APPENDIX 1-1

Final Permit and Rationale
U.S. MCB Hawaii MS4 No. HI S000007
Effective Date of Permit: October 15, 2014

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
EMD/CWB

09013PST.14

September 15, 2014

Mr. Douglas J. Wadsworth
Chief of Staff
U.S. Marine Corps, Marine Corps Base Hawaii
Box 63002, Building 1360
MCBH Kaneohe Bay, HI 96863-3002

Attention: Mr. Jeff Larson
Environmental Division

Dear Mr. Wadsworth:

Subject: Final Permit and Rationale
National Pollutant Discharge Elimination System (NPDES) Application for U.S. Marine Corps Base Hawaii Municipal Separate Storm Sewer System
MCBH Kaneohe Bay, Island of Oahu, Hawaii
Permit No. HI S000007

In accordance with the provisions of the Clean Water Act, Hawaii Revised Statutes, Chapter 342D; and Hawaii Administrative Rules, Chapters 11-54 and 11-55, Department of Health (DOH), the DOH has reviewed the following application for a National Pollutant Discharge Elimination System (NPDES) permit to discharge storm water runoff, including certain non-storm water discharges from the municipal separate storm sewer system, and storm water associated with industrial activity:

Facility	Permit No.
U.S. Marine Corps Base Hawaii Municipal Separate Storm Sewer System (MS4)	**HI S000007**

A public notice of our proposed action was published in the ***Honolulu Star-Advertiser*** on **July 3, 2014**.

After consideration of the expressed views of all interested persons and agencies received during the public notice, pertinent Federal and State statutes and rules regarding the discharge, the DOH hereby issues the enclosed NPDES permit for the discharge referred to above. This action does not constitute a significant change from the tentative determination set forth in the public notice. Responses to the comments received during the public comment period are provided in the enclosed.

This permit will take effect on **October 15, 2014.**

Please complete the DOH Customer Satisfaction Survey regarding your experience in applying for this permit. This brief survey is available on the e-Permitting Portal located at: https://eha-cloud.doh.hawaii.gov/epermit/View/home.aspx. Please use the Application Finder button and search for the "Customer Satisfaction Survey."

Should you have any questions, please contact Mr. Scott Takamoto of the Engineering Section, CWB, at 586-4309.

Sincerely,

STUART YAMADA, P.E., CHIEF
Environmental Management Division

ST:tg

Enclosures:
1. NPDES Permit
2. Rationale
3. DOH Response to comments, dated September 8, 2014

c: Water Division (WTR-5), CWA Standards and Permits Office, EPA, Region 9
(w/encls.) [via e-mail sablad.elizabeth@epa.gov only]
Mr. Jeff Larson, MCBH, Environmental Division
(w/encls.) [via e-mail Jeffrey.Larson@usmc.mil only]

PERMIT NO. HI S000007

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. §1251 et. seq.; the "Act"); Hawaii Revised Statutes, Chapter 342D; and Hawaii Administrative Rules (HAR), Department of Health (DOH), State of Hawaii, Chapters 11-54 and 11-55;

MARINE CORPS BASE HAWAII (MCBH), KANEOHE BAY

(PERMITTEE)

is authorized to discharge storm water runoff and certain non-storm water discharges as identified in Part B.2. of this permit from the MCBH, Kaneohe Bay Municipal Separate Storm Sewer System (MS4); storm water runoff from industrial sites; and additional storm sewer outfalls that may be identified from time to time by the Permittee,

into Kaneohe Bay (class AA), Nuupia Ponds (class 1), Kailua Bay (class A), and Mokapu Central Drainage Channel (class AA/2), Island of Oahu, Hawaii,

in accordance with the general requirements, discharge monitoring requirements, and other conditions set forth herein, and in the attached DOH "Standard NPDES Permit Conditions," that is available on the DOH, Clean Water Branch (CWB) website at http://health.hawaii.gov/cwb/files/2013/05/StandardNpdesPermitConditions.pdf.

All references to Title 40 of the Code of Federal Regulations (CFR) are to regulations that are in effect on July 1, 2014, except as otherwise specified. Unless otherwise specified herein, all terms are defined as provided in the applicable regulations in Title 40 of the CFR.

This permit will become effective on October 15, 2014.

This permit and the authorization to discharge will expire at midnight, **September 14, 2019**.

Signed this 15th day of September, 2014.

(For) Director of Health

FINAL PERMIT
September 15, 2014

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ATTACHMENT: STANDARD NPDES PERMIT CONDITIONS (VERSION 14). In case of conflict between the conditions stated in this permit and those specified in the Standard NPDES Permit Conditions, the more stringent conditions shall apply.

Part A. GENERAL REQUIREMENTS

The Permittee shall:

Part A.1. Comply with the existing Storm Water Management Plan (SWMP) until submittal of the revised SWMP to the DOH; and future activities as identified in its last submitted Annual Report. The revised SWMP shall be implemented upon submittal to the DOH.

Part A.2. Comply with all requirements in this permit, until its termination. In case of conflict with any requirements, the more stringent requirement shall apply.

Part A.3. Retain a copy of this permit and all other related materials and the SWMP, with all subsequent revisions, at designated location as identified in the SWMP.

Part A.4. Ensure that anyone working under this permit complies with the terms and conditions of this permit.

Part A.5. Include the permit number, **HI S000007**, and the following certification with all information required under this permit:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Part A.6. All “Plans” (e.g., SWMP Plan, Enforcement Response Plan, Trash Reduction Plan, Plan for Requiring Low Impact Development (LID) in its Standards; etc.) shall be available (e.g., on Permittee’s website or other means) for a minimum of 30 calendar days for public review and comment. The Permittee shall notify DOH by email at cleanwaterbranch@doh.hawaii.gov of the availability of the plan within five (5) calendar days of the plan being available. The Permittee shall address all comments received within the 30-calendar-day period and provide both comments and responses to the DOH with its submittal of the Plan in

accordance with the deadline as specified in Part H. All Plans shall be implemented upon submittal regardless of DOH's review and acceptance. If any deficiencies are found by the DOH after submittal, the Permittee shall correct the deficiencies to the DOH's satisfaction within 30 calendar days or such other time as agreed to in writing and resubmit the plan. In addition to the Plans being available for public comment, the current/existing plans shall also be accessible for public viewing.

Part A.7. All information and reports required under this permit and updates to information on file shall be submitted through the CWB Compliance Submittal Form for Individual NPDES Permits and Notice of General Permit Coverages (NGPCs). This form is accessible through the e-Permitting Portal website at: https://eha-cloud.doh.hawaii.gov/epermit/View/home.aspx. If not already registered, you will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool to locate the form. Follow the instructions to complete and submit this form. All submissions shall include a CD or DVD containing the downloaded e-Permitting submission and a completed Transmittal Requirements and Certification Statement for e-Permitting NPDES/NGPC Compliance Submissions Form, with original signature and date.

Part B. DISCHARGE LIMITATIONS

Part B.1. The Permittee shall effectively prohibit non-storm water discharges through its separate storm sewer system into State Waters and from its facilities discharging directly to State Waters or through a non-Permittee-owned MS4. National Pollutant Discharge Elimination System (NPDES) permitted discharges and non-storm water discharges identified in Part B.2 of this permit are exempt from this prohibition.

Part B.2. The following non-storm water discharges may be discharged into the Permittee's MS4 provided that the discharge is identified below, and meets all conditions when specified by the Permittee. In the event that any of the non-storm water discharges listed below is determined to be a source of pollution by the Permittee, the discharge will no longer be allowed.

- Water line flushing;
- Landscape irrigation;
- Diverted stream flows;
- Rising ground waters;
- Uncontaminated ground water infiltration (as defined in 40 CFR §35.2005(20));
- Uncontaminated pumped ground water, not including construction related dewatering activities;
- Discharges from potable water sources and foundation drains;
- Air conditioning condensate;
- Irrigation water;
- Springs;
- Water from crawl space pumps, uncontaminated water from utility manholes or boxes, and footing drains;
- Lawn watering runoff;
- Water from individual residential car washing;
- Water from charity car washes;
- Flows from riparian habitats and wetlands;
- Dechlorinated swimming pool discharges;
- Exterior building wash water (water only);
- Residual street wash water (water only), including wash water from sidewalks, plazas, and driveways, but excluding parking lots; and
- Discharges or flows from firefighting activities.

The Permittee may also develop a list of other similar occasional incidental non-storm water discharges (e.g., non-commercial car washes, etc.) that will not be addressed as illicit discharges. These non-storm water discharges must not be reasonably expected (based on the information available to the Permittee) to be significant sources of pollutants to the MS4, because of either the nature of the discharges or conditions the Permittee has established for allowing these discharges to the MS4 (e.g., non-commercial car wash with appropriate controls on frequency, proximity to sensitive water bodies, Best Management Practices (BMPs) for the wash water, etc.). The Permittee shall document in the SWMP any local controls or conditions placed on the discharges, and include a provision prohibiting any individual non-storm water discharge that is determined to be contributing pollutants to the MS4.

Part B.3. The discharge of pollutants from the Permittee's MS4 shall be reduced to the Maximum Extent Practicable (MEP), consistent with Section 402(p)(3)(B) of the Act. The intent of this permit, and the provisions herein, is for the Permittee to develop, achieve, and implement a timely, comprehensive, cost-effective SWMP to reduce the discharge of pollutants to the MEP from the Permittee’s MS4 to waters of the State. MEP is a dynamic performance standard and evolves as knowledge of urban runoff control measures increases.

Part B.4. The discharge of pollutants from the Permittee's facilities classified as Industrial in accordance with 40 CFR §122.26(b)(14) shall be reduced to the appropriate discharge limitations subject to the Best Available Technology currently available (BAT)/ Best Conventional Pollutant Control Technology (BCT) discharge requirement, consistent with the Act and other respective federal and state requirements for such facilities.

Part C. RECEIVING WATER LIMITATIONS, INSPECTIONS, AND CORRECTIVE ACTIONS

Part C.1. The discharge shall comply with the basic water quality criteria which states:

"All waters shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including:

Part C.1.a. Materials that will settle to form objectionable sludge or bottom deposits;

Part C.1.b. Floating debris, oil, grease, scum, or other floating materials;

Part C.1.c. Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to produce objectionable color, turbidity or other conditions in receiving waters;

Part C.1.d. High or low temperatures; biocides; pathogenic organisms; toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water;

Part C.1.e. Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life; and

Part C.1.f. Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works; highways; subdivisions; recreational, commercial, or industrial developments; or the cultivation and management of agricultural lands."

Part C.2. The discharge shall not cause or contribute to a violation of any of the applicable beneficial uses or water quality objectives contained HAR, Chapter 11-54, titled "Water Quality Standards."

Part C.3. During inspections/screenings as required by this permit, the Permittee shall also visually inspect the receiving state waters, effluent, and control measures and BMPs to detect violations of, and conditions which may cause violations of, the basic water quality criteria as specified in HAR, Section 11-54-4. (e.g., the Permittee shall look at effluent and receiving state waters for turbidity, color, floating oil and grease, floating debris and scum, materials that will settle, substances that will produce taste in the

water or detectable off-flavor in fish, and inspect for items that may be toxic or harmful to human or other life).

Part C.4. The Permittee shall immediately take action to stop, reduce, or modify the discharge of pollutants as needed to stop or prevent a violation of the basic water quality criteria as specified in HAR, Section 11-54-4.

Part C.5. For TMDLs adopted by DOH and approved by the EPA, the Permittee shall demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document within the timeframe as specified in its Implementation and Monitoring (I&M) Plan.

Part D. STORM WATER MANAGEMENT PLAN (SWMP)

Part D.1. Development, Improvement, Implementation and Enforcement of SWMP

The Permittee shall further develop and improve, implement, and enforce a SWMP designed to address the requirements of this permit and reduce, to the MEP, the discharge of pollutants to and from its MS4 to protect water quality and to satisfy the appropriate water quality requirements of the Act. The SWMP shall include the following information for each of the SWMP components described in Part D.1.a to Part D.1.g below:

- The BMPs, including the underlying rationale that will be implemented for each of the program components.
- The measurable standards and milestones for each of the BMPs, including the underlying rationale and interim measures to aid in determining the level of effort and effectiveness of each program component.
- The name or position title and of the person or persons responsible for implementation or coordination of each program component.
- A monitoring program to determine effectiveness of the controls and the overall storm water program.

Submittal Date - The SWMP shall be: updated and modified per the requirements of this permit; consistent with the format of this permit; submitted to the DOH in accordance with Part A.6 within 18 months after the effective date of this permit, or as otherwise specified; and fully implemented upon submittal. The Permittee shall implement the existing SWMP until submittal of the revision. The SWMP and any of its revisions, additions, or modifications are enforceable components of this permit.

Part D.1.a. Public Education and Outreach

The Permittee shall further develop and implement a comprehensive education and involvement program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water as well as enabling the public to identify and report a pollution-causing activity (i.e., spotting an illicit discharge) and the steps that the public can take to reduce pollutants in storm water runoff. The program should create: positive changes in attitude, knowledge, and

awareness; BMP implementation; pollutant load reduction; and an improvement in discharge and receiving water quality. The SWMP shall include a written public education plan for how the Permittee will reach all targeted audiences and implement the permit requirements described below. The Permittee may fulfill portions of this requirement by cooperating with other MS4 storm water public education programs.

Part D.1.a.(1) *Targeted Groups* - The Permittee shall address the following targeted groups in the Base-wide Awareness Plan with appropriate messages, and describe outreach activities and anticipated frequencies that each activity will be conducted over the permit term:

- Military personnel and dependents that work or live on base;
- Civilian personnel that work on base;
- Construction and maintenance contractors that work on base;
- Landscaping personnel and contractors;
- Construction Industry;
- Industrial facilities covered by the NPDES permit program;
- Commercial businesses (i.e., automobile detailing, automobile repair and maintenance, retail gasoline outlets, and restaurants, including those types of businesses highly ranked, pursuant to Part D.1.g.(4);
- Schools, recreational facilities;
- Any other source that the Permittee determines may contribute a significant pollutant load to its Small MS4.

Part D.1.a.(2) *Outreach Activities – The Permittee shall include in the Base-wide Awareness Plan the following activities, with prescribed frequencies that each activity will be conducted over the permit term:*

- Publicize the telephone numbers for facilities and on-base personnel to report illegal discharges;
- Distribution of brochures to the residential community and industrial/commercial facilities;
- Participation in special events (e.g., Earth Day Educational Events) and exhibits;
- An informative web site, that provides educational materials/information for residents and commercial tenants regarding storm water pollution, storm water pollutant controls and best management practices, and applicable storm water rules and regulations at the Facility. The website shall also provide links to a copy of the SWMP, the most recent storm water annual report, a

copy of this permit, and telephone numbers and email address to report illegal storm water activity. Any public meetings regarding storm water policy, regulations, or the SWMP shall also be posted with the applicable date, time, and location;

- Pesticides, herbicides, and fertilizer use program;
- The promotion of water conservation;
- Storm drain stenciling or marker installation;
- Proper disposal of grass clippings, leaves, and other green waste;
- A hazardous waste information and awareness program to promote awareness of proper disposal and handling of hazardous waste by residents and tenants (i.e., household chemicals, used oil, automotive fluids, paint, pesticides, and other toxics); and
- If determined to be necessary by the Permittee, public meetings/resident panels to discuss storm water management policies.

Information regarding: hazardous waste disposal; the proper disposal of grass clippings, leaves, and other green wastes; a link to the storm water website; and a phone number and email address to report illegal storm water activity shall be provided to all new residents and tenants on the Facility.

Part D.1.a.(3) *Evaluation Methods* - The Permittee shall evaluate the progress of the public education program based on the following:

- Annual survey of Facility residents and tenants to measure both behavior and knowledge relating to storm water. The surveys can be conducted in person at events, on the phone, or using Web-based survey tools. The results of the survey shall be compared to past surveys.
- Number of brochures distributed.
- Participation in events.
- Volunteer hours.
- Any other methods that the Permittee determines to be effective.

The results of the evaluation shall be summarized in the Annual Report.

Part D.1.b. Public Involvement/Participation

The Permittee shall include the public in developing, reviewing, and implementing the SWMP. The draft and final SWMP shall be made

available to the public (e.g., on Permittee's website) and at local offices. An informational meeting shall be scheduled and announced prior to finalizing the SWMP to solicit comments and answer questions from the public. Other activities to involve the public may include providing volunteer opportunities that improve water quality, organizing a citizen advisory group to solicit ongoing input from the public about changes to the SWMP and specific SWMP-related projects, or organizing clean-up events to educate the public about impacts of storm water.

Part D.1.c. Illicit Discharge Detection and Elimination (IDDE)

The Permittee shall implement the ongoing SWMP to detect and eliminate illicit connections and illegal discharges into its MS4 and shall include an improved program in the revised SWMP Plan. The program shall include:

Part D.1.c.(1) *Connection Permits for private drain connections* - Within one (1) year after the effective date of this permit the Permittee shall establish requirements for issuing connection permits and require obtaining the permit prior to allowing the drain connections. A database shall be maintained of all permitted connections to its MS4. Prior to issuing a connection permit, the Permittee shall ensure the following are met:

- the project has provided proof of filing a Notice of Intent (NOI) or NPDES application, if applicable; and
- control measures comply with its requirements to minimize pollutant discharge into its MS4.

Part D.1.c.(2) *Field Screening* - The Permittee shall implement an Outfall Field Screening Plan for observing major and minor outfalls to screen for improper discharges. The plan shall designate priority areas for screening, specify the frequency for screening, and identify the procedures to be followed if a discharge is observed. If any outfall locations are submerged at the time of inspection, the monitoring personnel shall inspect the discharge line (or contributing tributary lines), at the closest location(s) upstream of the discharge location and outside tidal influence. At a minimum, outfalls in priority areas shall be screened once per permit term.

Part D.1.c.(3) *Tracking* - The Permittee shall maintain a database of complaints, illicit connections, illegal discharges, and spills which tracks the location of the discharge by Tax Map Key (TMK), type of discharge, responsible

party, the Permittee's investigation and response of the discharge, follow-up activities, and the resolution of each discharge to the MS4.

Part D.1.c.(4) *Complaint Investigation* - The Permittee shall promptly investigate observed, suspected, or reported illicit flows and pursue enforcement actions, as appropriate. Complaints made to the CWB, which discharge to the Permittee's MS4 will be forwarded to the Permittee for action. The Permittee shall:

(i) Develop and implement a database to identify illicit discharge activities by TMK. The database shall include information about each suspected improper discharge, the Permittee's investigation of that discharge, follow-up activities, and the resolution of each discharge as required in Part D.1.c.(3) above;

(ii) Implement a program to facilitate public reporting of illicit discharges (i.e., environmental hotline and/or website for reporting), including providing at least one (1) contact that the public can reach (including phone number and/or email address). This contact information shall be clearly posted on its website; and

(iii) Develop and implement a response plan for the investigation of illicit discharges to be consistent with the requirements in this permit.

Part D.1.c.(5) *Enforcement* - Within one (1) year after the effective date of this permit, the Permittee shall:

(i) Establish policies for enforcement and penalties for entities found to be in noncompliance with requirements developed in accordance with Part D.1.c.(1), including for persons illegally discharging pollutants to its MS4, and

(ii) Pursue enforcement actions against entities in non-compliance with its requirements, with illegal drain connections, and illegally discharging pollutants to its MS4 without direct connections.

Part D.1.c.(6) *Spill Prevention and Response* - The Permittee shall implement its ongoing SWMP to prevent, respond to, contain, and clean up all wastewater and other spills that may enter its MS4 from any source (including private laterals and failing cesspools). This program shall be

included in the SWMP. Spill response teams, which may consist of local, state, and/or federal agencies, shall prevent entry of spills into the Permittee's MS4 and contamination of surface water, ground water, and soil to the MEP.

The Permittee shall coordinate spill prevention, containment, and response activities throughout all appropriate departments, programs, and agencies to ensure maximum water quality protection at all times.

The Permittee shall notify DOH of all wastewater spills or overflows from private laterals and failing septic systems into its MS4. The Permittee shall prevent, respond to, contain, and clean up wastewater from any such notification.

Part D.1.c.(7) *Used Oil and Toxic Materials Disposal* - The Permittee shall implement its ongoing SWMP to facilitate the proper management and disposal or recycling of used oil, vehicle fluids, toxic materials, and other household hazardous wastes. Such a program shall include educational activities, public information activities, and identification of collection sites or methods.

Part D.1.c.(8) *Training* - The Permittee shall provide annual training to staff on identifying and eliminating illicit connections, illegal discharges, and spills to its MS4. This training shall be specific to the Permittee's activities, policies, rules, and procedures.

Part D.1.d. Construction Site Runoff Control

The Permittee shall implement a construction site management program to reduce to the MEP the discharge of pollutants from both private and public construction projects (i.e., contract, in-house, maintenance, and encroachment). The construction site management program shall include the following minimum elements:

Part D.1.d.(1) *Requirement to develop BMPs Manuals* - Within two (2) years from the effective date of this permit, the Permittee shall develop and submit to the DOH, the following types of manuals for construction projects:

- Construction Best Management Practices Field Manual.
- Maintenance Activities Best Management Practices Field Manual.
- Storm Water Permanent Best Management Practices Manual.

The Permittee shall review these standards annually and, as necessary, revise to include descriptions of new or modified BMPs, including permanent BMPs and LID practices. All revisions made during a calendar year shall be discussed in its corresponding Annual Reports and all documents included in the SWMP Plan. All documents shall be made available to the Permittee's staff, contractors, and consultants, as appropriate.

Part D.1.d.(2) *Requirement to implement BMPs* - Within three (3) years from the effective date of this permit, the Permittee shall establish policies to require proposed construction projects to implement BMPs and standards described in the following:

- Construction Best Management Practices Field Manual.
- Maintenance Activities Best Management Practices Field Manual.
- Storm Water Permanent Best Management Practices Manual.

Part D.1.d.(3) *Inventory of construction sites* - Within six (6) months from the effective date of this permit, the Permittee shall implement a system to track both private and public construction projects (i.e., contract, in-house, maintenance, and encroachment). This system shall track information on the project (including permit or file number, if available); status of plan review and approval, inspection dates, and if applicable, enforcement actions; and whether the project has applied for coverage under HAR, Chapter 11-55, Appendix C, NPDES General Permit Authorizing the Discharge of Storm Water Associated with Construction Activity (a.k.a. General Construction Activity Storm Water permit) (unless the project will disturb less than one acre of land) and satisfied any other applicable requirements of the NPDES permit program (i.e., an individual NPDES permit).

Part D.1.d.(4) *Plan Review and Approval* - The Permittee shall:

(i) Review the appropriate Storm Water Pollution Prevention Plan (SWPPP) and other pollution prevention measures (e.g., for Erosion and Sediment Control, Grading, Post-construction BMP and Landscaping) or similar plans/documents prior to approval of the construction plans and specifications. The Permittee shall verify that the SWPPP meets the following requirements:

- HAR, Chapter 11-55, Appendix C, and any other requirements under the NPDES permit program, as applicable;

- Construction Best Management Practices Field Manual (after developed);
- Maintenance Activities Best Management Practices Field Manual (after developed);
- Storm Water Permanent Best Management Practices Manual (after developed); and
- Implementation of measures to ensure that the discharge of pollutants from the site will be reduced to the appropriate discharge limitations subject to the BAT/BCT discharge requirement, consistent with the Act and other respective federal and state requirements for such facilities and will not cause or contribute to an exceedance of water quality standards.

(ii) Require a permit or written equivalent approval for drainage connections to its MS4, discharge of surface storm water runoff of storm water associated with construction (i.e., from both private and public projects) or discharge permit (i.e., hydrotesting and dewatering effluent or other non-storm water, except those allowed under this permit) into their MS4 and maintain a database of the permits/approvals. Prior to issuing a drainage connection, discharge of surface runoff permit/approval, discharge permit, or encroachment permit, the Permittee shall ensure that the following are met:

- The project owner has provided proof of filing an NOI Form C or NPDES application for the discharge of storm water associated with construction activities that disturb one (1) acre or more;
- The project owner has provided proof of filing a NOI Form F and/or G or NPDES application for the discharge of hydrotesting effluent or construction dewatering effluent, respectively, if applicable; and
- A SWPPP or other documents (e.g., Erosion and Sediment Control, Grading, Post-construction BMP and Landscaping Plans, Dewatering Plan, and Hydrotesting Plan) relating to pollution prevention or similar document(s) have been reviewed and accepted by the Permittee;

(iii) Prohibit the commencement of construction on any private or public construction project (i.e., contract, in-house, maintenance, and encroachment) unless and until it has verified that the project

has received from DOH a Notice of General Permit Coverage (NGPC) under HAR, Chapter 11-55, Appendix C, NPDES General Permit Authorizing the Discharge of Storm Water Associated with Construction Activity (General Construction Activity Storm Water permit) (unless the project will disturb less than one (1) acre of land) and satisfied any other applicable requirements of the NPDES permit program (i.e., an individual NPDES permit);

(iv) Update and submit for review and acceptance to the DOH, a plan review checklist that its reviewers shall use in evaluating the plans and BMPs or other similar document(s) which have been implemented pursuant to this Part [i.e., Part D.1.d] within 90 calendar days from the effective date of this permit. Copies of this plan review checklist shall be provided to applicants for connection, discharge, and encroachment permits; and to consultants and contractors for their use in developing the Plans or other similar document(s) for Permittee-contracted construction projects. The plan review checklist shall include at a minimum, but not be limited to, comments on any deficiencies and the date when comments were addressed to the satisfaction of the Permittee. A system shall be implemented to ensure all comments, identified during the review process has been properly addressed.

Part D.1.d.(5) *Inspections* – The Permittee shall:

(i) Prior to the initiation of ground-disturbing activities at any site, except for activities associated with the installation of BMPs at a site, an engineer or qualified inspector employed or retained by the Permittee who reviews and becomes familiar with the project's SWPPP and/or other equivalent document(s), shall inspect the site to verify BMPs as required by the BMP Plan and/or other documents have been installed correctly and in the correct locations prior to the commencement of ground-disturbing activity. Inspections shall include a review of site Erosion and Sediment Controls, good housekeeping practices, and compliance with Permittee-accepted erosion and sediment control plans, construction BMPs Plans, or other similar documents and Permittee-approved permits. The inspector shall also identify and remedy any site conditions having the potential for erosion and

sediment runoff, including other pollutant discharges which may occur as a result of the project's construction activities.

(ii) In addition to inspections required by the NPDES permit program, all contract, in-house and maintenance construction projects shall be inspected at least monthly by a qualified construction inspector who is independent (i.e., not involved in the day-to-day planning, design, or implementation) of the construction projects to be inspected. The Permittee may use more than one (1) qualified construction inspector for these inspections. The reporting procedures shall include, at a minimum, notification of any critical deficiencies to the DOH. Upon three (3) successive monthly inspections that indicate, in total, no critical or major deficiencies or less than six (6) minor deficiencies with no more than three (3) minor deficiencies in one (1) month in a project's BMPs or other storm water management activities, the Permittee may decrease the inspection frequency for such project to quarterly. However, if while under a quarterly inspection frequency, an inspection of a project conducted pursuant to this paragraph indicates at least one (1) critical or major deficiency or a total of three (3) or more minor deficiencies in the project's BMPs or other storm water management activities, the inspections frequency shall immediately return to no less than monthly. This reduced inspection frequencies option is contingent upon the Permittee having defined each type (i.e., critical, major, or minor) of deficiency. The Permittee shall further develop and implement written procedures for appropriate corrective actions and follow-up inspections when deficiencies had been identified at an inspected project. The corrective action procedures shall, at a minimum, require that 1) any critical deficiencies shall be corrected or addressed before the close of business on the day of the inspection at which the deficiency is identified, and 2) any major deficiencies shall be corrected or addressed as soon as possible, but in no event later than five (5) calendar days after the inspection at which the deficiency is identified or before the next forecasted precipitation, whichever is sooner.

(iii) All construction projects with a connection permit, encroachment permit, or discharge of surface runoff permit/approval shall be inspected at least once annually or once during the life of the project, whichever comes first, by a qualified construction inspector who is independent (i.e., not involved in the day-to-day

planning, design, or implementation) of the construction projects to be inspected. The Permittee may use more than one (1) qualified construction inspector for these inspections. If the project has a SWPPP or other equivalent document(s), the inspection shall also verify that the BMPs were properly installed and at the locations specified in the Plan. The reporting procedures shall include, at a minimum, notification of any critical deficiencies to the DOH.

(iv) The Permittee shall develop and implement a standard inspection form(s); reporting and corrective procedures for inspections, including use of an inspection checklist, or equivalent; and a database or equivalent system to track inspection results. The inspection checklist shall include at a minimum, but not be limited to, identifying any deficiencies and the date of the corrective actions. Photos shall accompany the inspection checklist to document the deficiencies. The inspection form(s), inspection checklist, and reporting and corrective procedures shall be submitted to the DOH for review and acceptance within 90 calendar days of the effective date of this permit.

Part D.1.d.(6) *Enforcement* – Within one (1) year from the effective date of this permit, the Permittee shall:

(i) Establish policies for enforcement and penalties for those in non-compliance with Part D.1.d.(2) requiring the implementation of standards, and

(ii) Develop and implement an Enforcement Response Plan to include written procedures for appropriate corrective and enforcement actions, and follow-up inspections when an inspected project is not in full compliance with its requirements, other permits, and any other applicable requirements under the NPDES permit program.

Part D.1.d.(7) *Process to refer noncompliance and non-filers to the DOH* - In the event the Permittee has exhausted its use of sanctions and cannot bring a construction site or construction operator into compliance with its policies, standards, or this permit, or otherwise deems the site poses an immediate and significant threat to water quality, the Permittee shall provide an e-mail notification to cleanwaterbranch@doh.hawaii.gov, Attn: Enforcement Section

Supervisor within one (1) week of such determination. E-mail notifications shall be followed by written notification in accordance with Part A.6. and include a copy of all inspection checklists, notes, and related correspondence in pdf format (300 minimum dpi) within two (2) weeks of the determination. In instances where an inspector identifies a site that has not applied for permit coverage under the NPDES permit program, the Permittee shall provide written notification in accordance with Part A.6 to the DOH within two (2) weeks of the discovery.

Part D.1.d.(8) *Training* - The Permittee shall provide annual training on the Construction BMPs Program Plan to all staff with construction storm water responsibilities, including construction engineers, construction and maintenance inspectors, and plan reviewers. This training shall be specific to the Permittee's activities (including the proper installation and maintenance of accepted BMPs), policies, rules and procedures.

Part D.1.d.(9) *Education* - The Permittee shall implement an education program as part of its ongoing SWMP to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the storm water requirements they need to implement.

Part D.1.e. Post-Construction Storm Water Management in New Development and Redevelopment

The Permittee shall further develop, implement, and enforce a program to address storm water runoff from all (i.e., both private and public) new development and redevelopment projects that result in a land disturbance of one (1) acre or more and smaller projects that have the potential to discharge pollutants to the Permittee's MS4. The Permittee's program must ensure that permanent controls are in place to prevent or minimize water quality impacts to the MEP. The Permittee shall review and update, as necessary, the criteria defining when and the types of permanent post-construction BMPs, including, among other measures, LID techniques, that must be included in a project design to address storm water impacts and pollutants of concern. For State waters on the State CWA Section 303(d) list or State established and EPA approved Total Maximum Daily Loads (TMDLs), the pollutants of concern to be targeted shall include the parameters causing impairment. The Permittee shall consider trash reduction techniques to comply with short and long term plans as

required in Part D.1.f.(1)(v). The program shall include, at a minimum, the following elements:

Part D.1.e.(1) *Standards Revision* – The Permittee shall revise its standards for addressing post-construction BMPs to LID requirements. Within six (6) months of the effective date of this permit, the Permittee shall submit to the DOH for review and acceptance, a plan for requiring LID in the standards to the MEP, including revisions to the plan review and inspection checklist to include LID. LID refers to storm water management practices which seek to mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating storm water runoff close to its source. The standards shall ensure that the management practices are prioritized to favor infiltration, evapotranspiration, or harvesting/reuse of stormwater followed by other practices that treat and release stormwater. The standards shall be applicable to all construction projects disturbing at least one (1) acre and smaller projects that have the potential to discharge pollutants to the Permittee's MS4. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats storm water as a resource, rather than a waste product. LID treatment measures include harvesting and use, infiltration, evapotranspiration, or biotreatment. The plan for the implementation of LID provisions shall include at a minimum the following:

- Criteria for requiring implementation.
- Investigation into the development of quantitative criteria for a specific design storm to be managed by LID techniques. Examples of design storm requirements include: 24-hour, 85% storm through infiltration; on-site management of the first inch of rainfall within a 24-hour period; retention of the 100-year, 2-hour storm; or on-site management of the 24-hour, 95% storm.
- Feasibility criteria for circumstances in which a waiver could be granted for the LID requirements.
- When a LID waiver is granted, alternatives such as offsite mitigation and/or non-LID treatment control BMPs could be required.

A draft of the revised standards shall be submitted to the DOH in accordance with Part A.6 for review and acceptance within 12 months from the effective date of this permit and include, at a minimum, the

above. Within 18 months after the effective date of this permit, subject to adoption by rulemaking or other equivalent process, the revised standards shall be submitted to the DOH in accordance with Part A.6. To the extent that the revised standards have not been adopted, the Permittee shall submit a compliance schedule for adoption, which shall not exceed 24 months after the effective date of this permit.

Part D.1.e.(2) *Review of Plans for Post-Construction BMPs* – For design-bid-build projects, the Permittee shall not advertise any construction project nor award any construction contract until the project design has been reviewed and accepted to ensure that appropriate permanent post-construction BMPs, which include LID practices upon adoption into its standards, have been included in the project design and are included in the bid package to ensure compliance with this part of the permit. For design-build projects, the Permittee shall review and approve the project design the same as for design-bid-build projects prior to implementation. No project shall proceed without the inclusion of appropriate permanent post-construction BMPs unless a waiver is granted by the Permittee based on specific documentation demonstrating that such post-construction BMPs are not feasible. Project documents for projects that will include installation of permanent post-construction BMPs shall also include appropriate requirements for their future continued maintenance.

Part D.1.e.(3) *BMP, Operation and Maintenance, and Inspection Database* - The Permittee shall implement its Asset Management System to track the frequency of inspections and maintenance of the Permanent BMPs. In addition to the standard information collected for all projects (e.g., project name, owner, location, start/end date, etc.), the database shall also include, at a minimum:

- Type and number of LID practices.
- Type and number of Source Control BMPs.
- Type and number of Treatment Control BMPs.
- Latitude/Longitude coordinates of controls using Global Positioning Systems and NAD83 or other Datum as long as the datum remains consistent.
- Photographs of controls.
- Operation and maintenance requirements.
- Frequency of inspections.
- Frequency of maintenance.

All stormwater treatment and LID BMPs shall be inspected at least once a calendar year for proper operation; maintenance shall be performed as necessary to ensure proper operation.

Part D.1.e.(4) *Education* and *Training*

(i) *Project Proponents* - The Permittee shall provide education and outreach material for those parties who apply for permits (i.e., developers, engineers, architects, consultants, construction contractors, excavators, and property owners) on the selection, design, installation, operation and maintenance of storm water BMPs, structural controls, post construction BMPs, and LID practices. The outreach material may include a simplified flowchart for thresholds triggering permits and requirements, a list of required permits, implementing agencies, fees, overviews, timelines and a brief discussion of potential environmental impacts associated with storm water runoff.

(ii) *Inspectors* - All Permittee staff and contractors responsible for inspecting permanent post-construction BMPs and LID practices shall receive annual training.

Part D.1.f. Pollution Prevention/Good Housekeeping

The Permittee shall further develop and implement a system maintenance program to reduce to the MEP the discharge of pollutants from all Permittee-owned facilities, roads, parking lots, maintenance facilities, and the Permittee's MS4. The program shall include:

Part D.1.f.(1) *Debris Control BMPs Program Plan*

(i) *Asset Management System and Mapping* - The Permittee shall implement a comprehensive asset management system and map of its MS4, including structural and vegetative BMPs and an inventory of related appurtenances, including maintenance equipment, to ensure appropriate debris removal and system maintenance. The asset management system shall, at a minimum, assign an identification number for each drain inlet, outfall, and BMPs, and map their location on the Geographic Information System. The Permittee shall use this asset management system to establish priorities and to schedule and track efforts of appropriate system maintenance and debris

removal program activities such as street sweeping, catch basin cleaning, and green waste and accumulated soil removal. The SWMP shall include justification of its priorities applied to the asset management system on the basis of potential impacts to water quality.

(ii) *Inspection/Maintenance Schedule* - The Permittee shall include in its SWMP procedures, a schedule for inspections of:

a) All roadways for the purpose of identifying if sweeping of roadways, shoulders, and/or medians is needed; and

b) All storm drainage system catch basins, gutters and open ditches, trenches, and BMPs for the purpose of identifying if maintenance/cleaning of such structures are needed.

In both cases, the need for sweeping and/or maintenance/cleaning shall, at a minimum, be determined based upon material accumulation rates and/or potential threat of discharge to State waters that may have an effect on water quality. The schedule shall provide that each roadway mile, storm drainage feature, and BMP is inspected at least once during the term of this permit (maintenance/cleaning may be conducted in lieu of inspections to satisfy this requirement). The adopted procedures shall provide for the identification of roadway segments and their associated storm drainage features and BMPs that may require more frequent sweeping and/or structure cleaning based upon material accumulation rates and potential threat of discharge to State waters that may have an effect on water quality. The procedures shall establish debris accumulation thresholds above which sweeping and/or structure cleaning must occur. The priority-based schedule shall be annually reviewed; updated as necessary; and the changes, along with explanations of the changes submitted within the Annual Report.

(iii) *Storm Drain Placards* - The Permittee shall install placards on its drainage inlets; evaluate the effectiveness of the placards; and revise as necessary to meet its purpose. The purpose of the placards shall be discussed within the SWMP. A minimum of 50 new placards shall be installed per year. Priority shall be given to the Permittee's industrial and commercial areas and areas with pedestrian traffic. The Permittee shall implement its system to

track placement of placards and procedures for maintenance staff to inspect and replace, as necessary, placards during routine maintenance activities.

(iv) *Action Plan for Retrofitting Structural BMPs* – The Permittee shall provide the DOH with an Action Plan for Retrofitting Structural BMPs within one (1) year from the effective date of this permit, which shall identify retrofits to be implemented, and include an explanation of the basis for their selection and an implementation schedule. The implementation schedule shall cover a five (5) year period and be updated annually to include additional retrofit projects with water quality protection measures. The annual updates to the implementation schedule shall be included in the Annual Report with a description of the projects status. The Action Plan may include, but not be limited to projects in compliance with any TMDL implementation and monitoring plan.

(v) *Trash Reduction Plan* - Within three (3) years from the effective date of this permit, the Permittee shall develop and submit to the DOH for review and acceptance, a trash reduction plan which assesses the issue, identifies and implements control measures, and monitors the control measures to reduce trash loads from the MS4. The plan shall include, at a minimum and be formatted consistent with the following:

- Quantitative estimate of the debris currently being discharged (baseline load) from the MS4, including methodology used to determine the load.
- Description of control measures currently being implemented as well as those needed to reduce debris discharges from the MS4 consistent with short-term and long-term reduction targets.
- A short-term plan and proposed compliance deadline for reducing debris discharges from the MS4 by 50% from the baseline load.
- A long-term plan and proposed compliance deadline for reducing debris discharges from the MS4 to zero.
- Geographical targets for trash reduction activities with priority on waterbodies listed as impaired for trash on the State's CWA Section 303(d) list.
- Trash reduction-related education activities as a component of Part D.1.a.

- Integration of control measures, education and monitoring to measure progress toward reducing trash discharges.
- An implementation schedule.
- Monitoring plan to aid with source identification and loading patterns as well as measuring progress in reducing the debris discharges from the MS4.
- The Annual Report shall include a summary of its trash load reduction actions (control measures and best management practices) including the types of actions and levels of implementation, the total trash loads and dominant types of trash removed by its actions, and the total trash loads and dominant types of trash for each type of action.

The plan shall provide for compliance with the above short-term and long-term discharge limits in the shortest practicable timeframe.

Part D.1.f.(2) *Chemical Applications BMPs Program Plan*

(i) *Training* - The Permittee shall develop an Authorized Use List of chemicals used and implement a specific training program for all potential appliers (bulk and hand-held) of the chemicals (e.g., fertilizers, pesticides, and herbicides) on the proper application of the chemicals. The Permittee shall not permit the application of fertilizers, pesticides, or herbicides unless the applier has first received this training.

(ii) *Implement appropriate requirements for pesticide, herbicide, and fertilizer applications* - The Permittee shall implement BMPs to reduce the contribution of pollutants associated with the application, storage, and disposal of pesticides, herbicides, and fertilizers from Permittee-owned areas and activities to its MS4. Permittee-owned areas and activities include, at a minimum, federal facilities, right-of-ways, and landscaped areas.

Such BMPs shall include, at a minimum: 1) educational activities, permits, certifications and other measures for applicators; 2) integrated pest management measures that rely on non-chemical solutions; 3) the use of native vegetation; 4) chemical application, as needed; and 5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

The Permittee shall ensure that their employees or contractors or employees of contractors applying registered pesticides, herbicides, and fertilizers work under the direction of a certified applicator, follow the pesticide label, and comply with any other State, City, or Federal regulations for pesticides, herbicides, and fertilizers. All Permittee employees or contractors applying pesticides, herbicides or fertilizers shall receive training on the BMPs annually.

Part D.1.f.(3) *Erosion Control BMPs Program Plan* - The Permittee shall:

(i) Implement permanent erosion control improvements, ensuring that erosion-prone areas with the potential for significant water quality impact, but with limited public safety concerns, are also considered a high priority for remediation. Identification of erosion-prone areas with the potential for significant water quality impact shall include areas where there is evidence of rilling, gullying, and/or other evidence of significant sediment transport, and areas in close proximity to receiving waters listed as impaired by either sediment, siltation and/or turbidity. The Permittee shall include procedures to identify and implement erosion control projects based on water quality concerns while continuing to address high profile public safety projects.

(ii) Require the implementation of temporary erosion control measures (e.g., erosion control blankets and/or fabrics, gravel bag placement and silt fencing/fiber rolls) on erosion-prone areas with the potential for significant water quality impact if a permanent solution is not immediately possible. Notwithstanding any other implementation provisions, the SWMP shall require the implementation of such temporary erosion control measures on all applicable areas within 18 months from the effective date of this permit. For projects which require a CWA Section 401 Water Quality Certification (WQC), the WQC application shall be submitted to the DOH within one (1) year from the effective date of this permit and be implemented with six (6) months of the WQC or other regulatory permit(s) issuance date.

(iii) Develop a maintenance plan for vegetated portions of the drainage system used for erosion and sediment control, and LID features; including controlling any excessive clearing/removal, cutting of vegetation, and application of herbicide which affects its usefulness.

(iv) Provide the DOH with an Action Plan to address erosion at its storm drain system outlets with significant potential for water quality impacts to be completed within one (1) year from the effective date of this permit, which shall identify outfalls to be addressed, explanation on the basis of their selection and an implementation schedule. The implementation schedule shall cover a five (5) year period. A status report on implementation of the plan shall be included in the Annual Report. The Permittee shall install velocity dissipators or other BMPs to reduce erosion at locations identified by periodic required inspections.

(v) Submit a list of projects and an implementation schedule for permanent erosion control improvements as described in Part D.1.f.(3)(i) of this permit to the DOH within one (1) year from the effective date of this permit.

Part D.1.f.(4) *Maintenance Activities BMPs Program Plan*

(i) *Maintenance Activities Best Management Practices Field Manual* - The Permittee shall develop and implement a BMPs Field Manual for Maintenance Activities for all Marine Corps Base Hawaii maintenance activities within three (3) years from the effective date of this permit. Examples of such activities include, but are not limited to: paving and road repairs, street cleaning, saw cutting, concrete work, curb and gutter replacement, buried utility repairs and installation, vegetation removal, painting and paving, debris and trash removal, spill cleanup, etc. The Field Manual shall be updated as necessary or at least once per permit term and include written procedures to minimize pollutant discharge for maintenance activities which have the potential to discharge pollutants to its MS4.
The procedures shall ensure that appropriate BMPs are verifiable through field inspections (i.e., field inspectors can quickly determine if the appropriate BMPs have been implemented.

(ii) *Storm Water Pollution Control Plan (SWPCP)*. The Permittee shall implement and enforce the requirements of the SWPCP, as discussed in Part E.1. of this Permit.

(iii) *Training* - The Permittee shall further develop and provide annual training to staff on proper maintenance activities to prevent storm water pollution. The training shall cover the Field Manual, identify

potential sources of pollution, general BMPs that can be used to reduce and/or eliminate such sources, and specific BMPs for their activities. The training shall incorporate components of the public education campaign and educate staff that they serve a role in protecting water quality. Staff shall be made aware of the NPDES permit, the overall SWMP, and the applicable BMPs Program(s).

Part D.1.g Industrial and Commercial Activities Discharge Management Program

The Permittee shall develop and implement an industrial and commercial discharge management program to reduce to the MEP the discharge of pollutants from all industrial and commercial facilities and activities which initially discharge into the Permittee's MS4. At a minimum, the program shall include:

Part D.1.g.(1) *Requirement to Implement BMPs* - Require a permit or written equivalent approval for drainage connections and discharge of surface runoff into the MS4 and maintain a database of the permits/approvals. The permit/approval shall obligate the facility to implement BMPs.

Part D.1.g.(2) *Inventory and Map of Industrial Facilities and Activities* - The Permittee shall update and submit to the DOH, in electronic portable document format (pdf - minimum 300 dpi), the industrial facilities and activities inventory (industrial inventory), sorted by TMK, and map of such facilities and activities discharging, directly or indirectly, to its MS4.

The industrial inventory shall include the facility name, street address, TMK, nature of business or activity, Standard Industrial Classification (SIC) code(s) that best reflect the facility product or service, principal storm water contact, receiving State water, and whether an NGPC under HAR, Chapter 11-55, Appendix B, NPDES General Permit Authorizing the Discharge of Storm Water Associated with Industrial Activities (General Industrial Storm Water permit) or any other applicable NPDES permit has been obtained, including a permit or file number and issuance date.

At a minimum, the industrial inventory shall include facilities and activities such as:

- Municipal Landfills (open and closed).
- Hazardous waste recovery, treatment, storage and disposal facilities.

- Facilities subject to Section 313 of the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. 11023.
- Findings from follow-up investigations of the industrial facilities identified in the Questionnaire Survey.
- Facilities subject to NPDES permit coverage which are adjacent to the Permittee's facilities or discharge to the MS4.
- And any other industrial facility that either the Permittee or the DOH determines is contributing a substantial pollutant loading to the MS4.

Part D.1.g.(3) *Inventory and Map of Commercial Facilities and Activities* - The Permittee shall update and submit to the DOH, in pdf format (minimum 300 dpi), the commercial facilities and activities inventory (commercial inventory), sorted by priority areas, and map of such facilities and activities discharging, directly or indirectly, to its MS4 within its Annual Report. The commercial inventory update may be based on the collection of new information obtained during field activities or through other readily available intra-agency informational databases (e.g., business licenses, pretreatment permits, sanitary sewer hook-up permits).

The commercial inventory shall include, by priority area, the facility name, street address, TMK, nature of business or activity, SIC code(s) that best reflect the facility product(s) or service(s), principal storm water contact, and receiving State water.

At a minimum, the commercial inventory shall include facilities and activities such as:

- Findings from investigations of the commercial facilities identified in the Questionnaire Survey.
- Retail Gasoline Outlets.
- Retail Automotive Services, including Repair Facilities.
- Restaurants.
- Any other commercial facility that either the Permittee or the DOH determines is contributing pollutants to the MS4 that may cause or contribute to an exceedance of State water quality standards.

Part D.1.g.(4) *Prioritized Areas for Industrial and Commercial Facility and Activity Inspections* - The Permittee shall implement the Prioritized Areas for Industrial and Commercial Facility and Activity Plan. Under the Plan, the Permittee is to designate priority areas for industrial and

commercial facility and activity inspections, based on the relative risk that any discharge might be contaminated with pollutants.

Within 60 calendar days from the effective date of this permit, the Permittee shall submit a status report to the DOH. The status report shall identify the numbers of industrial and commercial facilities discharging into the Permittee's MS4 and the number of inspections that have been completed during the prior permit term. The status report shall be organized by priority area. On an annual basis, the Permittee shall modify the Plan based on updated information from its industrial and commercial inventory, findings from previous inspections, the number of industrial and commercial facilities in the area, the density of these facilities, previous storm water violations in the area, and water quality impairments in the area. The modified Plan shall set a schedule that ensures inspections will be completed in accordance with the schedule in Part D.1.g.(5). This Plan shall be submitted with the Permittee's Annual Report.

Part D.1.g.(5) *Inspection of Industrial and Commercial Facilities and Activities -* The industrial/commercial inspection program shall be implemented and updated as appropriate to reflect the outcomes of the investigations.

The Permittee shall ensure industrial and commercial facilities and activities identified in the industrial and commercial inventories required under Parts D.1.g.(2) and D.1.g.(3) are inspected and re-inspected as often as necessary based on its findings to ensure corrective action was taken and the deficiency was resolved.
At a minimum, the Permittee shall inspect each industrial facility that does not have NPDES permit coverage under the NPDES permit program at least twice every five (5) years, and each industrial facility that does have such NPDES permit coverage at least once every five (5) years. Any industrial facility discharging Industrial Storm Water (as defined by 40 C.F.R. Part 122.26(b)(14)) that does not have NPDES Permit coverage shall be reported to the DOH within 30 calendar days of the inspection. Commercial dischargers are to be ranked according to relative risk of discharge of contaminated runoff to the MS4. The highly ranked commercial facilities shall be inspected at least once every five (5) years.

All inspections shall be in accordance with the applicable portions (e.g., Chapter 11 – Storm Water) of the "NPDES Compliance

Inspection Manual" (EPA 305-X-04-001), dated July 2004. Inspectors shall be trained to identify deficiencies, assess potential impacts to receiving waters, evaluate the appropriateness and effectiveness of deployed BMPs, and require controls to minimize the discharge of pollutants to the MS4. The inspectors shall use an inspection checklist, or equivalent, and photographs to document site conditions and BMP conditions. Records of all inspections shall be maintained for a minimum of five (5) years, or as otherwise indicated.

The Permittee shall submit semi-annual inspection report(s) to the DOH by October 31st and April 30th for inspections done within the previous period.

Part D.1.g.(6) *Storm Water Pollution Control Plan (SWPCP) Review and Acceptance for Industrial Facilities* - The Permittee shall:

(i) Require Industrial Activities that initially discharge storm water into MCBH's Small MS4 to develop, implement, and update, as necessary, a SWPCP that meets MCBH's Standards and HAR Chapter 11-55, Appendix B, SWPCP requirements, which includes storm water monitoring;

(ii) Verify the facility owner has received NPDES permit coverage for the discharge of storm water associated with industrial activity or provided proof of filing a NOI, NPDES application, or NPDES "No Exposure;" and

(iii) Review for acceptance, the SWPCP and any revisions or updates or other plans relating to pollution prevention or similar document(s) to ensure the discharge of pollutants will be minimized to the maximum extent practicable.

Part D.1.g.(7) *Enforcement Policy for Industrial and Commercial Facilities and Activities* - Within one (1) year of the effective date of this permit, the Permittee shall establish and implement its own polices for enforcement and penalties for industrial and commercial facilities which have failed to comply. The policy shall be part of an overall escalating enforcement policy and must consist of the following:

- Conducting inspections.
- Issuance of written documentation to a facility representative within 30 calendar days of storm water deficiencies identified during

inspection. Documentation must include copies of all field notes, correspondence, photographs, and sampling results, if applicable.

- A timeline for correction of the deficiencies.
- Provisions for re-inspection and pursuing enforcement actions, if necessary.

In the event the Permittee has exhausted all available sanctions and cannot bring a facility or activity into compliance with its policies and this permit, or otherwise deems the facility or activity an immediate and significant threat to water quality, the Permittee shall provide e-mail notification to cleanwaterbranch@doh.hawaii.gov, Attn: Enforcement Section Supervisor within one (1) week of such determination. E-mail notification shall be followed by written notification and include a copy of all inspection checklists, notes, photographs, and related correspondence in pdf format (300 minimum dpi) in accordance with Part A.6 within two (2) weeks of the determination. In instances where an inspector identifies a facility that has not applied for the General Industrial Storm Water permit coverage or any other applicable NPDES permit, the Permittee shall provide email notification to the DOH within one (1) week of such determination.

Part D.1.g.(8) *Training* - The Permittee shall provide training to staff on how to conduct industrial and commercial inspections, the types of facilities requiring NPDES permit coverage for storm water permit associated with industrial activity or any other applicable NPDES permit, components in a SWPCP for industrial facilities, BMPs and source control measures for industrial and commercial facilities, and inspection and enforcement techniques. This training shall be specific to the Permittee's activities, policies, rules, and procedures. Any updates to the training shall be submitted to the DOH for review and acceptance within 90 calendar days of the change. Permittee inspectors shall receive annual training.

Part D.2. SWMP Modifications

The Permittee shall modify the SWMP as required when any of the following occur:

- Exceedance of any discharge limitation or water quality standard established in HAR, Section 11-54-4. The revisions shall include BMPs and/or other measures to reduce the amount of pollutants found to be in exceedance from entering State Waters.

- Change in conditions and incorporation of more effective approaches to pollutant control.
- System modifications, including any planned physical alterations or additions to the permitted MS4 and any existing outfalls newly identified over the term of the permit.

The Permittee shall properly address all modifications, concerns, requests, and/or comments to the satisfaction of the DOH and/or EPA. Minor changes may be proposed by the Permittee or requested by DOH or the EPA. Proposed changes that imply a major reduction in the overall scope and/or level of effort of the SWMP must be made for cause and in compliance with 40 CFR §122.62 and Part 124. A written report shall be submitted to the DOH for acceptance at least 30 calendar days prior to the initiation date of the major modification. The Permittee shall report and justify all other modifications made to the SWMP in its Annual Report for the year in which the modification was made.

Part E. INDUSTRIAL FACILITIES

Part E.1. The industrial facilities covered under this permit shall comply with the requirements in HAR, Chapter 11-55, Appendix B.

Building No.	General Category	Description
101	Maintenance	Maintenance Hangar
102	Maintenance	Maintenance Hangar
103	Maintenance	Maintenance Hangar
104	Maintenance	Maintenance Hangar
105	Maintenance	Maintenance Hangar
		Recycle Center
129	Maintenance	Small Boat Repair Shop
351	Maintenance	Vehicle Maintenance Shop
373	Maintenance	Motor Vehicle Maintenance Shop
375	Maintenance	Aircraft Maintenance
1170, 1171	POL Storage	Aircraft Fuel Islands
1252, 1253	Storage	Fuel Division Supply Department
1304	Operations	Ordnance Operations
1388	Maintenance	Lab/Boat Shop
1619	Maintenance	Ground Support Equipment Shop
1631	Maintenance	Aircraft Wash & Rinse Facility
5069	Maintenance	Corrosion Control Facility
6025	Storage	Liquid Oxygen/Nitrogen Facility
6107	Maintenance	Aircraft Rinse Facility
6182	Storage	Fuel Delivery Branch and Refueler Truck Parking
6183	Maintenance	Engine Test Facility
6479	Storage	Aircraft Ready Fuel Storage
Sanitary Landfill	Sanitary Landfill	Sanitary Landfill
WWTP	Utility	Water Reclamation Facility
Parking Apron	Storage	Aircraft Parking Apron

Part E.2. An individual at each facility (e.g., yard foreman) shall be charged with ensuring implementation of the SWPCP. This individual shall be trained to implement the SWPCP, including but not limited to, collecting storm water samples and analyzing samples for temperature and pH, conducting inspections, identifying deficiencies and performing corrective actions.

Part E.3. This permit may cover new or currently existing industrial facilities not currently identified in the Permittee's application upon submission of the "MS4 NPDES Individual Permit - Industrial Storm Water Discharge Notification Form" by the Permittee using the "CWB Compliance Submittal Form for Individual NPDES Permits and NGPCs" through the DOH's e-Permitting Portal. Along with the submission of the form, the Permittee shall submit a SWPCP for the industrial facility, and other attachments to the DOH for review and comment, including updating its SWMP Plan. Upon acceptance of the information, the DOH will acknowledge by letter NPDES permit coverage under this permit for the added facility. The SWPCP must be implemented upon the start-up of the facility or for an existing industrial facility; the SWPCP must be implemented upon submittal of the written request.

To request coverage of a facility's industrial storm water discharges under this NPDES permit:

- Open the e-Permitting Portal website at: https://eha-cloud.doh.hawaii.gov/epermit. Enter your login and password. If you do not have a login and password you will be asked to do a one-time registration.

- Click on the e-Permitting Application Finder tool and locate the "CWB Compliance Submittal Form for Individual NPDES Permits and NGPCs."

- Under Additional Links, download the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form."

- You are required to complete the "MS4 NPDES Individual Permit -Industrial Storm Water Discharge Notification Form" for each facility that discharges industrial storm water. All sections of this form MUST be completed for NPDES Permit compliance.

- Follow the instructions to complete and submit this form.

- Attach the completed "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form" in Section 7 of the "CWB Compliance Submittal Form for Individual NPDES Permits and NGPCs."

Part E.4. The SWPCP shall contain all information required under HAR, Chapter 11-55, Appendix B, Section 6.

Part E.5. If the industrial facilities listed in Part E.1 above qualify for Conditional "No Exposure" Exclusion from NPDES Storm Water Associated with Industrial Activity permitting, the Permittee may submit the "MS4 NPDES Individual Permit – Industrial Storm Water No Exposure Notification Form," following the procedure listed in Part E.3 above.

The Permittee will not be required to sample storm water runoff according to Part F.2 of this permit upon submittal of the "MS4 NPDES Individual Permit – Industrial Storm Water No Exposure Notification Form."

Part F. MONITORING REQUIREMENTS

Part F.1. Annual Monitoring Plan

Part F.1.a. The Permittee shall submit the Annual Monitoring Plan to the DOH by June 1st of each year for review and acceptance. The Annual Monitoring Plan shall be implemented over the coming fiscal year.

The monitoring program must be designed and implemented to meet the following objectives:

Part F.1.a.(1) Assess compliance with this permit (including TMDL Implementation & Management (I&M) Plans and demonstrating consistency with wasteload allocations (WLAs), if required);

Part F.1.a.(2) Measure the effectiveness of the Permittee's SWMP;

Part F.1.a.(3) Assess the overall health based on the chemical, physical, and biological impacts to receiving waters resulting from storm water discharges and an evaluation of the long term trends;

Part F.1.a.(4) Characterize storm water discharges;

Part F.1.a.(5) Identify sources of specific pollutants;

Part F.1.a.(6) Detect and eliminate illicit discharges and illegal connections to the MS4; and

Part F.1.a.(7) Assess the water quality issues in watershed resulting from storm water discharges to receiving waters.

Part F.1.b. The plan shall, at a minimum, include the following items:

Part F.1.b.(1) Written narrative of the proposed monitoring plan's objectives, including but not limited to the objectives identified in Part F.1.a, and description of activities;

Part F.1.b.(2) The monitoring locations on a sampling location map with an explanation of why the location was selected and the identification of the pollutants of concern for each of the sampling locations.

Part F.1.b.(3) The Permittee shall develop a priority based monitoring schedule for each type of industrial area or facility consistent with part 1 of this permit. The monitoring schedule will prioritize facilities or areas with the greatest potential of pollutant discharge. The facilities or areas ranked first within each type shall be monitored annually. Industrial facilities not ranked first shall be monitored on a rotational basis (at least two facilities monitored per year per type). The Plan shall provide the rationale for the priority rankings, identify the types of industry and the priority facilities within each industry, and provide a monitoring schedule for the rotational monitoring of industrial facilities. Facilities which exceed any of the limitations are required to be monitored during the next representative storm event for all parameters until none of the limitations are exceeded.

Part F.1.b.(4) For each activity, a description of how the results will be used to determine compliance with this permit.

Part F.1.b.(5) Identification of management measures proven to be effective and/or ineffective at reducing pollutants and flow.

Part F.1.b.(6) Written documentation of the following:

(i) Characteristics (timing, duration, intensity, total rainfall) of the storm event(s);

(ii) Parameters for measured pollutant loads; and

(iii) Range of discharge volumes to be monitored, as well as the timing, frequency, and duration at which they are identified;

Part F.1.b.(7) Written documentation of the analytical methods to be used;

Part F.1.b.(8) Written documentation of the Quality Assurance/Quality Control procedures to be used; and

Part F.1.b.(9) Estimated budget to be implemented over the coming fiscal year.

Part F.2. Storm Water Associated with Industrial Activities

The Permittee shall annually monitor the storm water runoff for the parameters specified below, for each of the Permittee's industrial facilities, including any additional parameters which the Permittee also believes to be present in the storm water runoff.

Effluent Parameter (units)	Effluent Limitation {1}	Type of Sample {2}
Flow (gallons)	{3}	Calculated or Estimated
Biochemical Oxygen Demand (5-Day) (mg/l)	{3}	Composite {4}
Chemical Oxygen Demand (mg/l)	{3}	Composite {4}
Total Suspended Solids (mg/l)	{3}	Composite {4}
Total Phosphorus (mg/l)	{3}	Composite {4}
Total Nitrogen (mg/l) {5}	{3}	Composite {4}
Nitrate + Nitrite Nitrogen (mg/l)	{3}	Composite {4}
Oil and Grease (mg/l)	15	Grab {6}
pH Range (Standard Units)	5.5-8.0 {7} 7.6-8.6 {8}	Grab {9}
Ammonia Nitrogen (mg/l)	{3}	Composite
Turbidity (0.1 NTU)	{3}	Grab
Dissolved Oxygen (0.1 mg/l)	{3}	Grab
Oxygen Saturation (1%)	{3}	Grab
Temperature (0.1 ºC)	{3}	Grab
Salinity (0.1 ppt)	{3}	Grab
Arsenic (µg/l) {10}{11}	360 {7} 69 {8}	Composite {4}
Cadmium (µg/l) {10}{11}	3+ {7} 43 {8}	Composite {4}
Chromium (VI) (µg/l) {10}{11}	16 {7} 1100 {8}	Composite {4}

Effluent Parameter (units)	Effluent Limitation {1}	Type of Sample {2}
Copper (µg/l) {10}{11}	6+ {7} 2.9 {8}	Composite {4}
Lead (µg/l) {10}{11}	29+ {7} 140 {8}	Composite {4}
Nickel (µg/l) {10}{11}	5+ {7} 75 {8}	Composite {4}
Selenium (µg/l) {10}{11}	20 {7} 300 [8]	Composite {4}
Silver (µg/l) {10}{11}	1+ {7} 2.3 {8}	Composite {4}
Zinc (µg/l) {10}{11}	22+ {7} 95 {8}	Composite {4}
Additional Toxic Pollutants {11}	{12}	{13}

mg/l = milligrams per liter = 1000 micrograms per liter (µg/l)
+ = The value listed is the minimum standard. Depending upon the receiving water $CaCO_3$ hardness, higher standards may be calculated using the respective formula in the U.S. Environmental Protection Agency publication Quality Criteria for Water (EPA 440/5-86-001, Revised May 1, 1987).

NOTES:

{1} Pollutant concentration levels shall not exceed the storm water discharge limits or be outside the ranges indicated in the table. Actual or measured levels which exceed those storm water discharge limits or are outside those ranges shall be reported to the CWB required in HAR, Chapter 11-55, Appendix B, Section 10(c). In the event any of these limitations are exceeded, the PERMITTEE, shall continue to monitor and report every representative storm event until limitations are met, unless as otherwise informed by the DOH-CWB.

{2} The Permittee shall collect samples for analysis from a discharge resulting from a representative storm. A representative storm means a rainfall that accumulates more than 0.1 inch of rain and occurs at least 72 hours after the previous measurable (greater than 0.1 inch) rainfall event.

"Grab sample" means a sample collected during the first 15 minutes of the discharge.

"Composite sample" means a combination of at least two (2) sample aliquots, collected at periodic intervals. The composite shall be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to the total flow of storm water discharge flow since the collection of the previous aliquot. The Permittee may collect aliquots manually or automatically.

Samples for analysis shall be collected during the first 15 minutes of the discharge and at 15-minute intervals thereafter for the duration of the discharge, as applicable. If the discharge lasts for over an hour, sample collection may cease.

{3} The value shall not exceed the applicable limit as specified in Chapter 11-54 for the applicable classification of the receiving state waters. If no limitation is specified in HAR, Chapter 11-54, then the Permittee shall monitor and report the analytical result. The Department may include discharge limitations specified in HAR, Section 11-55-19 and discharge limitations based on Federal Register, Vol. 73, No. 189, Pages 56572–56578, dated September 29, 2008.

{4} If the duration of the discharge event is less than 30 minutes, the sample collected during the first 15 minutes of the discharge shall be analyzed as a grab sample and reported toward the fulfillment of this composite sample specification. If the duration of the discharge event is greater than 30 minutes, the Permittee shall analyze two (2) or more sample aliquots as a composite sample.

{5} The Total Nitrogen parameter is a measure of all nitrogen compounds in the sample (nitrate, nitrite, ammonia, dissolved organic nitrogen, and organic matter present as particulates).

{6} The Permittee shall measure Oil and Grease using EPA Method 1664, Revision A.

{7} This limitation applies to discharge into state waters classified as inland streams.

{8} This limitation applies to discharge into state waters classified as marine open coastal waters.

{9} The Permittee shall measure pH within 15 minutes of obtaining the grab sample.

{10} The Permittee shall test for the total recoverable portion of all metals.

{11} Toxic pollutants, as identified in Appendix D or 40 CFR Part 122 or in HAR, Chapter 11-54, Section 11-54-4, need only be analyzed if they are identified as potential pollutants requiring monitoring in the SWPCP. The Permittee shall test for the total recoverable portion of all metals. If monitoring results indicate that the discharge limitation was equaled or exceeded, the SWPCP shall be amended to include additional BMPs targeted to reduce the parameter which was in excess of the discharge limitation.

{12} Effluent limitations are the acute water quality standards established in HAR, Chapter 11-54, Section 11-54-4. For pollutants which do not have established acute water quality standards, any detection concentration greater than 0.01 mg/l shall be reported.

{13} Cyanide and the volatile fraction of the toxic organic compounds shall be sampled by grab sample. All other pollutants, as identified in Appendix D of the 40 CFR Part 122 or in HAR Chapter 11-54, Section 11-54-4 shall be sampled by composite sample.

The sampling locations shall be representative of storm water discharging from the industrial facility and consist of storm water runoff from industrial activities.

Part F.3. TMDLs

As TMDLs are adopted by DOH and approved by the EPA that identify the Permittee as a source, the Permittee shall develop I&M Plans for a minimum of one (1) additional TMDL per year within one (1) year of the approval date. The Permittee shall include within each I&M Plan a compliance schedule with a final deadline to demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document. The schedule shall provide for the implementation of the BMPs, monitoring to evaluate its performance, and time to make adjustments necessary to demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document at the earliest possible time. If the schedule extends beyond a year, interim dates and milestones shall be included in the schedule with the time between interim dates not to exceed one (1) year.

Part F.4. Re-opener

In accordance with 40 CFR Parts 122 and 124, this permit may be modified (i.e., to include compliance schedules, permit conditions, etc.) to address additional or revised TMDLs as adopted by DOH and approved by the EPA.

Part G. REPORTING REQUIREMENTS

All submittals to the DOH shall be in a format consistent with first satisfying the requirements of this permit.

Part G.1. Annual Report

Part G.1.a. The Permittee shall submit the Annual Report by December 31st of each year in pdf format (minimum 300 dpi) in accordance with Part A.6. The Annual Report shall cover the past fiscal year. The Annual Report for the fiscal year prior to the expiration date of the permit shall serve as the permit's renewal application. Submittal of the renewal application shall include a $1,000 filing fee.

Part G.1.b. The Permittee shall revise its SWMP to include a description of reporting procedures and activities, including schedules and proposed content of the Annual Reports such that, at a minimum, the following is reported for each storm water program component in each Annual Report:

Part G.1.b.(1) *Requirements* - Describe what the Permittee was required to do (describe status of compliance with conditions of this permit and other commitments set forth in the SWMP).

Part G.1.b.(2) *Past Year Activities* - Describe activities over the reporting period in comparison to the requirements, including, where applicable, progress accomplished toward meeting specific measurable goals, standards and milestones or other specific performance requirements. When requirements were not fully met, include a detailed explanation as to why the Permittee did not meet its commitments for the reporting period. Also describe an assessment of the SWMP, including progress towards implementing each of the SWMP program components.

Part G.1.b.(3) *Future Activities* - Describe planned activities, including, *where* applicable, specific activities to be undertaken during the next reporting period toward accomplishing specific measurable goals, standards and milestones or other specific performance requirements.

Part G.1.b.(4) *Resources* - Report on the status of the Permittee's resource base for implementing this NPDES permit during the applicable reporting period and an estimate of the resources over and above those required in the current reporting period that will be required in the next reporting period.

Part G.1.c. *Modifications* - In each Annual Report, the Permittee shall describe any modifications made to the SWMP and implementation schedule during the past year, including justifications. The Permittee shall also describe major modifications made to the Permittee's MS4, including, but not limited to, addition and removal of outfalls, drainage lines, and facilities.

Part G.1.d. *Program Effectiveness Reporting* - Within one (1) year from the effective date of the permit, the Permittee shall submit to the DOH a written strategy for determining effectiveness of its SWMP. The strategy shall include water quality monitoring efforts as well as program implementation information and other indicators. The Permittee shall include an assessment of program effectiveness and identification of water quality improvements or degradation beginning with the 2nd Annual Report.

Part G.2. Annual Monitoring Report

Part G.2.a. The Permittee shall submit the Annual Monitoring Report by December 31st of each year in pdf format (minimum 300 dpi) in accordance with Part A.6. The Annual Monitoring Report shall cover the past fiscal year.

Part G.2.b. The monitoring report shall at a minimum, include the following items:

Part G.2.b.(1) Discussion on the activities/work implemented to meet each objective, as outlined in Part F.1.a, including any additional objectives identified by the Permittee, and the results [e.g., assessment of the water quality issues in each watershed resulting from storm water discharges, refer to Part F.1.a.(7)] and conclusions.

Part G.2.b.(2) Written narrative of the past fiscal year's activities, including those coordinated with other agencies, objectives of activities, results and conclusions.

Part G.2.b.(3) Data gathered on levels of pollutants in non-storm water discharges to the Permittee’s MS4; and

Part G.2.b.(4) Using rainfall data collected by the Permittee and other agencies, the Permittee shall relate rainfall events, measured pollutant loads, and discharge volumes from the watershed and other watersheds that may be identified from time to time by the DOH or Permittee.

Part G.2.b.(5) Dates when monitoring occurred for each industrial facility covered under this permit. The monitoring event shall be of a representative storm event, where results were available for all required parameters following the QA/QC measures as described in the Annual Monitoring Plan.

Part G.2.b.(6) Discharge Monitoring Reports (DMRs) for industrial facilities shall be included in the Annual Monitoring Report and be submitted via NetDMR once established by the DOH. NetDMR is a Web-based tool that allows NPDES permittees to electronically sign and submit their DMRs to EPA's Integrated Compliance Information System (ICIS-NPDES) via the Environmental Information Exchange Network. A DMR must be submitted for the facility which is scheduled to be monitored even if sampling was not conducted. An explanation as to why sampling was not conducted shall be explained with the submittal.

Part H. SUMMARY OF DEADLINES

Deadline	Description	Part	Submit to the DOH
18 months after the Effective Date of Permit (EDOP)	Revised SWMP Plan.	D.1	Yes
1 year after EDOP	Establish requirements for issuing connection permits and require obtaining the permit prior to allowing the drain connection.	D.1.c.(1)	No
1 year after EDOP	Establish policies for enforcement and penalties for non-compliance with Part D.1.c.(1) and for persons illegally discharging pollutants to its MS4; and pursue enforcement actions.	D.1.c.(5)	No
2 year after EDOP	Establish BMP Manuals.	D.1.d.(1)	Yes
3 year after EDOP	Establish policies to require construction projects to implement BMPs and standards.	D.1.d.(2)	No
6 months after EDOP	Implement a system to track both private and public construction projects.	D.1.d.(3)	No
90 calendar days after EDOP	Plan review checklist.	D.1.d.(4)(iv)	Yes
90 calendar days after EDOP	Inspection form(s), inspection checklist, and reporting and corrective procedures.	D.1.d.(5)(iv)	Yes
1 year after EDOP	Establish policies for enforcement and penalties for non-compliance with Part D.1.d.(2); and develop and implement an Enforcement Response Plan.	D.1.d.(6)	No

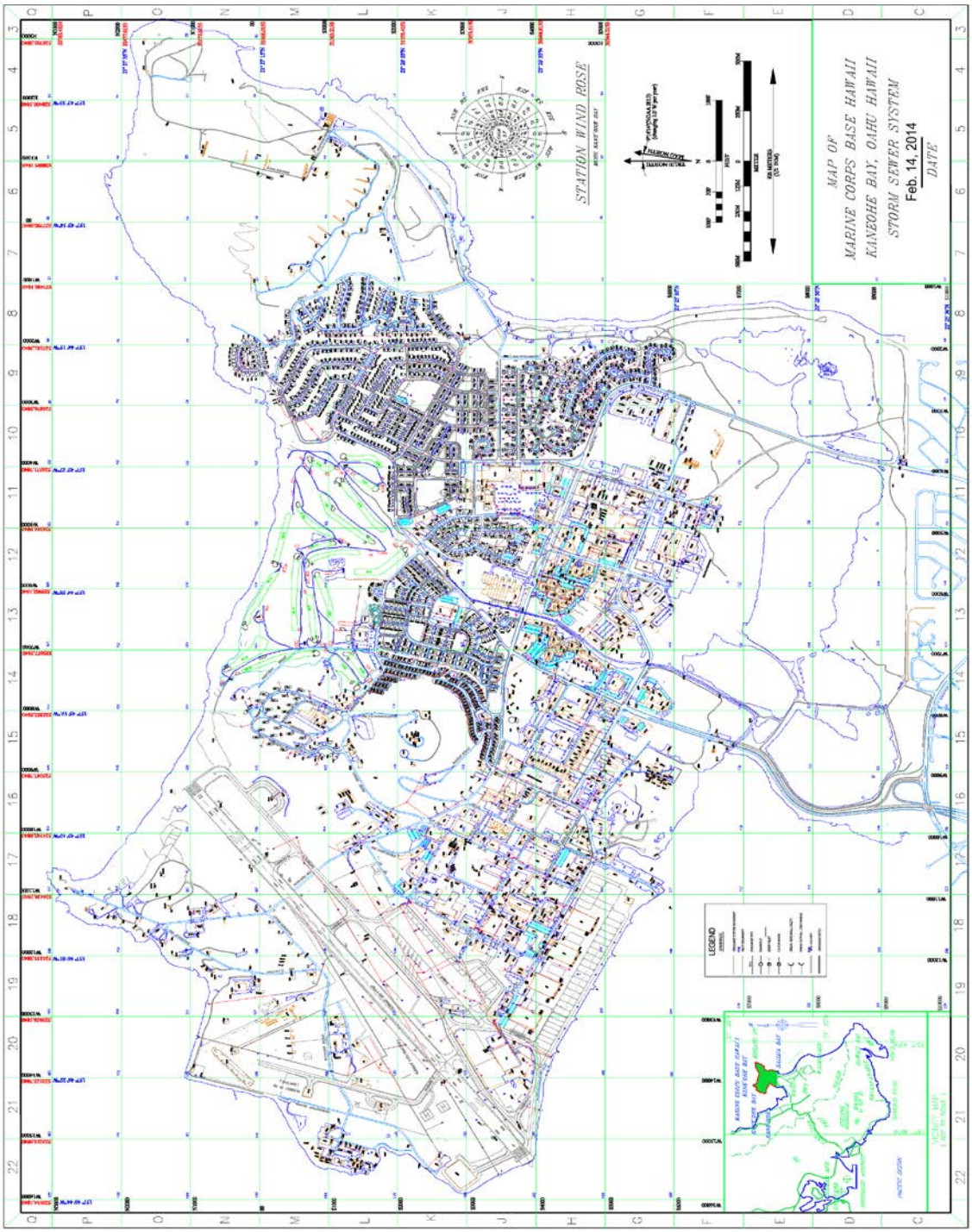
Deadline	Description	Part	Submit to the DOH
6 months after EDOP	Plan for requiring LID in its Standards.	D.1.e.(1)	Yes
12 months after EDOP	Draft of the revised Standards.	D.1.e.(1)	Yes
18 to 24 months after EDOP dependent on adoption by rulemaking	Final of the revised Standards.	D.1.e.(1)	Yes
1 year after EDOP	Action Plan for Retrofitting Structural BMPs	D.1.f.(1)(iv)	Yes
1 year after EDOP	Trash Reduction Plan	D.1.f.(1)(v)	Yes
18 months after EDOP	Require the implementation of temporary erosion control measures on erosional areas within the right-of-ways.	D.1.f.(3)(ii)	No
1 year after EDOP	WQC application(s) for temporary erosion control measures.	D.1.f.(3)(ii)	Yes
1 year after EDOP	Action Plan to address erosion at its storm drain system outlets.	D.1.f.(3)(iv)	Yes
1 year after EDOP	List of projects and implementation schedule for permanent erosion control improvements.	D.1.f.(3)(v)	Yes
4th Year Annual Report	Industrial facilities and activities inventory information.	D.1.g.(2)	Yes
4th Year Annual Report	Commercial facilities and activities inventory information	D.1.g.(3)	Yes

Deadline	Description	Part	Submit to the DOH
60 calendar days after EDOP	Prioritized areas for industrial and commercial facility and activity inspection status report.	D.1.g.(4)	Yes
October 31st and April 30th of each year	Semi-Annual Industrial and Commercial Inspection Reports.	D.1.g.(5)	Yes
1 year after EDOP	For Industrial and Commercial Facilities, establish and implement policies for enforcement and penalties.	D.1.g.(7)	No
90 calendar days of the change	Updates to the industrial and commercial inspection training	D.1.g.(8)	Yes
30 calendar days prior to the initiation date of the major modification	SWMP Modification Report	D.3.a	Yes
As needed	MS4 NPDES Individual Permit - Industrial Storm Water Discharge Notification Form and SWPCP for each industrial activity. (For those that have not yet been submitted.)	E.3	Yes
June 1st of each year	Annual Monitoring Plan	F.1.a	Yes
Various	TMDL Compliance, refer to Schedules of Compliance	F.3	Yes
December 31st of each year	Annual Report, to include but not limited to: • Progress evaluation results of the public education program [Part D.1.a.(3)],	G.1	Yes

Deadline	Description	Part	Submit to the DOH
	• Description and reason for any revision to its Standards and copy of the revised Standards [Part D.1.d.(1)], • Updates to its inspection/maintenance schedule, including explanation of the changes [Part D.1.f.(1)(ii)], • Updates to its implementation schedule for retrofitting structural BMPs [Part D.1.f.(1)(iv)], • Summary of its trash load reduction actions [Part D.1.f.(1)(v)], • Status report on implementation of erosion control measures at its storm drain system outlets [Part D.1.f.(3)(iv)], • Updated industrial inventory information (4th Annual Report)[Part D.1.g.(2)] • Updated commercial inventory information (4th Annual Report)[Part D.1.g.(3)] • Modified Prioritized Areas for Industrial and Commercial Facility and Activity Plan [Part D.1.g.(4)], • SWMP Modifications [Part D.2] • System Modifications [Part D.2], and • Annual Report requirements [Part G.1]		

Deadline	Description	Part	Submit to the DOH
1 year after EDOP	Written strategy for determining effectiveness of its SWMP	G.1.d	Yes
December 31st of each year	Annual Monitoring Report with Discharge Monitoring Reports	G.2	Yes

Part I. Map


MAP OF
MARINE CORPS BASE HAWAII
KANEOHE BAY, OAHU HAWAII
STORM SEWER SYSTEM
Feb. 14, 2014
DATE
STATION WIND ROSE
LEGEND

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
DOH/CWB

09013PST.14a

DATE: September 15, 2014
NPDES PERMIT NO. HI S000007 (fka HI 1121423)

RATIONALE: **APPLICATION FOR RENEWAL OF NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO VARIOUS WATERS OF THE UNITED STATES**

PERMITTEE: **U.S. MARINE CORPS, MARINE COPRS BASE HAWAII (MCBH)**

FACILITY: **U.S. MARINE CORPS BASE HAWAII MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)**

FACILITY STREET ADDRESS
U.S. Marine CORPS Base Hawaii
MCBH Kaneohe Bay
Kaneohe, Island of Oahu 96863

PERMITTEE MAILING ADDRESS
U.S. Marine Corps Base Hawaii
Box 63002, Building 1360
MCBH Kaneohe Bay, HI 96863-3002
Cert. Person: Mr. Douglas J. Wadsworth
Chief of Staff
Telephone: (808) 257-7707
Contact: Mr. Jeff Larson
Environmental Division
Telephone: (808) 257-6920
Email: Jeffrey.Larson@usmc.mil

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This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this permit.

A. Permit Information

The following table summarizes administrative information related to the Marine Corps Base Hawaii (hereinafter facility).

Table 1. Facility Information

Permittee	U.S. Marine Corps Base Hawaii	
Name of Facility	U.S. Marine Corps Base Hawaii, Kaneohe Bay Municipal Separate Storm Sewer System (MS4)	
Facility Address	U.S. Marine Corps Base Hawaii MCBH Kaneohe Bay, HI 96863	
Facility Contact, Title, and Phone	Mr. Jeff Larson Environmental Division Telephone: 808-257-6920 Email: Jeffrey.Larson@usmc.mil	
Authorized Person to Sign and Submit Reports	Mr. Douglas J. Wadsworth Chief of Staff Telephone: 808-257-7707 Email: Douglas.J.Wadsworth@usmc.mil	
Mailing Address	U.S. Marine Corps Base Hawaii Box 63002, Building 1360 MCBH Kaneohe Bay, Hawaii 96863-3002	
Billing Address	Same	
Type of Facility	Municipal Separate Storm Sewer System	
Pretreatment Program	NA	
Reclamation Requirements	NA	
Facility Permitted Flow	Outfall Serial No.	Discharge
	Various Outfalls, as identified in permit application	Storm Water Runoff*
		Storm Water Associated with Industrial Activity
Receiving Waters	Kaneohe Bay, Nuupia Ponds, & Kailua Bay, as identified in the permit application & Mokapu Central Drainage Channel as Identified in public comment period.	
Receiving Water Types	Kaneohe Bay – Embayment; Nuupia Ponds - Inland Waters; Kailua Bay – Open Coastal; Mokapu Drainage Channel – Inland/ Embayment	
Receiving Water Classification	Kaneohe Bay – Class AA; Nuupia Ponds – Class 1; Kailua Bay – Class A; & Mokapu Central Drainage Channel – Class AA/2.	

* including certain specified non storm water discharges

1. NPDES Permit No. HI 1121423 became effective on January 30, 2003 and expired on January 31, 2007. The Permittee submitted renewal NPDES permit application on July 26, 2006, whereby the NPDES Permit No. was changed to HI S000007. The Hawaii Department of Health (hereinafter DOH administratively extended the NPDES permit on January 26, 2007, pending the reapplication processing.

2. The Director of Health (hereinafter Director) proposes to issue a permit to discharge to the waters of the State until five (5) years after the date of issuance, and has included in the proposed permit those terms and conditions which he has determined are necessary to carry out the provisions of the Federal Water Pollution Control Act (P.L. 92-500), Federal Clean Water Act (CWA) (P.L. 95-217) and Chapter 342D, Hawaii Revised Statutes.

B. Facility Setting

1. Facility Operation and Location

This MS4 permit shall cover the Marine Corps Base Hawaii (MCBH) – Kaneohe Bay facility on the Island of Oahu. MCBH is located on the Mokapu Peninsula of windward Oahu in Kaneohe and is home to the Marine Aircraft Group 24, 3d Marine Regiment, Patrol and Reconnaissance Wing Two, Marine Forces Pacific Headquarters, Pacific Command Headquarters, government agencies and many other commands. MCBH provides high quality training support, housing and recreation activities for the Marines, Sailors and their families (roughly 11,000 military personnel). The storm sewers are systems of conveyances, including storm drains, catch basins, curbs, gutters, canals, and ditches designed to collect and convey storm water runoff. Storm water discharges from the MS4 enters Kaneohe Bay, Nuupia Ponds, and Kailua Bay from various outfalls. Per NPDES Storm Water Permit Application for Marine Corps Base Hawaii, July 28, 1994, outfalls were grouped according to the types of industrial activities occurring within the drainage basins. The four groupings are: 1) active runway and possible burn pit runoff (outfall nos. 001 & 002); 2) active runway and helipad/wash rack (outfall no. 025); 3) active runway/hangar operations/light industrial activities (outfall nos. 003-007 & 009-024); and 4) sanitary landfill (outfall no. 008). Representative outfalls for the 4 groupings were noted as 001, 025, 019, and 008. Note: 1) light industrial operations consisted primarily of vehicle and AmTrack maintenance activities; 2) in 2001, a sedimentation basin was constructed in the sanitary landfill and has not discharged since. More recently the outfalls were identified starting with an “O” and the old Landfill outfall no. 008 was redesignated as nos. LF-1 & LF-2. As such, the outfall numbering is designated as follows: Nuupia Ponds outfalls - O10, O11, & O12; Kaneohe Bay outfalls - O16, O16A, O16B, O17, O17A, O18, O19, O20, O21, O22, O24, O25, O26, O27, & O28; and Kailua Bay outfalls - LF-1, & LF-2.

2. Industrial Activities

The following industrial facilities were identified in the permit application (list to be updated in the first annual report after permit issuance and to include SIC codes):

Table 2. Industrial Activities

Building No.	General Category	Description
101	Maintenance	Maintenance Hangar HMLA 367
102	Maintenance	Maintenance Hangar HMH 463
103	Maintenance	Maintenance Hangar HSL 37
104	Maintenance	Maintenance Hangar VP4 VP47
105	Maintenance	Maintenance Hangar VPU2 VR-52 (DYNCORP)
		Recycle Center
129	Maintenance	Small Boat Repair Shop
351	Maintenance	Vehicle Maintenance Shop
373	Maintenance	Motor Vehicle Maintenance Shop
375	Maintenance	Aircraft Maintenance
1170, 1171	POL Storage	Aircraft Fuel Islands
1252, 1253	Storage	Fuel Division Supply Department
1304	Operations	Ordnance Operations
1388	Maintenance	Lab/Boat Shop
1619	Maintenance	Ground Support Equipment Shop
1631	Maintenance	Aircraft Wash & Rinse Facility
5069	Maintenance	Corrosion Control Facility
6025	Storage	Liquid Oxygen/Nitrogen Facility
6107	Maintenance	Aircraft Rinse Facility
6182	Storage	Fuel Delivery Branch and Refueler Truck Parking
6183	Maintenance	Engine Test Facility
6479	Storage	Aircraft Ready Fuel Storage
Sanitary Landfill	Sanitary Landfill	Sanitary Landfill
WWTP	Utility	Water Reclamation Facility
Parking Apron	Storage	Aircraft Parking Apron

The current permit covers the industrial facilities and requires each facility to have a Storm Water Pollution Control Plan (SWPCP) and perform monitoring.

3. Receiving Water Classification

The MCBH separate storm sewer system discharges into receiving waters Kailua Bay, Kaneohe Bay, Nuupia Ponds, and the Mokapu Central Drainage Channel.

The receiving water Kailua Bay (Dry Criteria) is classified by the Department of Health as a Class A, Open Coastal, Marine Water under Hawaii Administrative Rules (HAR), Section 11-54-6. The objective of Class A waters is to protect their use for recreational purposes and aesthetic enjoyment. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class.

The receiving waters Nuupia Ponds and Mokapu Central Drainage Channel are classified by the Department of Health as a Class 1, Inland Water under HAR, Section 11-54-5. It is the objective of Class 1 waters that these waters remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. To the extent possible, the wilderness character of these areas shall be protected.

The receiving water Kaneohe Bay (Wet Criteria) and Mokapu Central Drainage Channel (portion of the channel that is tidally influenced by Kaneohe Bay) are classified by the Department of Health as Class AA, Embayment, Marine Water under HAR, Section 11-54-6. It is the objective of Class AA waters that these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected.

4. Impaired Water Bodies on CWA 303(d) List

CWA Section 303(d) requires states to identify specific water bodies where water quality standards (WQS) are not expected to be met after implementation of technology-based effluent limitations on point sources.

The 2012 State of Hawaii Water Quality Monitoring and Assessment Report, which includes the 2012 303(d) List of Impaired Water Bodies in the State of Hawaii, was approved by the EPA on September 20, 2013.

According to the report, the receiving waters are classified as follows:

Table 3. Receiving Water Assessments from the 303(d) List/305(b) Report

Receiving Water	Wet/Dry Criteria	Pollutant Decisions								Category Codes[1]
		Enterococci	Total Nitrogen	Nitrate+ Nitrite Nitrogen	Total Phosphorus	Turbidity	Chlorophyll a	Ammonia Nitrogen	Other	
Kaneohe Bay	Wet	Not Attained	Not Attained	Not Attained	Unknown	Not Attained	Unknown	Not Attained	---	3,5
Kailua Bay	Dry	Attained	Attained	Attained	Attained	Attained	Attained	Attained	---	2

Receiving Water	Season	Pollutant Decisions							Category Codes[1]
		Enterococci	Total Nitrogen	Nitrate+ Nitrite Nitrogen	Total Phosphorus	Turbidity	Total Suspended Solids	Other	
Nuupia Ponds	Not Listed								
Mokapu Central Drainage Channel	Not Listed								

[1] Category Codes: 2 - Data show some uses attained
3 - Not enough data to evaluate
5 - Data show at least one use not attained, TMDL needed.

5. Summary of Existing Effluent Limitations and Monitoring Data

Effluent limitations contained in the existing permit for discharges from industrial activities and monitoring data presented in the 2013 annual report are presented in the following table.

Table 4. Effluent Limitations – Storm Water Associated with Industrial Activities

Parameter	Units	Discharge Limitation {1}	Minimum Monitoring Frequency	Type of Sample {2}
Flow	Gallons	{3}	{4}	Calculated or Estimated
Biochemical Oxygen Demand (5-day)	mg/l	{3}	{4}	Composite {5}
Chemical Oxygen Demand	mg/l	{3}	{4}	Composite {5}
Total Suspended Solids	mg/l	{3}	{4}	Composite {5}
Total Phosphorus	mg/l	{3}	{4}	Composite {5}
Total Nitrogen {6}	mg/l	{3}	{4}	Composite {5}
Nitrate+Nitrite Nitrogen	mg/l	{3}	{4}	Composite {5}
Oil and Grease	mg/l	15	{4}	Grab {7}
pH	SU	{8}	{4}	Grab {9}
Toxic Pollutants {10}	µg/l	{11}	{4}	{12}

NOTES:

{1} Pollutant concentration levels shall not exceed the storm water discharge limits or be outside the ranges indicated in the table. Actual or measured levels which exceed those storm water discharge limits or are outside those ranges shall be reported to the Director as required in Section 16.f. of the Standard NPDES Permit Conditions within 30 days after the Permittee becomes aware of the results. The Permittee shall provide the DOH with an explanation of the pollutant origin. Monitoring results shall be submitted on the DMR Form. This requirement shall supersede the immediate reporting requirement in the Standard NPDES Permit Conditions for these limitations only.

{2} The Permittee shall collect samples for analysis from a discharge resulting from a representative storm. A representative storm means a rainfall that accumulates more than 0.1 inch of rain and occurs at least 72 hours after the previous measurable (greater than 0.1 inch) rainfall event.

"Grab sample" means a sample collected during the first 15 minutes of the discharge.

"Composite sample" means a combination of at least two (2) sample aliquots, collected at periodic intervals. The composite shall be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to the total flow of storm water discharge flow since the collection of the previous aliquot. The Permittee may collect aliquots manually or automatically.

Samples for analysis shall be collected during the first 15 minutes of the discharge and at 15-minute intervals thereafter for the duration of the discharge, as applicable. If the discharge lasts for over an hour, sample collection may cease.

{3} No limitation at this time. Only monitoring and reporting is required.

{4} Each monitoring location shall be monitored at least once during the term of this permit.

{5} If the duration of the discharge event is less than 30 minutes, the sample collected during the first 15 minutes of the discharge shall be analyzed as a grab sample and reported toward the fulfillment of this composite sample specification. If the duration of the discharge event is greater than 30 minutes, the Permittee shall analyze two (2) or more sample aliquots as a composite sample.

{6} The Total Nitrogen parameter is a measure of all nitrogen compounds in the sample (nitrate, nitrite, ammonia, dissolved organic nitrogen, and organic matter present as particulates).

{7} The Permittee shall measure Oil and Grease using EPA Method 1664, Revision A.

{8} For discharge into Class 1 or 2, Inland Waters, the pH shall not deviate more than 0.5 units from ambient conditions and shall not be lower than 5.5 nor higher than 8.0. For discharge into Class A, Marine Waters, the pH shall not deviate more than 0.5 units from a value of 8.1, except at coastal locations where and when freshwater from stream, stormdrain or groundwater discharge may depress the pH to a minimum level of 7.0.

{9} The Permittee shall measure pH within 15 minutes of obtaining the grab sample.

{10} Toxic pollutants, as identified in Appendix D of 40 CFR Part 122 or in HAR, Chapter 11-54, Section 11-54-4, need only be analyzed if they are identified as potential pollutants requiring monitoring in the SWPCP. The Permittee shall test for the total recoverable portion of all metals. If monitoring results indicate that the discharge limitation was equaled or exceeded, the SWPCP shall be amended to include additional BMPs targeted to reduce the parameter which was in excess of the discharge limitation.

{11} Effluent limitations are the acute water quality standards established in HAR, Chapter 11-54, Section 11-54-4. For pollutants which do not have established acute water quality standards, any detected concentration greater than 0.01 mg/l shall be reported.

{12} Cyanide and the volatile fraction of the toxic organic compounds shall be sampled by grab sample. All other pollutants, as identified in Appendix D of the 40 CFR Part 122 or in HAR, Chapter 11-54, Section 11-54-4, shall be sampled by composite sample.

Table 5. Monitoring Results – Storm Water Associated with Industrial Activities

Parameter (Units)	Maximum Reported Value [1]	
	Hangar 105	Sanitary Landfill
Flow (MGD)	Not Reported	No Discharge
Biochemical Oxygen Demand (5-day) (mg/l)	14	No Discharge
Chemical Oxygen Demand (mg/l)	6.09	No Discharge
Total Suspended Solids (mg/l)	11	No Discharge
Total Phosphorus (mg/l)	0.037	No Discharge
Total Nitrogen (mg/l)	0.297	No Discharge
Nitrate+Nitrite Nitrogen (mg/l)	0.071	No Discharge
Oil and Grease (mg/l)	< 5	No Discharge
pH (SU)	**6.5**	No Discharge
Turbidity (NTU)	Not Reported	No Discharge
Ammonia Nitrogen (mg/l)	Not Reported	No Discharge
Dissolved Oxygen (mg/l)	Not Reported	No Discharge
Temperature (°C)	Not Reported	No Discharge
Salinity (ppt)	Not Reported	No Discharge

[1] Source: Annual DMRs submitted by the Permittee for the years 2009 through 2013.

Table 6. Monitoring Results – Total Metals Analyzed at Hangar 105

Parameter (Units)	Reported Values	Water Quality Standard (Chronic, Salt Water)
Arsenic (µg/l)	ND	69
Cadmium (µg/l)	0.269	43
Chromium VI (µg/l)	3.94	1100
Copper (µg/l)	**13.3**	2.9
Lead (µg/l)	5.7	140
Nickel (µg/l)	6.05	75
Selenium (µg/l)	ND	300
Silver (µg/l)	ND	2.3
Zinc (µg/l)	36.8	95

Bold indicates exceedance of the water quality standard.

6. Compliance History

MCBH Kaneohe Bay's compliance with the NPDES permit was audited January 11-12, 2012. MCBH has submitted annual reports in accordance with the current permit.

The following were noted in the audit report:

1. The Storm Water Pollution Control Plan was out of date and needed to be updated to reflect current conditions and MCBH's current Storm Water Management Program. However, it was noted in the audit report that the Permittee was waiting for issuance of a reissued permit prior to commencement of the updates to ensure all applicable requirements are included in the SWPCP.
2. The maintenance of the separate storm sewer system is deficient due to inadequate resources (i.e., limitations of the availability of staff to conduct required maintenance).
3. Additional oversight may be needed by MCBH to ensure all Tenants and Facilities operating at MCBH are complying with the requirements of the Permit.
4. The illicit discharge prevention program should be improved to ensure illicit discharges are identified and eliminated, including washing activities conducted by various Tenants throughout the installation. Specifically, three active/potential illicit discharges were observed during the audit.
5. MCBH may need to provide additional oversight and inspection of construction activities performed by the public-private venture contractor, Forest City.

7. Planned Changes

No planned changes have been declared.

C. Proposed Determinations

This permit contains the same goals as the previous permit but contains more specific requirements for the Permittee to achieve the intended goals.

1. General Requirements

The general requirements, specified in Part A., set the framework for Permittee compliance with the draft permit. The Permittee shall comply with its existing Storm Water Management Program (SWMP) Plan until submittal of the revised plan. The purpose of this requirement is to clarify DOH's expectations during which the SWMP Plan is being revised per the requirement of this permit and to prevent any gap in time where an SWMP Plan is not being implemented.

This part also contains other basic requirements, including requiring a copy of the SWMP Plan be retained at a location designated in its SWMP and the inclusion of the certification statement with all submittals, and provides the EPA address where information shall be submitted. This part further requires that the Permittee allows the public an opportunity to review and comment on the different plans required by the SWMP and clarifies the DOH's expectations for the Permittee to address all of DOH's comments on required submittals.

2. Discharge Limitations

Discharge Limitations listed in Part B, of the permit specify that the Permittee shall effectively prohibit non-storm water discharges through its MS4 into State waters (per Section 402(p) of the Act). "Effectively prohibit" means that a non-storm water discharge shall be specifically regulated by an NPDES permit, or that the discharge is not considered a waste, or that the discharge does not contain constituents of concern which would necessitate an NPDES permit. NPDES permitted discharges and certain non-storm water discharges identified in Part B.2. of this permit may be allowed into the MS4 provided that such discharges will not contain pollutants in amounts that will result in a violation of an applicable water quality standard.

As required by Section 402(p) of the Act and 40 CFR §122.26(d)(2)(iv), the discharge of pollutants must be reduced to the "maximum extent practicable (MEP)." The activities described in the SWMP shall meet this MEP control standard.

The discharge of pollutants from the Permittee's industrial facilities shall be consistent with the BAT/BCT requirement of the Act.

3. Receiving Water Limitations

Receiving Water Limitations listed in Part C of the permit are restated from HAR, Section 11-54-4(a). In accordance with HAR, Section 11-54-3(a), existing storm water discharges into State Waters are allowed provided such discharges meet the basic water quality criteria listed in HAR, Section 11-54-4 (refer to Part C.1. of the permit). The discharge shall not cause or contribute to a violation of any of the applicable beneficial uses or water quality objectives contained in HAR, Chapter 11-54, titled "Water Quality Standards." This part sets a minimum frequency for visual inspections of State waters to provide guidance to the Permittee for development of their inspection program, and also to create an enforceable requirement.

4. Storm Water Management Plan

Storm Water Management Plan (SWMP) listed in Part D, of the permit contains six (6) minimum control measures as listed below.

a. Public Education and Outreach

b. Public Involvement/Participation

c. Illicit Discharge Detection and Elimination

d. Construction Site Runoff Control

Requirements within this section apply to all public construction projects and private projects which discharge storm water to the Permittee's MS4.

e. Post-Construction Storm Water Management in New Development and Redevelopment

This section includes Low Impact Development (LID) requirements for addressing post-construction BMPs.

f. Pollution Prevention/Good Housekeeping

This section requires the Permittee to develop and submit to DOH a trash control plan with an implementation schedule to reduce trash discharges from the MS4 to zero. Numerous waterbodies on Oahu are currently listed on the State's CWA section 303(d) as impaired due to trash, and the proposed requirement is intended to address this problem. Similar requirements have recently been adopted for trash control in the City and County of Honolulu's MS4 Permit, State DOT's MS4 Permit, and in the State of California. The DOH recommends that the Permittee review these requirements in developing a practicable plan and implementation schedule.

This section also requires the development of a maintenance plan for vegetated portions of the drainage system used for erosion and sediment control and LID features and the submittal of an Action Plan to address erosion at outlets to be submitted within one (1) year of the effective date of this permit and implemented within five (5) years.

g. Industrial and Commercial Activities Discharge Management Program

This section requires implementation of BMPs for industrial and commercial facilities through the issuance of a permit or written equivalent approval process for drainage connections and discharge of surface storm water runoff into the MS4. This section also specifies inspection frequencies for industrial and commercial facilities.

Under this section, the Permittee is required to review and approve Storm Water Pollution Control Plans for industrial activities, similar to the Plan review and approval process for construction activities

The Permittee must also establish and implement enforcement policies for facilities which have failed to comply with its requirement and rules for penalties.

h. Modifications

This section requires the Permittee to revise the SWMP, as necessary, if any discharge limitation or water quality standard is exceeded. All modifications to this permit shall be made pursuant to any applicable requirements in the DOH's Standard NPDES Permit Conditions.

5. Industrial Facilities

The storm water runoff from industrial facilities within the installations covered by this individual MS4 permit are subject to the Storm Water Discharges Associated With Industrial Activity NPDES requirements under 40 CFR Part 122.26(b)(14)(ii). The storm water discharge from the facility can be covered under DOH's NPDES general permit for storm water associated with industrial activity, however, as in the current permit, it is included in this individual MS4 permit in Part E. Twenty-seven (27) industrial facilities were identified in the application.

Accordingly, the proposed storm water runoff discharge conditions and requirements for storm water associated with industrial activity are incorporated in the draft permit based on Appendix B of HAR, Chapter 11-55. The Permittee is also required to prepare and implement a SWPCP. The storm water requirements are retained from the current permit. Future industrial facilities may be covered under this individual MS4 permit upon submission of MS4 NPDES Individual Permit - Industrial Storm Water Discharge Notification Form. Because operations on military bases are dynamic, this permit requires the Permittee to develop a priority based monitoring schedule for each type of industrial facility with the greatest potential for pollutant discharge, and a rotational monitoring schedule for other industrial facilities (at least two facilities monitored per year per type). For facilities to be of the same type, the activities and pollutant sources must be the same.

Priority based monitoring provides the greatest certainty that representative samples of the discharges most likely to impact water quality are collected and assessed for compliance with applicable effluent limitations and water quality standards.

If the industrial facilities listed in Part E.1 of the permit qualify for Conditional "No Exposure" Exclusion from NPDES Storm Water Associated with Industrial Activity permitting, the Permittee may submit the "MS4 NPDES Individual Permit – Industrial Storm Water No Exposure Notification Form," following the procedure listed in Part E.3, of the proposed permit.

The Permittee will not be required to sample storm water runoff according to Part F.2, of the proposed permit upon submittal of the "MS4 NPDES Individual Permit – Industrial Storm Water No Exposure Notification Form."

6. Monitoring Requirements

a. The draft permit includes the following monitoring program objectives:

Part F.1.a.(1)	Assess compliance with this permit (including TMDL Implementation & Management (I&M) Plans and demonstrating consistency with WLAs, if required);
Part F.1.a.(2)	Measure the effectiveness of the Permittee's SWMP;
Part F.1.a.(3)	Assess the overall health based on the chemical, physical, and biological impacts to receiving waters resulting from storm water discharges and an evaluation of the long term trends;
Part F.1.a.(4)	Characterize storm water discharges;
Part F.1.a.(5)	Identify sources of specific pollutants
Part F.1.a.(6)	Detect and eliminate illicit discharges and illegal connections to the MS4; and
Part F.1.a.(7)	Assess the water quality issues in watershed resulting from storm water discharges to receiving waters.

Annual Monitoring Plan is due on June 1st. Part F.1.b. lists the Plan's minimum requirements.

b. Industrial Facilities

Part F.2, specifies the monitoring parameters for Industrial Facilities. Discharge Monitoring Report (DMR) requirements are specified in Part G.2.b.(6). DMRs shall be included in the Annual Monitoring Report and submitted via NetDMR once established by the DOH.

7. Reporting Requirements

a. Annual Report

Most of the information specified in the end-of-year report is required by 40 CFR §122.42(c). The Annual Report is due on December 31st.

b. Annual Monitoring Report

The Annual Monitoring Report is due on December 31st and shall be included in the Annual Report.

Discharge Monitoring Reports (DMRs) for Municipal Industrial Facilities shall be included in the Annual Monitoring Report. A DMR must be submitted for the facility which is scheduled to be monitored even if sampling was not conducted. An explanation as to why sampling was not conducted shall be explained with the submittal.

8. Summary of Deadlines

The Permit includes a Summary of Deadlines in Part H, of the permit.

APPENDIX 1-2

Pollution Prevention Team Contact List

Table 1-2-1 Pollution Prevention Team Contacts

POLLUTION PREVENTION TEAM		
	NAME	**PHONE/EMAIL**
TEAM LEADER: ENV Compliance Office		
FACILITIES MAINTENANCE: Facilities Engineering Maintenance Control Division (MCD)/ Maintenance Repair Operations (MRO)		
MAPPING: ENV GIS		
PERSONNEL TRAINER: ENV Centralized Environmental Training and Education Program (CETEP)		
SITE INSPECTOR: ENV Compliance Office		
STORM WATER SAMPLING COORDINATOR: ENV Compliance Office		
RECORDKEEPER: ENV Compliance Office		
Reserved for Future Use		
Reserved for Future Use		

Last Revised: _____

APPENDIX 3-1

BMPs for Allowable Non-storm Discharge

NOTE: In the event that any of the listed discharges is observed or expected to be significant sources of pollutants to the MS4, the discharge will no longer be allowed.

BMPs FOR ALLOWABLE NON-STORM DISCHARGE

Allowable Discharge	BMP Description
Water line flushing *(including steamline condensate and flushing)*	If applicable, clean pavement surfaces of dust, debris, or other pollutants prior to discharge to the paved surface, street gutter, or drainage ditch. If possible, discharge to vegetated, pervious areas that do not have high erosion potential.
Landscape irrigation	Reduce watering demand by watering during the cool part of the day. Follow manufacturer's application instructions to prevent excessive herbicide and/or pesticide use.
Diverted stream flows	BMPs not applicable
Rising ground waters	BMPs not applicable
Uncontaminated ground water infiltration (as defined in 40 CFR §35.2005(20))	Install temporary pollution prevention measures (sandbags, plastic sheets, hay bales, silt fences, sediment traps/basins, etc.) at drainage inlets or conveyances, where possible, prior to discharge. If possible, place sandbags, silt fences, or hay bales around drainage inlets prior to discharge and/or discharge to vegetated, pervious areas that do not have high erosion potential.
Uncontaminated pumped ground water, not including construction related dewatering activities	Clean pavement surfaces of dust, debris, or other pollutants, and remove any oil sheen or slick prior to discharge to paved surface, street gutter, or drainage ditch. If possible, place sandbags, silt fences, or hay bales around drainage inlets prior to discharge and/or discharge to vegetated, pervious areas that do not have high erosion potential.
Discharges from potable water sources and foundation drains *(including emergency eye wash basins and showers, and drinking fountains on piers)*	Waterline Flushing: Clean pavement surfaces of dust, debris, or other pollutants prior to discharge to the paved surface, street gutter, or drainage ditch. If possible, discharge to vegetated, pervious areas that do not have high erosion potential. Emergency Eye Wash and Shower and Drinking Fountains: Quantity of discharge will be very small. Pollution potential negligible for MCB Hawaii, Kaneohe Bay

NOTE: In the event that any of the listed discharges is observed or expected to be significant sources of pollutants to the MS4, the discharge will no longer be allowed.

BMPs FOR ALLOWABLE NON-STORM DISCHARGE

Allowable Discharge	BMP Description
Air conditioning condensate	Quantity of discharge will be very small. Pollution potential negligible for MCB Hawaii, Kaneohe Bay
Irrigation water	Reduce watering demand by watering during the cool part of the day. Follow manufacturer's application instructions to prevent excessive herbicide and/or pesticide use.
Springs	BMPs not applicable
Water from crawl space pumps, uncontaminated water from utility manholes or boxes, and footing drains *(including discharge from buildings with basements, and crawl space pumps used by utility companies to dewater utility manholes and other maintenance and operations substructure facilities)*	Clean pavement surfaces of dust, debris, or other pollutants, and remove any oil sheen or slick prior to discharge to paved surface, street gutter, or drainage ditch. If possible, place sandbags, silt fences, or hay bales around drainage inlets prior to discharge and/or discharge to vegetated, pervious areas that do not have high erosion potential.
Lawn watering runoff	Reduce watering demand by watering during the cool part of the day. Follow manufacturer's application instructions to prevent excessive herbicide and/or pesticide use.
Water from individual residential car washing	Wash cars at designated wash areas. Minimize detergent use and do not wash engine components. Pavement surfaces where cars are being washed shall be cleaned by sweeping and removing debris and other pollutants prior to the car wash activity. For charity car washes, BMPs have been developed and will be implemented during these events.
Water from charity car washes	Wash cars at designated wash areas. Minimize detergent use and do not wash engine components. Pavement surfaces where cars are being washed shall be cleaned by sweeping and removing debris and other pollutants prior to the car wash activity. For charity car washes, BMPs have been developed and will be implemented during these events.
Flows from riparian habitats and wetlands	BMPs not applicable

NOTE: In the event that any of the listed discharges is observed or expected to be significant sources of pollutants to the MS4, the discharge will no longer be allowed.

BMPs FOR ALLOWABLE NON-STORM DISCHARGE

Allowable Discharge	BMP Description
Dechlorinated swimming pool discharges	Dechlorinate water prior to discharge. Clean pavement surfaces of dust, debris, or other pollutants prior to discharge to paved surface, street gutter, or drainage ditch. If possible, discharge to vegetated, pervious areas that do not have high erosion potential.
Exterior building wash water (water only) *(including piers and wharves – water only without detergent)*	Clean surfaces by sweeping and remove debris and other pollutants prior to washdown.
Residual street wash water (water only), including wash water from sidewalks, plazas, and driveways, but excluding parking lots	Clean surfaces by sweeping and remove debris and other pollutants prior to washdown.
Discharges or flows from firefighting activities *(including fire hydrant testing, fire sprinkler testing, and firefighter training activities)*	BMPs not applicable for emergency situations. For training and testing activities, clean pavement surfaces of dust, debris, or other pollutants prior to discharge to the paved surface, street gutter, or drainage ditch. If possible, discharge to vegetated, pervious areas that do not have high erosion potential.
Boat Rinsing	The intent of the rinsing activity is salt removal. Washing must be limited to water only. No detergents are allowed. Engine maintenance/degreasing activities must be conducted at designated locations featuring an oil-water separator and cannot be discharged directly to the MS4. No discharge of bilge water to the MS4.
Dive Gear Rinsing	The intent of the rinsing activity is salt removal. Washing must be limited to water only. No detergents are allowed.
Emergency pipe and tank hydrotesting and disinfecting	Dechlorinate water prior to discharge. Clean pavement surfaces of dust, debris, or other pollutants prior to discharge to paved surface, street gutter, or drainage ditch. If possible, discharge to vegetated, pervious areas that do not have high erosion potential.

NOTE: In the event that any of the listed discharges is observed or expected to be significant sources of pollutants to the MS4, the discharge will no longer be allowed.

BMPs FOR ALLOWABLE NON-STORM DISCHARGE

Allowable Discharge	BMP Description
Emergency trench dewatering	Clean pavement surfaces of dust, debris, or other pollutants, and remove any oil sheen or slick prior to discharge to paved surface, street gutter, or drainage ditch. If possible, place sandbags, silt fences, or hay bales around drainage inlets prior to discharge and/or discharge to vegetated, pervious areas that do not have high erosion potential.

APPENDIX 3-2

MCB Hawaii Dig Permit

DIGGING WORK CLEARANCE REQUEST

MCBH Kaneohe Bay, Facilities Department

Project Title: Extended Site Inspection (ESI) for Fire Fighting Training Area (FFTA)	FOR FACILITIES USE ONLY **DWCR NO:**

The Digging Work Clearance Request ***(DWCR)*** is required for any excavation work that may disrupt utility services, vehicular or aircraft traffic flow, protection provided by fire and intrusion alarm systems, or routine activities of Marine Corps Base Hawaii, Kaneohe Bay. The clearance process tries to identify, as much as practicable, any known, potentially hazardous work condition and is to help prevent accidents. It also informs key Base activities of the digging work and coordinates the required work with these activities to keep customer inconvenience to a minimum. ***The DWCR and CATEX must be approved prior to the start of work.***

1. INSTRUCTIONS:

The contractor/excavating activity shall complete blocks 2 thru 15 below. Submit this ORIGINAL MS Word Document with plans or drawings showing the location, width, and depth of excavation in an *Electronic Format* to MCBH Kaneohe Bay, Facilities Department via the Contracting Officer and/or Project Manager. Allow at least **20 Working Days** before commencement of work for clearance review by Facilities Department. Upon receipt of the approved and signed DWCR, the contractor/excavating activity may proceed with the excavation and shall follow all precautionary notes and directions as provided.

2. Required Documents prior to APPROVING this Dig Permit.

(a) An SOP for FMSS *(Appendix C)* has been received and approved by LFPE ☐ **yes** ☑ **no**

(b) An Environmental Category Exclusion *(CATEX)* has been submitted and approved. ☑ **yes** ☐ **no** ***(copy of CATEX is attached)***

If No, explain why:

This DWCR will Not be approved without an Approved CATEX or Waiver from LFPE

3. SITE LOCATION: FFTA site is located at the northwestern edge of the MCBH near Bldg. 1304; see attached figures.	**4. TARGET START DATE:** December 14, 2009
5. MCBH PROJECT MANAGER: Jeff Larson, MCBH Environmental Compliance and Protection Department; and Wesley Ching, NAVFAC Hawaii Remedial Project Manager **POC:** Jeff Larson, MCBH Environmental Compliance and Protection Department	**6. PHONE NO:** 257-6999 (Jeff Larson) 471-1171 Ext. 361 (Wes Ching)
7. CONTRACTOR: AECOM Technical Services, Inc. **POC:** Besty Alspaugh (1-866-327-8485)	**8. COMPANY PH.#:**808-523-8874 **FAX #:** 808-523-8950 **ADDRESS:** 841 Bishop St. Suite 500, Honolulu, HI 96813
9. CONTRACT NO.: N62742-03-D-1837	**10. WORK ORDER/JOB NO.:** HC27

11. TYPE OF WORK INVOLVED: ***(check all that applies)***

UNDERGROUND UTILITIES: ☐ WATER ☐ SEWER ☐ DRAIN ☐ ELECTRICAL ☐ TELEPHONE ☐ FIBEROPTIC

EXCAVATION: ☐ TRENCHING ☐ FOUNDATION/SLAB ☐ DE-WATERING ☐ SOIL BORING/TEST PIT

☑ OTHER: **Soil borings and monitoring well installation**

12. DESCRIPTION OF WORK: ***(Required)***

* **Provide a work description including the method of excavation** *(use of hand tools or type of heavy/powered equipment)*

* **Provide description of any precautionary measures to be followed and safety devices to be used such as shoring.**

* **Provide drawings or sketch showing the depth, width and length of the excavation and any known utilities that may interfere with the work**. ***(continue on additional sheet if required)***

Attached Sketch: ☑ **Yes** ☐ **No** ***(if no, explain)***

ESI field investigation activities will be conducted using a phased approach and will consist of two phases, Phase I and Phase II. Prior to intrusive activites, magnetic, electromagnetic, and ground penetrating radar geophysical surveys will be conducted by the geophysical subcontractor at proposed soil boring locations to determine the lcoations of underground utilities in accordance with NAVFAC Pacific ER Program Procedure I-A-5, *Utility Clearance* and Procedure I-B-2, *Geophysical Testing Procedures* (DON 2007).

Phase I will establish baseline conditions and further delineate the FFTA site (see attached Figure 1) through the collection of subsurface soil samples and groundwater samples from existing site monitoring wells (MW-2, MW-3, and MW-4). To delineate the horizontal and vertical extent of potential soil petroleum contamination, a 50-foot grid (see attached Figure 3) will be placed over the site. The Ultraviolet Optical Screening Tool (UVOST) and laser-induced fluorescence (LIF) technology will utilize a direct-push drill rig to advance the UVOST/LIF track-driven probe into a borehole. A soil sample will be collected at a depth where the highest detection of petroleum is found. Based on historical FFTA site data, groundwater is located approximately 5 feet below ground surface. The direct-push, track-driven probe system will be advanced to approximately 4 to 5 feet below the water table as petroleum contaminants tend to float and a 3- to 5-foot smear zone is often common. All boreholes created during this investigation will be abandoned in accordance with NAVFAC Hawaii ER Program Procedure I-C-1, *Monitoring Well Installation and Abandonment* (DON 2007). Additionally, a visual site survey will be conducted to determine whether surficial soil staining is present around the concrete-lined pits and, if so, discrete surface soil samples from these areas only will be collected down to 1 foot in depth.

Groundwater results from existing wells will determine whether additional monitoring wells are required to delineate the extent of petroleum contamination. Soil screening and/or visual confirmation of petroleum contamination will also contribute to the determination if additional monitoring wells are required.

Phase II is entirely dependent upon the finding associated with Phase I activities. Phase I site and analytical data will be evaluated and Phase II implemented if data gaps are noted as a result of this evaluation. Phase II activities will include, as warranted, the collection of additional subsurface soil samples and the installation of up to four (4) additional groundwater monitoring wells, one (1) downgradient to existing MW-2, two (2) cross-gradient to existing MW-2, and one (1) downgradient to existing MW-2. Any additional monitoring wells requiring installation would be installed within the confines of the grid boundary noted on attached Figure 3.

DIGGING WORK CLEARANCE REQUEST

MCBH Kaneohe Bay, Facilities Department

Project Title: Extended Site Inspection (ESI) for Fire Fighting Training Area (FFTA)	FOR FACILITIES USE ONLY **DWCR NO:**

Continuation:

12a. DESCRIPTION OF WORK:

CLEARANCE REVIEW
(MCBH DEPARTMENTS)

Project Title: Extended Site Inspection (ESI) for Fire Fighting Training Area (FFTA)

FOR FACILITIES USE ONLY
DWCR NO:

ORGANIZATION	SPECIAL INSTRUCTIONS	SIGNATURE / DATE
13. FACILITIES DEPT — **A. * WATER LINES** WATER DRAINAGE LINES ***Phil Lum***, 257-2171 ext.**246**		
B. * SEWER DRAINAGE LINES ***Phil Lum***, 257-2171 ext.**246**		
C. * ELECTRICAL LINES ***Ron Hochbrueckner***, 257-2171 ext.**250**		
D. * FIBER OPTIC SYSTEM ***Ron Hochbrueckner***, 257-2171 ext.**250**		
14. PHYSICAL SECURITY * LAN/FIBER SYSTEM ***GySgt Scrabeck***, 257-8556, (or current POC)		
15. MILITARY POLICE TRAFFIC CONTROL ***Sgt Petty***, 257-1146 (or current POC)		
16. * FUELS DIVISION ***Ed Campbell*** 257-3187	Fuel Lines: ☐ Active ☐ Non Active ☐ N/A	
17. AT&T TELEPHONE * COMMUNICATIONS ***Rusty Walker,*** 257-2323 ext.**226** (or current POC)		
18. * CABLE TELEVISION OCEANIC ***L. Iha*** , 625-8443 Fax : 625-5888		
19. ENVIRONMENTAL ***Ron Yamada*** 257-6920 ext.**229** ***J. Cleghorn***, 257-6920 ext.**254**	☐ E.A. ☐ CATEX ☐ Other **Comments:**	
20. SAFETY ***Clayton Lihilihi***, 257-1830		
21. EXPLOSIVE SAFETY ***Clayton Lihilihi*** , 257-1830		
22. OTHER (Specify)		

***NOTE: YOU ARE REQUIRED TO TONE AREA .!**

DIGGING WORK CLEARANCE REQUEST

MCBH Kaneohe Bay, Facilities Department

Project Title:	FOR FACILITIES USE ONLY **DWCR NO:**

23. The contractor/excavating activity shall perform a general site survey prior to any excavation. You are ***Required*** to ***Tone Area*;** The activity will make every effort to locate unknown utilities posing a conflict with their work insofar as these utilities fall with the proposed excavation limits and are detectable by industry-standard underground utility locating equipment. If water valves; sewer, drain, or electrical manholes; recent trenching scars; or pavement trench patches are found where no utility line is shown on the drawings/sketches provided, the contractor/unit shall contact the undersigned prior to any excavation._____. **Initial/Date**

24. There are known existing primary utilities shown for the area in question ☑ **yes**
_____. **Initial/Date**

25. The equipment operator shall closely monitor the excavated material for significant changes in color, size (gradation) and type of material. Such changes may indicate the presence of an unmarked utility. If such changes are noted, the contractor/unit shall cease all excavation by equipment and probe by hand. If any questions arise, contact the undersigned. _____. **Initial/Date**

The contractor/excavating activity shall have an approved Digging Work Clearance Request at the work site at all times during excavation.

The Digging Work Clearance Request does NOT relieve the contractor/excavating activity from responsibility for any damage to underground utilities encountered during excavation.

All known existing primary utilities are shown on the attached sketches/drawings. Those not shown in the original sketches/drawings were added. The contractor/excavating activity shall locate each intersecting line and all other lines in the general vicinity of the excavation prior to any excavation. The utility lines shown on the drawings/sketches represents approximate locations only.

In case of emergency, contact **Emergency Shop**, Facilities Department, Maintenance Division, phone 257-2380.

NOTE:
If the actual work differs from the written Description of Work (Item No. 12 above)., this DWCR will be voided and MUST be Resubmitted.
This Dig Permit shall be TERMINATED 180 days after the signed approval date below unless otherwise noted.

Digging Work Clearance Request No.# _____ is hereby: ☐ Approved.
☐ Disapproved

_____.
LCDR Lance Lee, **LFP / Date**
FACILITIES DEPARTMENT,
257-2171, Ext. 223

APPENDIX 3-3

Final Action Plan to Address Erosion at Storm Drain Outlets

October 2015

Final

ACTION PLAN TO ADDRESS EROSION AT STORM DRAIN SYSTEM OUTLETS

Storm Water Management Plan

Marine Corps Base Hawaii

NPDES Permit No. HI 000007

Prepared by:

Marine Corps Base Hawaii

October 2015

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOH	State of Hawaii Department of Health
ECE	Environmental Compliance Evaluation
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
HDPE	High Density Polyethylene
ID	Identification
INRMP	Integrated Natural Resources Management Plan
MCB Hawaii	Marine Corps Base Hawaii
MCDC	Mokapu Central Drainage Channel
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
SWMP	Storm Water Management Plan

1 Introduction

As of the effective date, October 15, 2014, the Marine Corps Base Hawaii (MCB Hawaii) is required to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HIS000007 (referred to hereinafter as the "MS4 Permit"). The MS4 Permit includes authorized storm water and specified non-storm water discharges into Kaneohe Bay, Nuupia Ponds, Kailua Bay, and the Mokapu Central Drainage Channel (MCDC). Per the MS4 Permit, Part D.1.f.(3).(iv), MCB Hawaii is required to provide an Action Plan to Address Erosion at Storm Drain System Outlets (Outfalls). The MS4 Permit states:

> *Permit Requirements, Part D.1.f.(3).(iv):*
>
> *"Provide the DOH with an Action Plan to address erosion at its storm drain system outlets with significant potential for water quality impacts to be completed within one (1) year from the effective date of this permit, which shall identify outfalls to be addressed, explanation on the basis of their selection and an implementation schedule. The implementation schedule shall cover a five (5) year period. A status report on implementation of the plan shall be included in the Annual Report. The Permittee shall install velocity dissipators or other BMPs to reduce erosion at locations identified by periodic required inspections."*

The goal of this Action Plan is to continue to reduce erosion at MCB Hawaii outfalls posing a significant risk for impacting the water quality of receiving waters, through monitoring and implementation of effective and feasible Best Management Practices (BMPs).

2 Identification of Erosional Outfalls

2.1 Completed Erosion Control Studies and Projects

The MCB Hawaii Environmental Department (ENV) has conducted several ongoing studies and projects to identify and address its highest priority erosion issues on a watershed level. A continued focal point for erosion concerns within MCB Hawaii has been the landfill and Ulupau Crater area. The following three studies are useful references for measures that have been taken to address erosion at prioritized outfalls within these areas and others throughout MCB Hawaii:

1. *Final Marine Corps Base Hawaii Integrated Natural Resources Management Plan (INRMP), Update, 2012-2016* (2011). Prepared for MCB Hawaii, by the Environmental Compliance and Protection Department MCB Hawaii and Sustainable Resources Group Int'l Inc.
2. *Erosion Assessment with Recommendations: Outer Slopes and Southeast Shoreline, Ulupau Crater, Marine Corps Base Hawaii* (2007). Prepared for the ENV, by Sustainable Resource Group Int'l Inc.
3. *Landfill and Northeast Crater Catchment Erosion Assessment Report with Recommendations* (2004). Prepared for the ENV, by Sustainable Resource Group Int'l Inc.

The INRMP provides an extensive look at base wide ecosystem conservation plans. This goal-driven and active document is reviewed annually and necessary revisions/updates are made at least once every five years. The two erosion assessment studies conducted for the landfill and Ulupau contain detailed information and recommendations for MCB Hawaii's erosion project focus areas, which have since been addressed, and are also referred to in the INRMP.

A list of projects completed in the previous INRMP are available in the updated 2011 INRMP, in Tables E2-1 and E2-5. For the purpose of this report, completed projects related to erosion control are summarized in Table 1.

Table 1: Erosion Related Projects Completed from the Previous INRMP

Project Number	Project Description	Project Status
HI0920013M	Install Erosion BMPs - Southeast Crater Shoreline: The project addressed recommendations made in the erosion assessment for outer slope and southeast shoreline of Ulupau Crater. An unlined dirt ditch was lined with corrugated high density polyethylene (HDPE), and eroding slopes along southern shoreline cliffs were stabilized with waddles. Drainage features at the Weapons Range Parking Lot were also improved.	Completed
HI0920014M	Install Erosion BMPs - North-Facing Crater Slopes: The project addressed recommendations made in the erosion assessment for the outer slope and southeast shoreline of Ulupau Crater. An unlined dirt ditch was lined with corrugated HDPE, and eroding slopes along the north-facing side of Ulupau Crater cliffs were stabilized with waddles.	Completed
HI60834	Evaluation Study - Percolation Ditch Wetland Improvements: Initial project was completed in 2007. Continued issues with encroachment of the invasive California grass and water lilies into the wetland.	Completed 2010
HI20012	Sustain Weapons Range-Install Erosion Control BMPs: Work included access road improvements, improving drainage, and installing erosion BMPs.	Completed 2008
HI20010	Design/Construct Improved MCDC: This project included replacement of three acres of weed-choked land along the west bank, with a meandering, re-sloped corridor to increase flood storage capacity.	Completed 2008
HI20013	Environmental Compliance Evaluation (ECE)-Mandated Erosion Assessment of MCB Hawaii Properties	Completed 2004

Featured structural erosion/sediment control measures that are in place at MCB Hawaii to improve water quality at priority outfalls are summarized below:

Debris/Sediment Collection

- Wetlands:
  1. Nuupia Pond Complex (Sediment Basin/Storm Water Storage)
  2. Hale Koa (Sediment Basin/Storm Water Storage)
  3. Temporary Lodging Facility Wetland (Sediment Basin/Storm Water Storage)
  4. Salvage Yard Wetland (Sediment Basin/Storm Water Storage)
  5. Motor Pool (Filter Runoff)
  6. Percolation Ditch (Sediment Basin/Storm Water Storage)
- Concrete debris collector & sediment basin installed at inlet to sediment basin installed along the restored portion of MCDC
- Two debris/sediment collectors have been installed at inlets to the lined drainage channel starting at Uli Street along Daly Road
- Sediment trap (near Buildings 6002 & 6003) and retention basin located before discharge point to Nuupia Ponds

Erosion Controls

- To address erosion on the southeast shoreline, the earthen drainage channel ending at Middaugh Street, adjacent to Daly Road has been lined with corrugated HDPE to act as a velocity dissipator and prevent erosion.
- To address erosion on the north –facing Ulupau Crater slopes, the earthen drainage channel starting at Uli Street along Daly Road has been lined with corrugated HDPE to act as a velocity dissipator and prevent erosion.
- Golf Course drainage channel perpendicular to Manning St. has been flattened enough to allow access for maintenance, allowing vegetation to grow back.

Ulupau Crater continues to be a priority area for erosion concerns. Post-project evaluations are in place, as listed in Section 2.2, to consistently evaluate effectiveness of existing erosion control measures and provide adaptive management, as needed.

2.2 Active/Planned Erosion Control Projects (2012-2016)

Projects that were active or planned during the INRMP (2012-2016) Five Year Implementation Plan, related to erosion control at MCB Hawaii, are listed in Table 2.

Table 2: Active or Planned Erosion Related Projects in the INRMP Update 2012-2016

INRMP Objective No.	Project Description
7.2.1	Maintain current wetland GIS boundary layers.
7.2.4	• Ensure assigned personnel obtain appropriate training on wetland delineation, regulations, and/or monitoring protocols. • Explore interagency cooperative projects to implement regional wetland enhancement and monitoring opportunities.
7.3.1	• Initiate systematic monitoring of ambient erosion conditions and implement appropriate follow-on actions. • Conduct follow-on monitoring of erosion control project results and adaptive management. • HI0920013M Install Erosion BMPs: Southeast Crater Shoreline (Post-Project Evaluation Study). • HI0920014M Install Erosion BMPs: North-Facing Crater Slopes (Post-Project Evaluation Study)
7.3.2	HI20010 Watershed Repair/Restore, MCDC (Post-Project Evaluation Study)
7.3.3	• Review and update all relevant plans and projects to integrate watershed BMPs • Identify and assist appropriate personnel to incorporate BMPs into operational guidelines and SOPs.
7.3.4	• Ensure relevant personnel obtain appropriate training on watershed BMPs. • Display/distribute *available* presentation materials on watershed health, assessment and BMPs. • Develop/distribute *additional* presentation materials on watershed health, assessment and BMPs.

2.3 Action Plan for Identification of Erosion Areas

As part of its continued commitment to reduce erosion at priority outfalls, MCB Hawaii's on-going identification and selection of erosional hot spots will be based on:

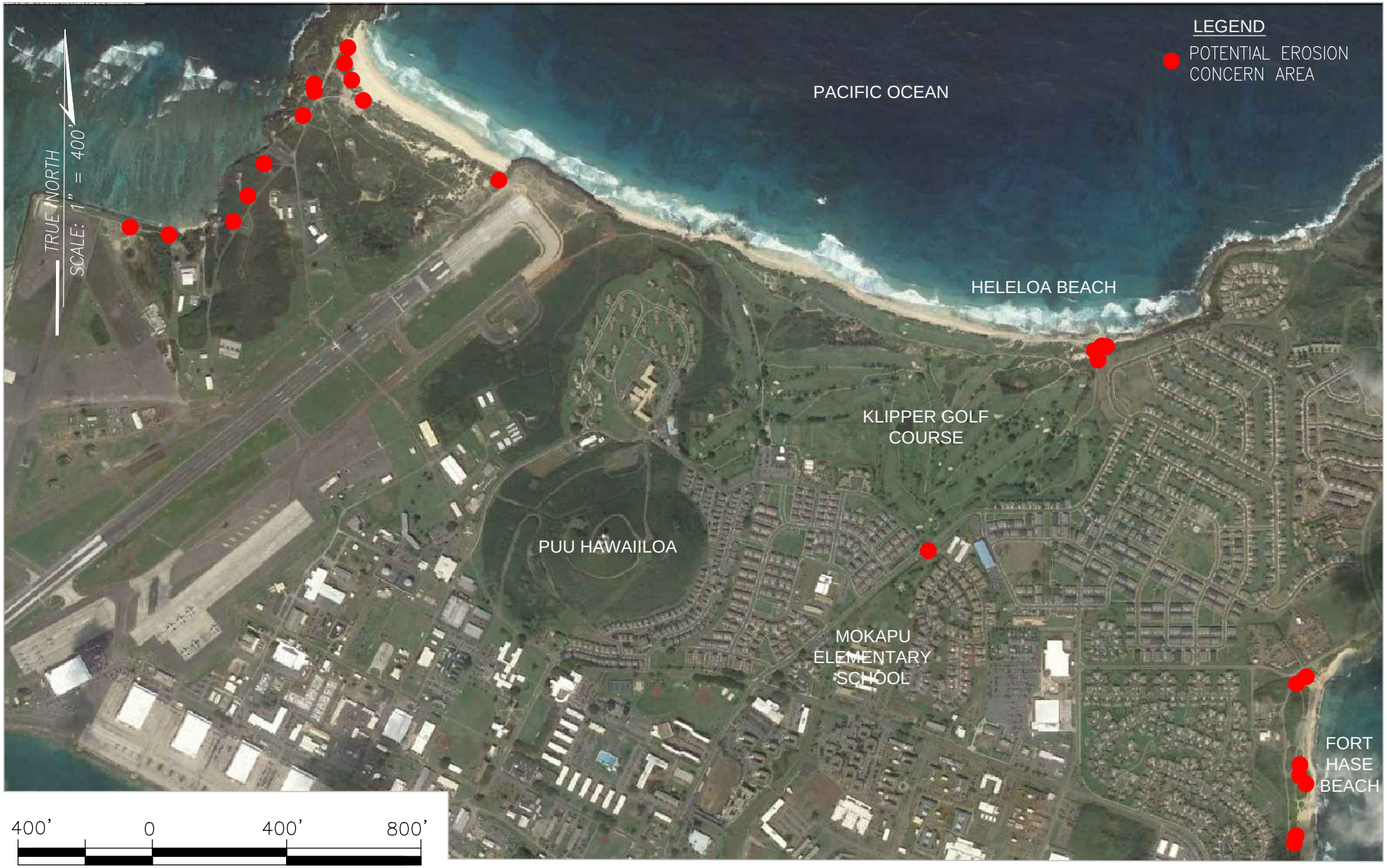
- Preliminary verification of existing priority erosional outfalls.
- Follow-up evaluations, included as part of active or planned erosion related projects, during which any new potential erosional hot spots will be identified.
    - The *Erosion Assessment with Recommendations: Outer Slopes and Southeast Shoreline, Ulupau Crater, Marine Corps Base Hawaii (2007)* identified potential areas of concern that were located outside of the completed corrective action project focus areas (see attached Figure 1). General site inspections for erosion will be conducted at these locations during the first year of inspections to be completed.
- Potential erosional hot spots brought to the attention of the ENV by the Base Inspector or MCB Hawaii residents.

Field inspections will be conducted using the attached "Erosional Area Inspection Checklist" and will be used to classify sites as low, medium, or high priority.

New high priority erosional hot spots will be ranked based on the following criteria:

- Immediate threat to public safety or risk of property damage;
- Proximity to and potential impact on receiving surface water;
- Level of onsite usage; and
- Constructability of the recommended erosion control measure.

A summary of these efforts will be included in the Annual Report.



400' 0 400' 800'

SCALE: 1"=400'

SOURCE: SUSTAINABLE RESOURCES GROUP INTERNATIONAL, INC. ,2007. FIGURE 13 MCBH–KB: EROSION AND RUNOFF AREAS OF CONCERN. EROSION ASSESSMENT WITH RECOMMENDATIONS FOR OUTER SLOPES AND SOUTHEAST SHORELINE OF ULUPAU CRATER, MARINE CORPS BASE HAWAII, FINAL REPORT, MAY 2007.

DATE: OCT 2015	PROJECT TITLE: MCB HAWAII STORM WATER MANAGEMENT PLAN - ACTION PLAN TO ADDRESS EROSION AT STORM DRAIN SYSTEM OUTLETS	
FIGURE TITLE: POTENTIAL EROSIONAL AREAS		FIGURE NO.: 1

3 Proposed Actions

Moving forward, MCB Hawaii's program for erosion control at storm water outfalls will be based on the following activities:

- The MCB Hawaii Facilities Department's Geographic Information System (GIS) database will be updated to create an inventory of existing erosional outfalls and erosion control BMPs. Existing internal databases will be used to track inspection and maintenance frequency.
- MCB Hawaii will implement design of permanent erosion control measures for high priority sites, to address both sediment accumulation and velocity of flow.
    - If a permanent solution for a high priority erosion hot spot cannot be constructed immediately, the site will be addressed with temporary erosion controls, such as silt fences, bio-filter socks, geotextiles, etc., within 18 months of the EDOP.
- Following preliminary investigations, inspection frequency will be based on the outcome of previous inspections. If appropriate BMPs have been installed to address erosion concerns or if there are no reported high priority erosion concerns after two consecutive rainfall events, a site will be downgraded to a reduced inspection frequency:
    - Low priority sites shall be inspected at least once every five (5) years.
    - Medium priority sites shall be inspected at least biannually.
    - High priority sites shall be inspected at least annually.
- Training will be provided to designers, contractors, and maintenance staff on optimizing use of BMPs, and to ensure the use of appropriate BMPs during all stages of the implementation of temporary and permanent BMPs.
- All applicable documents and field manuals, provided with MCB Hawaii's SWMP update, will be used to guide implementation, inspection, and maintenance of new and existing erosion control measures.

Annual status reports will be used to evaluate and revise the Action Plan to Address Erosion at Storm Drain System Outlets, as needed.

4 Proposed Implementation Schedule

Based on the outcome of preliminary verification inspections and the number of high priority sites identified, if any, the following implementation schedule is proposed. The implementation year is the year in which the proposed repair is scheduled to be completed; however, this schedule is subject to change due to funding availability, permitting delays, or other unforeseen circumstances. Changes to the implementation schedule will be provided in the Annual Report.

Table 3: Implementation Schedule

Task	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
• Conduct Preliminary Verification Inspections	X				
• Update GIS Database	X	X	X	X	X
• Outline Ranking of High Priority Erosional Hot Spots, if any	X				
• Setup Maintenance and Field Inspection Plan		X			
• Implementation of Temporary Erosion Control Measures at High Priority Sites, as needed	X	X	X	X	X
• Implementation of Maintenance and Field Inspection Plan		X	X	X	X
• Design and Appropriation of Funding for Permanent Erosion Controls:					
○ Priority #1		X			
○ Priority #2			X		
○ Priority #3				X	
• Implementation of Permanent Erosion Controls:					
○ Priority #1			X		
○ Priority #2				X	
○ Priority #3					X
• Update Internal Database for Tracking of Maintenance and Inspections, as needed		X	X	X	X
• Erosion Control BMP Program Status Updates (in Annual Report) – Evaluation		X	X	X	X

5 References

1. *Final Marine Corps Base Hawaii Integrated Natural Resources Management Plan (INRMP), Update 2012-2016* (2011). Prepared for MCB Hawaii, by the Environmental Compliance and Protection Department MCB Hawaii and Sustainable Resources Group Int'l Inc. November 2011.
2. *Erosion Assessment with Recommendations: Outer Slopes and Southeast Shoreline, Ulupau Crater, Marine Corps Base Hawaii* (2007). Prepared for the ENV, by Sustainable Resource Group Int'l Inc. May 2007.
3. *Landfill and Northeast Crater Catchment Erosion Assessment Report with Recommendations* (2004). Prepared for the ENV, by Sustainable Resource Group Int'l Inc. June 2004.

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Attachment

Erosional Area Inspection Checklist

Erosional Area Field Inspection Checklist

Inspection Date:		Name and phone # of those present during inspection:	
Time:			

Site Information

Site name:	Location/ watershed:

Facility Description:

Point of Contact Name/Position: _____

Phone Number: _____ Email: _____

Inspection: ☐ Announced ☐ Unannounced	Approximate size of site (acres)?

Type of Inspection: ☐ Preliminary Investigation ☐ Construction Site ☐ Post-project Monitoring

Weather during inspection:	Amount of Rainfall in past 24 hrs (inches): _____

Site Drainage Description:

General Discharge Observation *(if inspection performed during a rain event)* and Location(s):

(For Follow-up Inspections) Date of last inspection: _____

Deficiencies Noted in Last Inspection:

Erosion Controls/Concerns

(*Identify existing measures observed on site and provide general comment/deficiencies where applicable*)

Are potential sources of sediment protected? Yes ☐ No ☐

Is there storm water discharge to unprotected areas? Yes ☐ No ☐

Deteriorating or unmaintained vegetation? Yes ☐ No ☐

Steep/unprotected slopes? Yes ☐ No ☐

Are appropriate BMPs in place to prevent erosion due to activities associated with construction (such as wash-down areas, silt fences, bio-filter socks, inlet protection, etc.)? Yes ☐ No ☐

Are structural BMPs installed correctly and in good condition? Yes ☐ No ☐

Is there evidence of deficiencies in the storm drain system? *(such as overflow of inlets, basins, etc.)* Yes ☐ No ☐

Do existing structures appear to have adequate maintenance? Yes ☐ No ☐
(Less than ½ full of sediment and debris, vegetated channels/basins are not overgrown, etc.)

Is there evidence of erosion onsite? *(gullies, rills, exposed soil, steep/eroded slopes, etc.)*	**Is there evidence of sediment leaving the site?** *(sediment accumulation/plumes, stained pavement, etc.)*
Yes ☐ No ☐	Yes ☐ No ☐

If any of the above questions are answered 'yes', describe below:

_____

_____

Have past deficiencies been addressed: Yes ☐ No ☐ *(if no, describe below)*

_____

_____

Describe structural BMPs in place? Permanent ☐ Temporary ☐ Both ☐ N/A ☐

☐ Inlet Protection
☐ Sediment Basin
☐ Bio-filter Sock
☐ Silt Fence
☐ Vegetated Swale
☐ Sediment/Debris Collecting Inlet
☐ Energy Dissipator
☐ Erosion Control Mats/Geotextiles
☐ Mechanical Separator
☐ Filter berm
☐ Slope Stabilization

☐ Lined Drainage Channel
☐ Outlet Protection(Headwall)
☐ Removable Inlet Filter
☐ Other *(describe)*: _____

Describe Condition and Observed Structural/Maintenance Deficiencies *(if any)*:

_____

_____

_____

_____

_____

(If there is no observed erosion and no deficiencies noted in existing BMPs)

Are existing BMPs consistent with applicable plans, field manuals and SWMPP requirements? Yes ☐ No ☐
If no, describe:

Photos Taken: Yes ☐ No ☐
Photo Reference IDs:

Erosional Area Priority Level

Does any deficiency pose a potential risk to public safety or of property damage? Yes ☐ No ☐
(if yes, site is high priority)

Do deficiencies impair current usage of the site? Yes ☐ No ☐

Does runoff from this site impact other areas? Yes ☐ No ☐

What is the name and proximity to receiving surface water? _____

Is there an observable impact on the receiving water quality? Yes ☐ No ☐

Based on findings, this site is:

☐ Does not pose an erosion concern

☐ LOW PRIORITY – No observable erosion concerns. Condition of vegetation or structural BMPs poses a potential for an erosion concern to develop.

☐ MEDIUM PRIORITY – Observed erosion concerns and evidence of sediment leaving the site or affecting locations downstream.

☐ HIGH PRIORITY – Immediate risk for impacts to water quality, nearby/downstream property, and/or public safety.

Recommendations/Additional Notes:

_____

_____

_____

_____

_____

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

APPENDIX 3-4

Final Enforcement Response Plan

October 2015

Final

ENFORCEMENT RESPONSE PLAN

Storm Water Management Plan

Marine Corps Base Hawaii

NPDES Permit No. HI 000007

Prepared by:

Marine Corps Base Hawaii

October 2015

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APPENDIX A - Reporting and Corrective Procedures for Construction Storm Water Inspection (January 2015)

List of Acronyms and Abbreviations

BMP	Best Management Practice
CCH	City and County of Honolulu
DOE	State of Hawaii Department of Education
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
ERP	Enforcement Response Plan
GIS	Geographic Information System
JBPHH	Joint Base Pearl Harbor-Hickam
MCB Hawaii	U.S. Marine Corps Base Hawaii
MCCS	Marine Corps Community Services
MCD	Facilities Maintenance Control Division
MS4	Municipal Separate Storm Sewer System
MS4 Permit	U.S. Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
PPV	Public-Private Venture (Housing)
ROICC	Resident Officer in Charge of Construction
sf	Square Feet
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan
SWPPP	Storm Water Pollution Prevention Plan
U.S.	United States

1 Introduction

As of the effective date, October 15, 2014, the Marine Corps Base Hawaii (MCB Hawaii) is required to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HIS000007 (referred to hereinafter as the "MS4 Permit"). The MS4 Permit includes authorized storm water and specified non-storm water discharges into Kaneohe Bay, Nuupia Ponds, Kailua Bay, and the Mokapu Central Drainage Channel (MCDC). Per the MS4 Permit, Part D.1.d.(6) MCB Hawaii is required to provide an Enforcement Response Plan. The MS4 Permit states:

Construction Site Runoff Control, Part D.1.d.(6)

"Enforcement – Within one (1) year from the effective date of this permit, the Permittee shall:

(i) Establish policies for enforcement and penalties for those in non-compliance with Part D.1.d.(2) [Requirement to implement BMPs] requiring the implementation of standards, and

(ii) Develop and implement an Enforcement Response Plan to include written procedures for appropriate corrective and enforcement actions, and follow-up inspections when an inspected project is not in full compliance with its requirements, other permits, and any other applicable requirements under the NPDES permit program."

Enforcement is also required within other parts of the MS4 Permit as follows:

Illicit Discharge Detection and Elimination (IDDE), Part D.1.c.(5)

"Enforcement – Within one (1) year after the effective date of this permit, the Permittee shall:

(i) Establish policies for enforcement and penalties for entities found to be in noncompliance with requirements developed in accordance with Part D.1.c.(1) [Connection Permits for private drain connections], including for persons illegally discharging pollutants to its MS4, and

(ii) Pursue enforcement actions against entities in non-compliance with its requirements, with illegal drain connections, and illegally discharging pollutants to its MS4 without direct connections."

Industrial and Commercial Activities Discharge Management Program, Part D.1.g.(7)

"Enforcement Policy for Industrial and Commercial Facilities and Activities - Within one (1) year of the effective date of this permit, the Permittee shall establish and implement its own polices for enforcement and penalties for industrial and commercial facilities which have failed to comply. The policy shall be part of an overall escalating enforcement policy and must consist of the following:

- *Conducting inspections.*
- *Issuance of written documentation to a facility representative within 30 calendar days of storm water deficiencies identified during inspection. Documentation must include copies of all field notes, correspondence, photographs, and sampling results, if applicable.*
- *A timeline for correction of the deficiencies.*

- *Provisions for re-inspection and pursuing enforcement actions, if necessary.*

In the event the Permittee has exhausted all available sanctions and cannot bring a facility or activity into compliance with its policies and this permit, or otherwise deems the facility or activity an immediate and significant threat to water quality, the Permittee shall provide e-mail notification to cleanwaterbranch@doh.hawaii.gov, Attn: Enforcement Section Supervisor within one (1) week of such determination. E-mail notification shall be followed by written notification and include a copy of all inspection checklists, notes, photographs, and related correspondence in pdf format (300 minimum dpi) in accordance with Part A.6 within two (2) weeks of the determination. In instances where an inspector identifies a facility that has not applied for the General Industrial Storm Water permit coverage or any other applicable NPDES permit, the Permittee shall provide email notification to the DOH within one (1) week of such determination."

The primary objectives of the ERP are to:

1. Ensure base-wide compliance with the MS4 Permit and updated Storm Water Management Plan (SWMP).
2. Improve records and tracking information to create an updated inventory of construction projects, and to facilitate routine and follow-up inspections which will ultimately help to prevent illicit runoff from reaching receiving surface waters.

2 Existing Policy and Standards

MCB Hawaii is unique from most MS4s in that within its property boundary, it owns the property and almost all of the facilities, and provides funding for a majority of work. For the purpose of this document, the term "tenants" will be used to describe all individuals and organizations present within MCB Hawaii. This includes, but is not limited to military personnel and their dependents, construction and maintenance contractors, civilian employees, commercial businesses, industrial facilities, schools, and recreational facilities.

All tenants on base are subject to the rules and regulations of the new MS4 Permit, and the subsequent SWMP. The revised permit and plans supersede previous versions of these documents.

Due to the nature and internal structure of MCB Hawaii, the most effective means for enforcement is escalation of unaddressed violations to the next higher authority. Although unaddressed violations can be escalated as high as the Base Commander, this has not been an issue in the past due to the inherent threat of discharge or eviction from MCB Hawaii.

2.1 Management of MS4 Compliance at MCB Hawaii

MS4 Permit violations can be reported through various inspection procedures or through formal complaints by tenants. The entity responsible for standard inspection procedures is dependent on the type of facility or project, organized as follows:

- General Base-wide Inspections: Routine inspections are carried out by the Base Inspector and crew. These are intended to promote overall compliance with all established rules and regulations. The Base Inspector is also responsible for following up with all written or verbal complaints received via mail, email, or the complaint hotline.
- Construction/Post-Construction Sites: Oversight for MS4 compliance of construction projects will comply with the "Reporting and Corrective Procedures for Construction Storm Water Inspections, January 2015," submitted by MCB Hawaii to meet the requirements in Section D.1.d.(5)(iv) of the MS4 Permit (see attached). Construction projects are split into two main categories at MCB Hawaii, contracted projects and in-house and maintenance construction.

    1. Contract Projects:

        Projects contracted by the Navy Facilities Engineering Command (NAVFAC) are managed through the Resident Officer in Charge of Construction (ROICC), Kaneohe. In these situations the ROICC manages required inspections for safety issues and environmental compliance. Inspection records are tracked internally at the ROICC Office and are available to the MCB Hawaii Environmental Department (ENV).

        The Department of Education (DOE), Marine Corps Community Services (MCCS), and Housing Public Private Venture (PPV) Forest City also contract construction projects and are responsible for ensuring communication and enforcement of contractor compliance with MS4 Permit regulations. Inspection records are tracked internally by the entity involved and are available to the ENV. In accordance with the MS4 Permit requirements, ENV will conduct monthly inspections of construction projects completed by these tenants.

2. In-house and Maintenance Construction Projects:

   These projects are managed by the Facilities Maintenance Control Division (MCD) and are typically less than 5,000 square feet (sf) and/or related to emergency repairs. ENV will conduct monthly inspections, and tracking as required by the MS4 Permit. At the ENV's discretion, special consideration will be given to emergency projects to account for the urgent nature of these projects.

- Housing PPV: Forest City is responsible for communicating and enforcing MS4 Permit requirements with all tenants of the PPV Housing. The Base Inspector conducts regular inspections of the PPV Housing areas, as part of the general base-wide inspections, to ensure compliance of residents.
- Illicit Discharge: The ENV currently conducts annual illicit discharge inspections of all industrial areas listed in Part E of the MS4 Permit.
- Commercial: Commercial sites within MCB Hawaii are managed by MCCS. The Base Inspector conducts regular inspection of these facilities as part of the general base-wide inspections.
- Industrial: The ENV conducts annual inspections of industrial areas listed in Part E of the MS4 Permit.
- Schools: Mokapu Elementary's storm water program is managed and funded by the DOE. The Base Inspector conducts regular inspection of school facilities as part of the general base-wide inspections.
- Formal Complaints: Written or verbal complaints received via mail or the complaint hotline are followed-up by the Base Inspector.

At the discretion of the ENV, all facilities are subject to additional periodic inspection by an ENV qualified inspector(s). See Table 1 for the Organization of MCB Hawaii's Oversight for MS4 Compliance.

Table 1: Organization of MS4 Compliance Oversight

Source of Storm Water Runoff	Responsible for Corrective Action	Responsible for Inspections	Required Permits/ Agreements	Recordkeeping and Tracking
General Basewide Storm Water Issues	Varies	Base Inspector, ENV	None	Varies
NAVFAC Construction by Outside Contractor	Contractor	ROICC	Contract documents, including plans & specifications Project-specific NPDES Permit or connection/discharge permit (if applicable)	ROICC
Construction & Maintenance – In-house	MCD	MCD, ENV	Project-specific NPDES Permit or connection/discharge permit (if applicable) None (If no permits needed)	ENV
DOE – Mokapu Elementary School	DOE (State)	DOE, ENV	Lease Agreement Project-specific NPDES Permit or connection/discharge permit (if applicable)	DOE
PPV Housing	Resident (Residential Lots) Forest City (Common Areas)	Base Inspector, ENV	Lease Agreement Project-specific NPDES Permit or connection/discharge permit (if applicable)	Forest City
MCCS – Commercial Areas	Commercial Tenant	ENV	Lease Agreement Project-specific NPDES Permit or connection/discharge permit (if applicable)	MCCS
Industrial Areas	Facility Manager	ENV	Facility-specific Pollution Control Plan	ENV
Written/Verbal Complaints	Varies	Base Inspector, ENV	Varies	Varies

3 Tenant Agreements

The DOE, commercial, and PPV Housing tenants are required to follow updated MCB Hawaii SWMP requirements through primary lease agreements with MCB Hawaii. Secondary tenants, that have leases with any of these three entities, are responsible for complying with the more stringent requirements of either the MCB Hawaii SWMP or their secondary lease, as applicable. In all cases the primary lease holder is accountable for all communications and enforcement of MCB Hawaii MS4 Permit regulations among its tenants. Commercial businesses are overseen by MCCS. The PPV Housing area is managed by Forest City, which signs secondary lease agreements with all residents. The DOE manages and funds MS4 compliance for Mokapu Elementary School. It is noted that the Mokapu Elementary School is not part of the DOE MS4 and is subject only to the MCB Hawaii MS4 permit.

With regard to MCCS and DOE tenant agreements, compliance with MS4 permit requirements is an enforceable environmental requirement. Per the Termination Clause in the Base / Entity Agreement inclusive of environmental, the Commanding Officer (CO) has the authority to evict a tenant and / or take other suitable enforcement action. This authority is granted under the Supported Agreement Directive DODI 4000.19. The standard period of notification of noncompliance is 180 days during which time the CO may consult the ENV for any clarifications.

MCB Hawaii ENV will coordinate with MCB Hawaii Real Estate to receive an inventory of the existing properties and the points of contact for any observed MS4 Permit violations.

Regular operations and maintenance (O&M) activities in school, commercial, and residential areas will continue to be monitored through routine general base-wide inspections. For contracted construction projects, it is the primary lease holder's responsibility to ensure communication and enforcement of MCB Hawaii MS4 Permit regulations with contractors. These construction projects are also subject to the "Reporting and Corrective Procedures for Construction Storm Water Inspections, January 2015"and applicable contract requirements; in the event of a discrepancy, the more stringent requirement will apply. Periodic site inspections will be conducted by an ENV-qualified inspector, at the discretion of the ENV. The ENV will work directly with DOE, MCCS, Forest City, or a corresponding representative, where applicable.

In the future MCB Hawaii may work with the Navy legal department to develop contract language for new and renewing tenants that will facilitate inspection procedure tracking and overall SWMP compliance.

4 Inspections and Reporting Procedures

Outside of its own inspections, the ENV will be notified of MS4 Permit violations detected during routine inspections if:

1. The Base Inspector identifies a violation during general base-wide inspections.
2. A MS4 Permit violation is not internally, and promptly resolved by processes in place through construction contracts with the ROIC, MCCS, PPV or DOE.

Upon ENV notification, the violation will be classified according to severity of the offense, as follows:

Critical Deficiency: A deficiency that poses an immediate risk of discharge of pollutants to a storm drain MS4 system, surface waters or State waters. Critical deficiencies include, but are not limited to, the following examples:

- Any evidence or observed discharge of non-storm water to the storm drain system, surface waters, or State waters generated by construction activity;
- No Storm Water Pollution Prevention Plan (SWPPP) document or NPDES permit;
- Absence of perimeter controls and/or linear barriers required by the SWPPP document;
- There are identified storm drain inlets, surface waters, or State waters within or adjacent to the project site in close proximity to disturbed soil areas without control measures in place that pose an immediate threat of untreated storm water discharges;
- Work in an active stream channel or other surface water body without proper implementation of required BMPs; and
- Any presence of any spilled oil or hazardous materials near to unprotected storm drain inlets, surface waters, or State waters.

Major Deficiency: A deficiency that is a significant issue that could result in the discharge of pollutants to the storm drain system, surface waters or State waters. Major deficiencies include, but are not limited to, the following examples:

- Linear barriers and/or perimeter controls in areas tributary to a water body or drain inlet that are installed as required by the SWPPP document, but are not functional, such as silt fences that are not anchored properly, have collapsed, or are overwhelmed by accumulated sediment;
- Hazardous materials or waste stored within a project without containment or implementation of BMPs;
- Any fluid spills covering more than one square yard and/or are adjacent to protected storm drain inlets, surface waters, or State waters;
- Sediment tracking more than 50 feet from project entrance/exit location(s);
- Expansion of the active disturbed soil area limit without written approval;

- Soil stabilization and sediment controls are not installed in accordance with the current SWPPP document/ BMP site map;
- Sediment controls are installed in accordance with the SWPPP document, but there is a large unstabilized disturbed soil area with insufficient controls down gradient to prevent the discharge of untreated storm water to the storm drain system, surface waters, or State waters if a rain event generates runoff; and
- Dust from project site visibly blowing off the site and into storm drain conveyances or adjacent surface water bodies.

Minor Deficiency: A deficiency that does not pose a threat of discharge of untreated storm water or pollutants to the storm drain system, surface waters, or State waters, but are not in direct conformance with the SWPPP document. Minor deficiencies include, but are not limited to, the following examples:

- BMPs are not deficient, but are not consistent with the SWPPP plan;
- SWPPP does not reflect current operations and an amendment is recommended;
- Linear barriers and/ or perimeter controls are properly installed according to the SWPPP document, but require minor maintenance;
- Sediment controls are installed per the SWPPP, but not properly maintained;
- Site inspections by project staff are not being conducted at the required frequencies;
- Non-storm water or waste management BMPs that are improperly maintained;
- Any fluid spills covering less than one square yard and not adjacent to storm drain inlets, surface waters, or State waters;
- Evidence of active wind erosion on unstabilized slopes/stock piles;
- Minor tracking less than 50 feet from project entry/exit locations; and
- Major deficiencies which are corrected prior to the inspector leaving the site.

ENV will evaluate the reported violation and classify it is a critical, major, or minor deficiency. At this time the ENV will provide a recommendation and deadline for corrective action, as well as required follow-up activities/inspections. Deadlines and follow-up procedures are dependent on the severity of the offense, as follows:

- Critical Deficiencies: ENV will immediately provide verbal notification to the responsible tenant/manager. ENV will document the issue using the approved inspection checklist, photograph log and internal project tracking system, and send a written notification with an attached inspection checklist containing photographs to the responsible tenant and MCB Hawaii project manager(s), if applicable, to explain the site nonconformities. ENV will ensure that corrective actions for all critical deficiencies are initiated immediately and completed as soon as possible. Deficiencies that result in discharge to receiving waters will be adequately corrected by close of business on the day the deficiency is identified. The tenant and project manager(s), if

applicable, will provide ENV daily updates and submit daily progress reports documenting the corrective actions taken and the progress made until completion. ENV will complete a final inspection to verify that the corrective actions have been completed and adequately address the deficiencies.

ENV will immediately notify DOH if work is being completed without appropriate permits or if there is a discharge to State waters that exceeds reportable quantities or exceeds water quality standards.

- Major Deficiencies: ENV will immediately provide verbal notification to the responsible tenant/manager. ENV will document the issue using the approved inspection checklist, photograph log and internal project tracking system and send a written notification with an attached inspection checklist containing photographs to the responsible tenant and MCB Hawaii project manager(s), if applicable, to explain the site nonconformities. ENV will follow-up to ensure all major deficiencies are addressed or corrected as soon as possible, but in no event later than five (5) calendar days after the deficiency is identified or before the next forecasted rain event, whichever is sooner. The tenant and project manager(s), if applicable, will document the corrective actions taken and submit a response report to the ENV within five (5) calendar days of completion. ENV will complete a final inspection to verify that the corrective actions have been completed and adequately address the deficiencies.
- Minor Deficiencies: ENV will document the issue using the approved inspection checklist, photograph log and internal project tracking system. The responsible tenant and MCB Hawaii project manager(s), if applicable, will be notified verbally of any non-conformities at the end of the inspection and provided an emailed copy of the inspection form (with attached photographs) within 48 hours of the inspection (normal business days). A response from the tenant and project manager(s), if applicable, documenting the corrective action taken to address the identified issues is expected within five (5) calendar days from receiving the completed inspection form.

All inspection forms will be tracked internally by ENV for monitoring of follow-up activities. Problems that have not been sufficiently addressed within the time period will become subject to MCB Hawaii's enforcement policy.

After deficiencies have been properly addressed, follow-on inspections will be completed at least monthly to ensure that all deficiencies will continue to be addressed. Inspections will also be conducted based on public complaints. Upon three successive monthly site inspections that indicate, in total, no critical or major project BMP and storm water control deficiencies or less than six minor deficiencies with no more than three minor deficiencies in one month, the ENV may decrease inspection frequency to quarterly per the permit. This will be at the discretion of the ENV qualified inspector(s). However, if under quarterly inspection frequency, a critical deficiency is observed or three (3) or more minor deficiencies are detected, inspection frequency shall return to no less than monthly.

5 Enforcement Procedure

MS4 Permit violations that have been observed and are not adequately addressed within the specified time period, will be subject to the base enforcement procedure. The ENV enforcement procedures vary depending on whether the job is contracted or in-house.

Contracted Work: Violations related to contracted projects, such as construction projects initiated by NAVFAC, MCCS, or Forest City, or day-to-day commercial activities, etc., will use contract language to hold contractors accountable for oversight and compliance with conditions of MCB Hawaii's MS4 Permit. In these cases, the contract will be written to meet the intent of the MS4 regulations. The ENV will immediately be notified of any violations that are not addressed promptly, as required by MCB Hawaii's SWMP and/or the contract. The contracting entity will be given formal notice by the ENV Director with an appropriate deadline for action. IF the problem remains unchanged, the situation will be brought to the attention of the next higher authority.

In-house Work: Violations related to in-house work, that exceed the allotted mitigation time period will fall under enforcement by escalation through the chain of command for the base. Unaddressed issues are initially brought to the attention of the ENV Director, after which the responsible party will be given formal notice with an appropriate deadline for action. If the problem remains unchanged, the situation will be brought to the attention of the next higher authority.

Regardless of the type of project, the ultimate penalty for non-compliance of MS4 Permit regulations is eviction or discharge of the responsible party from MCB Hawaii. This is placed at the discretion of the Base Commander.

Table 2 displays a summary of the enforcement action procedure for MCB Hawaii.

Table 2: Enforcement Action Procedure Summary

OBSERVED DEFICIENCY	CRITICAL		MAJOR	MINOR
Immediate Response by ENV	Notify DOH (written and verbal) if there is a discharge to State waters that exceeds reportable quantities or exceeds water quality standards	Notify Responsible Party (verbal notice)	Notify Responsible Party (verbal notice at time of inspection, and written notice incl. photo documentation)	Notify Responsible Party (verbal notice at time of inspection; followed by written notice incl. photo documentation within 2 business days)
Maximum Allotted Time for Corrective Action[1]		Same day (close of business)	5 calendar days from written notice -OR- prior to storm event (whichever comes first)	5 calendar days from verbal notice
Follow up Inspection Frequency		Minimum once a month for 3 months	Minimum once a month for 3 months	Minimum once a month for 3 months
Reduced Inspection Frequency[2]		Quarterly[2]	Quarterly[2]	Quarterly[2]

Notes:

1. ENV will document all issues using the approved inspection checklist, photograph log and internal project tracking system.
2. Insufficient action from the responsible party during the specified time will be elevated to the MCB Hawaii ENV Director. This will be escalated as needed until either the deficiency has been mitigated or the Base Commander is involved.
3. If no critical or major deficiencies or less than 6 minor deficiencies (no more than three in one month) inspections can be reduced from monthly to quarterly at the discretion of ENV.

6 References

Reporting and Corrective Procedures for Construction Storm Water Inspections (2015). Prepared for the Marine Corps Base Hawaii by Environmental Compliance & Protection Department, Marine Corps Base Hawaii. January 2015.

APPENDIX A

Reporting and Corrective Procedures for Construction Storm Water Inspection

January 2015

REQUIREMENT

In accordance with the Marine Corps Base (MCB) , Hawaii Municipal Separate Storm Sewer System (MS4) Permit Number HI S000007 effective October 15, 2014, Part D.1.d.(5)(iv), MCB Hawaii is required to submit reporting and corrective procedures for construction site inspections. This document establishes construction site inspection, corrective actions, tracking and reporting procedures to ensure compliance with the MS4 permit requirements.

DEFINITIONS

The terms minor, major and critical when relating to deficiencies in this document are defined as the following:

Critical Deficiency: A deficiency that poses an immediate risk of discharge of pollutants to a storm drain MS4 system, surface waters or State waters. Critical deficiencies include, but are not limited to, the following examples:

- Any evidence or observed discharge of non-storm water to the storm drain system, surface waters, or State waters generated by construction activity
- No SWPPP document or NPDES permit
- Absence of perimeter controls and/or linear barriers required by the SWPPP document
- There are identified storm drain inlets, surface waters, or State waters within or adjacent to the project site in close proximity to disturbed soil areas without control measures in place that pose an immediate threat of untreated storm water discharges;
- Work in an active stream channel or other surface water body without proper implementation of required BMPs; and
- Any presence of any spilled oil or hazardous materials near to unprotected storm drain inlets, surface waters, or State waters

Major Deficiency: A deficiency that is a significant issue that could result in the discharge of pollutants to the storm drain system, surface waters or State waters. Major deficiencies include, but are not limited to, the following examples:

- Linear barriers and/or perimeter controls in areas tributary to a water body or drain inlet that are installed as required by the SWPPP document, but are not functional, such as silt fences that are not anchored properly, have collapsed, or are overwhelmed by accumulated sediment;
- Hazardous materials or waste stored within a project without containment or implementation of BMPs;
- Any fluid spills covering more than one square yard and/or are adjacent to protected storm drain inlets, surface waters, or State waters;
- Sediment tracking more than 50 feet from project entrance/exit location(s);
- Expansion of the active disturbed soil area limit without written approval

- Soil stabilization and sediment controls are not installed in accordance with the current SWPPP document/ BMP site map;
- Sediment controls are installed in accordance with the SWPPP document, but there is a large unstabilized disturbed soil area with insufficient controls down gradient to prevent the discharge of untreated storm water to the storm drain system, surface waters, or State waters if a rain event generates runoff; and
- Dust from project site visibly blowing off the site and into storm drain conveyances or adjacent surface water bodies.

Minor Deficiency: A deficiency that does not pose a threat of discharge of untreated storm water or pollutants to the storm drain system, surface waters, or State waters, but are not in direct conformance with the SWPPP document. Minor deficiencies include, but are not limited to, the following examples:

- BMPs are not deficient, but are not consistent with the SWPPP plan;
- SWPPP does not reflect current operations and an amendment is recommended;
- Linear barriers and/ or perimeter controls are properly installed according to the SWPPP document, but require minor maintenance
- Sediment controls are installed per the SWPPP plan, but not properly maintained;
- Site inspections by project staff are not being conducted at the required frequencies;
- Non-storm water or waste management BMPs that are improperly maintained;
- Any fluid spills covering less than one square yard and not adjacent to storm drain inlets, surface waters, or State waters;
- Evidence of active wind erosion on unstabilized slopes/stock piles;
- Minor tracking less than 50 feet from project entry/exit locations and
- Major deficiencies which are corrected prior to the inspector leaving the site

PROCEDURES

Permit Citation	Permit Requirement	MCB Hawaii Environmental Procedure
Part D.1.d(4)	Plan review and approval	MCB Hawaii Environmental will review all project SWPPP's and supporting documents. MCB Hawaii Environmental will verify that all documents meet HAR, Chapter 11-55, Appendix C, section 7 and approved BMP manual requirements by using an approved SWPPP document checklist. Comments and notes will be made to the document preparer if any SWPPP elements are omitted or any portion is believed insufficient. Deficiencies will be noted with the date comments were addressed by the document preparer to the satisfaction of MCB Hawaii Environmental.
Part D.1.d(5)i	Inspections	Prior to the start of any ground-disturbing activities, except for activities associated with the installation of BMPs at a site, the qualified MCB Hawaii Environmental inspector will inspect the site to verify BMPs have been properly installed to the SWPPP specifications. The inspector will document any site conditions having the potential for erosion and sediment runoff as a result of the project's construction activities. A spreadsheet will be used to verify all comments made by MCB Hawaii Environmental during the review process have been properly resolved.
Part D.1.d.(5)ii,	Inspection frequency	All contract, in-house and maintenance construction projects greater than one acre will be inspected at least monthly by an independent MCB Hawaii Environmental qualified construction inspector(s), who is familiar with the project SWPPP. Initial inspections will verify BMPs have been properly installed prior to the start of earth disturbing activities. The inspector(s) will use the attached "Construction Oversight Field Inspection Checklist" that will document any BMP deficiencies and inconsistencies between the approved SWPPP and project site conditions. The inspection form will include the date, inspection observations with photographs, potential noncompliance issue(s) and any necessary corrective actions needed to be addressed. Inspection forms will be sent (via email) to the construction contractor and the MCB Hawaii project manager(s) within 48 hours of the inspection (working business days). A photographic log will be kept to document all minor, major and critical issues observed on site. A response (via email) from the contracting project manager to MCB Hawaii Environmental verifying (with photographs, maps.ect) appropriate corrective action was taken to address the identified deficiencies is expected within 5 calendar days of receiving the inspection form.

		MCB Hawaii Environmental will track all inspections using an internal public share drive. Upon three successive monthly site inspections that indicate, in total, no critical or major project BMP and storm water control deficiencies or less than six minor deficiencies with no more than three minor deficiencies in one month, MCB Hawaii Environmental may decrease inspection frequency to quarterly per the permit. This will be at the discretion of the MCB Hawaii Environmental qualified inspector(s). However, If under quarterly inspection frequency, a critical deficiency is observed or three (3) or more minor deficiencies are detected, inspection frequency shall return to no less than monthly.
Part D.1.d(5).ii	Corrective actions and reporting	If any critical deficiencies are observed MCB Hawaii Environmental will immediately notify DOH verbally and in writing. MCB Hawaii Environmental will verbally notify the responsible construction contractor and ensure all critical deficiencies are addressed and adequately corrected before the close of business day on the day the deficiency is identified. In the event a major deficiency is detected, MCB Hawaii Environmental will immediately send a written notification with an attached inspection checklist containing photographs to the responsible construction contractor and MCB Hawaii project manager(s) explaining the site nonconformities. MCB Hawaii Environmental will ensure all major deficiencies are addressed or corrected as soon as possible, but in no event later than five calendar days after the deficiency is identified or before the next forecasted rain event, whichever is sooner. In the event a minor deficiency is detected, MCB Hawaii Environmental will document the issue using the approved inspection checklist, photograph log and internal project tracking system. The responsible construction contractor and MCB Hawaii project manager(s) will be notified verbally of any non-conformities at the end of the inspection and provided an emailed copy of the inspection form (with attached photographs) within 48 hours of the inspection (normal business days). A response from the contractor documenting the corrective action taken to address the identified issues is expected within 5 calendar days from receiving the completed inspection form. Per the permit, the MCB Hawaii Environmental i qualified construction inspector(s) will conduct follow-up inspections as needed, at least monthly to ensure site deficiencies have been properly addressed and all storm water controls are in proper working order. Inspections will also be conducted upon complaints

		from citizens or concerned groups. Unannounced and follow-up inspections will be conducted as necessary. For all projects, if the corrective measures are not completed, then the deficiency will be elevated to the MCB Hawaii Environmental Director.
	Record keeping	Electronic inspection reports, spreadsheets and supporting photographic logs will be kept on file with the MCB Hawaii Environmental Division. Records shall be kept for five (5) years in accordance with the NPDES permit.

Construction Oversight Field Inspection Checklist

Inspection Date:		Name and phone # of those present during inspection:	
Time:			

Site Information

Construction site name:	
Permit number:	Location/ watershed:
Inspection: ☐ Announced ☐ Unannounced	Surface waters located within 50 feet of disturbance? ☐ Yes ☐ No
Approximate % of exposed site: _____	Phase (if construction site is multi-phased): Construction completed, restoration in progress
Construction stage: ☐ Preliminary Stage ☐ Mass Grading Stage ☐ Streets and Utilities Stage ☐ Vertical Construction Stage	
Completed Activities:	

Weather and Discharge Observations

Weather during inspection:
(*complete weather observations below if inspection performed during rain event*)

Date rain predicted to occur:		Predicted % chance of rain:	
Estimate storm beginning: _____ (date and time)	Estimate storm duration: _____ (hours)	Estimate time since last storm: _____ (days or hours)	Rain gauge reading: _____ (inches)

Discharge Observations (if inspection performed during a rain event) Location(s):

Odors	Yes ☐	No ☐	N/A ☐	Floating material	Yes ☐	No ☐	N/A ☐
Suspended Material	Yes ☐	No ☐	N/A ☐	Sheen	Yes ☐	No ☐	N/A ☐
Discolorations	Yes ☐	No ☐	N/A ☐	Turbidity	Yes ☐	No ☐	N/A ☐

BMP Effectiveness

(*add additional sheets or attached detailed BMP Inspection Checklists*)

Outfalls or BMPs Evaluated	Deficiencies/ Comments
EROSION CONTROL (vegetation preservation, etc. see SWPPP)	
SEDIMENT CONTROL – Storm drain inlet protection	
HOUSE KEEPING- General housekeeping , washout facilities, litter, solid waste	
SEDIMENT CONTROL – Tracking control	.
SEDIMENT CONTROL – Perimeter control/silt fence	
NON-STORMWATER – Vehicle & equipment fueling, storage, and maintenance	.
NON-STORMWATER – Other (paving, concrete, water conservation)	
WASTE MANAGEMENT – Material and stockpile	

management	
Photos Taken: Yes ☐ No ☐	Photo Reference IDs:

Site Inspections, Monitoring, and Sampling

Requirement			Comments
SWPPP/ SSCBMP/NGPC Retained Onsite:	Yes ☐	No ☐	
SWPPP/ SSCBMP/ Site maps Current:	Yes ☐	No ☐	
Weekly Inspections Performed:	Yes ☐	No ☐	
Amendment log up to date:	Yes ☐	No ☐	
Inspections conducted within 24 hours of storm event of< 0.25 inches:	Yes ☐	No ☐	
Documented staff training?	Yes ☐	No ☐	

Corrective Actions Identified

Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____
Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____
Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____
Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

APPENDIX 3-5

Wastewater Spill Notification/Response Guidelines

Sewage Spill Notifications/Responses

Sewage Spill Notification Responsibility

1. Jeff Larson	Work: 257-6999	Home: 262-7419	
2. Randall Hu	Work: 257-7142	Home: 247-8114	
3. Lee Yamamoto	Work: 257-0800	Home: 945-0872	Cell: 368-2633

Bypass, Upset, or Sewage Spill Resulting in a Discharge to State Waters (includes storm drains).

1. Immediate notification (no later than 24 hours after spill) to DOH Clean Water Branch (586-4309). When DOH is notified, request waiver of the 5 day written reporting requirement, and ask if a press release will be required. Press release can be required for spills greater than 1000 gallons.

If spill notification is done outside of DOH working hours, make notification to one of the following:

a) Hawaii State Hospital: 247-2191
b) State on Scene Coordinator: 226-3799 or 251-1057

2. Warning signs shall be posted near waters likely to be affected by the discharge and where public access is possible. Warning signs are stored in building 5091 at the WWTP.

3. If public health is threatened, the Naval Preventive Medical Clinic shall be contacted to conduct water quality testing. POC is Lt. Palm (471-2212 x552). If Lt. Palm cannot be reached call the Quarterdeck at 473-1880 x2210.

4. In the case of a bypass or upset at the WWTP, make sure that influent and effluent BOD and TSS samples are taken during bypass or upset.

Sewage Spill Resulting in a Discharge to Ground Only.

1. If spill is less than a 1000 gallons immediate reporting is not required. A tabulated summary of discharges less than 1,000 gallons shall be submitted quarterly to DOH.

2. If spill is greater than 1000 gallons, immediately notify the DOH Wastewater Branch at 586-4294. Make sure to report that the spill was to ground only. When DOH is notified, request waiver of 5 day written reporting requirement.

If spill notification is done outside of DOH working hours, make notification to one of the following:

a) Hawaii State Hospital: 247-2191
b) State on Scene Coordinator: 226-3799 or 251-1057

3. Contaminated grounds shall be cleared of all debris and standing wastewater, and disinfected.

APPENDIX 4-1

CONSTRUCTION CHECKLISTS:

- Routine Project Exemption Form
  <reserved for future use>
- Storm Water Pollution Prevention Plan Content Review Checklist
- Draft Initial BMP Site Inspection Checklist
- Construction Oversight Field Inspection Checklist

Marine Corps Base (MCB) Hawaii
Storm Water Pollution Prevention Plan Content Review Checklist

Project Name: _____ Location:_____ Date: _____

NPDES Tracking No: _____ Reviewed By:_____ Contractor Name_____

Permit Citation	Are the required SWPPP elements included?	Yes	No	N/A	Comments/ Notes
	Project Activity and Description				
7.2.1	SWPPP identifies a "storm water team" including personnel name and individual responsibilities				
7.2.2	Defines the nature of construction activities, total site area (in acres) that is expected to be disturbed by construction activities (including any off-site areas)				
	Indicates the maximum area expected to be disturbed at one time				
7.2.3	If applicable, an explanation is given if the project is in response to a public emergency or natural disaster				
7.2.4	Provides the name of all contractors and indicates the areas of the project each contractor controls				
	Project Scheduling				
7.2.5	Contains a sequence of scheduled construction activities and approximate start and end dates				
7.2.5.1	Includes a schedule of the approximate dates storm water control measures will be installed and made operational				
7.2.5.2	Maintains a schedule of the initiation and duration of earth-disturbing activities including when grading, excavating and filling activities will occur				
7.2.5.3	If applicable, the work schedule indicates when construction activity will be temporarily or permanently ceased				
7.2.5.4 & 5.2.1	The dates of temporary and final site stabilization are included, including when ground disturbance will occur, which is consistent to stabilizing soil immediately after earth-disturbing activities have ceased on all portions of the site				

7.2.5.5	The schedule includes approximate dates of when temporary storm water control measures, construction equipment, and vehicles will be removed from the project site				
	The schedule outlines the estimated start and end dates of pollutant-generating activities				
	Site Maps and Work Boundaries				
7.2.6	Contains a legible site map showing property boundaries and locations where construction activities will occur				
7.2.6.1.	Map includes approximate slopes before and after grading and drainage patterns with flow patterns				
7.2.6.1.c & 7.2.6.1.d	Map includes locations where sediment, soil and other materials will be stockpiled, including contaminated spoils				
7.2.6.1.e & 7.2.6.1.f	Crossings of any state waters and vehicle exit points (to paved roads) are included				
7.2.6.1.g	All impervious surfaces are identified including built structures (upon completion of construction)				
7.2.6.1.h	Construction support area locations are included				
7.2.6.2	Site maps include locations of all state waters and listed impaired water bodies within or in the immediate vicinity of the project site				
7.2.6.3	If state waters are identified within 50 feet of earth disturbances, the map provides boundary lines of natural buffers (50-foot undisturbed) or buffers with double sediment control				
7.2.6.4	Map includes topography of the site, existing vegetation cover and drainage patterns of storm water onto, over and from the site property before and after major grading activities				
	Storm Water Discharge Locations				
7.2.6.5	Storm drain inlets have been located on and near the immediate vicinity of the sites that receive project storm water discharge				
7.2.6.7& 7.2.6.8	Includes the locations of storm water control measures and the locations where chemicals will be used and stored				
	Construction Site Pollutants				
7.2.7.a	A list and description of all pollutant-generating activities are included				

7.2.7.b	Inventory of pollutants or pollutant constituents for each pollutant-generating activity that could be discharged from the construction site are listed				
7.2.8	All sources of non-storm water are identified, including control measures to prevent discharges				
7.2.9	If state waters are located within 50 feet of project earth disturbances, natural buffers and additional sediment control measures are described				
	Erosion and Sediment Control				
7.2.10.1	All storm water control measures that will be installed and maintained on the project site are described				
7.2.10.1.a	Information is included on the type and design of all storm water control measures to be implemented and maintained				
7.2.10.1.b	Site specific sediment controls will be made operational prior to the initiation of earth disturbing activities				
7.2.10.1.c	If applicable, control measures are enacted to prevent the contact of any contaminated soil to storm water				
7.2.10.1.d	Stabilization techniques are used for vehicle exit points				
7.2.10.1.e	If applicable, linear project's BMPs are documented to the extent practicable				
7.2.10.2	Specific vegetative and/or non-vegetative stabilization measures are outlined				
	Post Construction and Spill Prevention Management				
7.2.10.3	Post construction BMP measures are described				
7.2.11.1	A spill prevention plan is included with spill response procedures for stopping, containing and cleaning up spills				
7.2.11.1.b	Procedures are defined for notifying appropriate facility personnel in the case of a hazardous substance spill				
7.2.11.2	Measures for handling and disposing of waste (including hazardous, sanitary) generated onsite are outlined				
	Staff Training Documentation and Inspections				
7.2.12	Procedures for maintaining storm water control measures, conducting inspections and taking corrective actions are outlined				

7.2.12.a, 7.2.12.b & 7.2.12.c	Personnel responsible for conducting inspections, an inspection schedule and any implemented inspection forms are included				
7.2.13	Documentation included shows personnel have been trained on their specific responsibilities				
7.2.14	If applicable, documentation of compliance with the Safe Drinking Water Act Underground Injection Control (UIC) is included				
7.2.15	The contactors information is listed (name, position title, address, phone, email)				
7.2.15.2.a	If applicable, the following are included: a copy of the drainage system owner's approval, county-approved grading permit, section 401 water quality certification and a copy of the department of the army permit				
	SWPPP Certifications and Amendments				
7.2.17	The SWPPP has been certified, signed and dated				
7.2.18.a & 7.2.18.b	After the issuance of the NGPC the SWPPP includes a copy of the NOI (with any correspondence with the department) and a copy of the NGPC including attachments				
7.4.1.4.	If applicable, where the department requires additional discharge requirements, a copy of any correspondence is included with a description of additional storm water control measures				
7.4.4	If applicable, modifications made to the SWPPP are certified, signed and dated by the Certifying Person				
	Is a hydrotesting or other non-storm water permit required?				

Additional Comments:
Date Corrections Received by MCB HI ENV:

MCB Hawaii Environmental, Clean Water Program will not allow construction to commence on any contract or in-house project until a Clean Water Program employee has reviewed the SWPPP to verify that it meets the requirements of HAR, Chapter 11-55, Appendix C and any other requirements under the NPDES permit program.

The SWPPP document has been reviewed according to the above criteria.

_____ _____

Reviewed By (MCB HI ENV Clean Water Program Signature) Date

INITIAL BMP SITE INSPECTION CHECKLIST

Site Name: _____ Installation: _____ Location: _____

Date: _____ Permit Number:_____ Inspector: _____

Inspection Criteria	Yes	No	N/A	Comments
Is the inspection occurring before the initiation of ground-disturbing activities?	☐	☐	☐	
Is the SWPPP/ BMP plan complete including all site maps?	☐	☐	☐	
Are BMPs installed in the locations specified in the plan?	☐	☐	☐	
Are all site BMPs and erosion/sediment controls installed correctly?	☐	☐	☐	
Are good housekeeping practices used?	☐	☐	☐	
Is the site in compliance with all Permittee-accepted permits, plans?	☐	☐	☐	
Will other pollutant discharges occur as a result of the project's construction activity?	☐	☐	☐	
Will any part of the site have the potential for erosion and sediment runoff?	☐	☐	☐	

Additional Comments:

Construction Oversight Field Inspection Checklist

Inspection Date:		Name and phone # of those present during inspection:	
Time:			

Site Information

Construction site name:	
Permit number:	Location/ watershed:
Inspection: ☐ Announced ☐ Unannounced	Surface waters located within 50 feet of disturbance? ☐ Yes ☐ No
Approximate % of exposed site: _____	Phase (if construction site is multi-phased): Construction completed, restoration in progress
Construction stage: ☐ Preliminary Stage ☐ Mass Grading Stage ☐ Streets and Utilities Stage ☐ Vertical Construction Stage	
Completed Activities:	

Weather and Discharge Observations

Weather during inspection:
(*complete weather observations below if inspection performed during rain event*)

Date rain predicted to occur:		Predicted % chance of rain:	
Estimate storm beginning: _____ (date and time)	Estimate storm duration:_____ (hours)	Estimate time since last storm: _____ (days or hours)	Rain gauge reading: _____ (inches)

Discharge Observations (if inspection performed during a rain event) Location(s):

Odors	Yes ☐	No ☐	N/A ☐	Floating material	Yes ☐	No ☐	N/A ☐
Suspended Material	Yes ☐	No ☐	N/A ☐	Sheen	Yes ☐	No ☐	N/A ☐
Discolorations	Yes ☐	No ☐	N/A ☐	Turbidity	Yes ☐	No ☐	N/A ☐

BMP Effectiveness

(*add additional sheets or attached detailed BMP Inspection Checklists*)

Outfalls or BMPs Evaluated	Deficiencies/ Comments
EROSION CONTROL (vegetation preservation, etc. see SWPPP)	
SEDIMENT CONTROL – Storm drain inlet protection	
HOUSE KEEPING- General housekeeping , washout facilities, litter, solid waste	
SEDIMENT CONTROL – Tracking control	.
SEDIMENT CONTROL – Perimeter control/silt fence	
NON-STORMWATER – Vehicle & equipment fueling, storage, and maintenance	.
NON-STORMWATER – Other (paving, concrete, water conservation)	
WASTE MANAGEMENT – Material and stockpile	

management	
Photos Taken: Yes ☐ No ☐	Photo Reference IDs:

Site Inspections, Monitoring, and Sampling

Requirement			Comments
SWPPP/ SSCBMP/NGPC Retained Onsite:	Yes ☐	No ☐	
SWPPP/ SSCBMP/ Site maps Current:	Yes ☐	No ☐	
Weekly Inspections Performed:	Yes ☐	No ☐	
Amendment log up to date:	Yes ☐	No ☐	
Inspections conducted within 24 hours of storm event of< 0.25 inches:	Yes ☐	No ☐	
Documented staff training?	Yes ☐	No ☐	

Corrective Actions Identified

Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____
Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____
Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____
Corrective Action:	
Follow-up:	Date correction received: _____ Photo reference: _____ Initials: _____

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

APPENDIX 4-2

Reporting and Corrective Procedures for Construction Storm Water Inspections

January 2015

REQUIREMENT

In accordance with the Marine Corps Base (MCB) , Hawaii Municipal Separate Storm Sewer System (MS4) Permit Number HI S000007 effective October 15, 2014, Part D.1.d.(5)(iv), MCB Hawaii is required to submit reporting and corrective procedures for construction site inspections. This document establishes construction site inspection, corrective actions, tracking and reporting procedures to ensure compliance with the MS4 permit requirements.

DEFINITIONS

The terms minor, major and critical when relating to deficiencies in this document are defined as the following:

Critical Deficiency: A deficiency that poses an immediate risk of discharge of pollutants to a storm drain MS4 system, surface waters or State waters. Critical deficiencies include, but are not limited to, the following examples:

- Any evidence or observed discharge of non-storm water to the storm drain system, surface waters, or State waters generated by construction activity
- No SWPPP document or NPDES permit
- Absence of perimeter controls and/or linear barriers required by the SWPPP document
- There are identified storm drain inlets, surface waters, or State waters within or adjacent to the project site in close proximity to disturbed soil areas without control measures in place that pose an immediate threat of untreated storm water discharges;
- Work in an active stream channel or other surface water body without proper implementation of required BMPs; and
- Any presence of any spilled oil or hazardous materials near to unprotected storm drain inlets, surface waters, or State waters

Major Deficiency: A deficiency that is a significant issue that could result in the discharge of pollutants to the storm drain system, surface waters or State waters. Major deficiencies include, but are not limited to, the following examples:

- Linear barriers and/or perimeter controls in areas tributary to a water body or drain inlet that are installed as required by the SWPPP document, but are not functional, such as silt fences that are not anchored properly, have collapsed, or are overwhelmed by accumulated sediment;
- Hazardous materials or waste stored within a project without containment or implementation of BMPs;
- Any fluid spills covering more than one square yard and/or are adjacent to protected storm drain inlets, surface waters, or State waters;
- Sediment tracking more than 50 feet from project entrance/exit location(s);
- Expansion of the active disturbed soil area limit without written approval

- Soil stabilization and sediment controls are not installed in accordance with the current SWPPP document/ BMP site map;
- Sediment controls are installed in accordance with the SWPPP document, but there is a large unstabilized disturbed soil area with insufficient controls down gradient to prevent the discharge of untreated storm water to the storm drain system, surface waters, or State waters if a rain event generates runoff; and
- Dust from project site visibly blowing off the site and into storm drain conveyances or adjacent surface water bodies.

Minor Deficiency: A deficiency that does not pose a threat of discharge of untreated storm water or pollutants to the storm drain system, surface waters, or State waters, but are not in direct conformance with the SWPPP document. Minor deficiencies include, but are not limited to, the following examples:

- BMPs are not deficient, but are not consistent with the SWPPP plan;
- SWPPP does not reflect current operations and an amendment is recommended;
- Linear barriers and/ or perimeter controls are properly installed according to the SWPPP document, but require minor maintenance
- Sediment controls are installed per the SWPPP plan, but not properly maintained;
- Site inspections by project staff are not being conducted at the required frequencies;
- Non-storm water or waste management BMPs that are improperly maintained;
- Any fluid spills covering less than one square yard and not adjacent to storm drain inlets, surface waters, or State waters;
- Evidence of active wind erosion on unstabilized slopes/stock piles;
- Minor tracking less than 50 feet from project entry/exit locations and
- Major deficiencies which are corrected prior to the inspector leaving the site

PROCEDURES

Permit Citation	Permit Requirement	MCB Hawaii Environmental Procedure
Part D.1.d(4)	Plan review and approval	MCB Hawaii Environmental will review all project SWPPP's and supporting documents. MCB Hawaii Environmental will verify that all documents meet HAR, Chapter 11-55, Appendix C, section 7 and approved BMP manual requirements by using an approved SWPPP document checklist. Comments and notes will be made to the document preparer if any SWPPP elements are omitted or any portion is believed insufficient. Deficiencies will be noted with the date comments were addressed by the document preparer to the satisfaction of MCB Hawaii Environmental.
Part D.1.d(5)i	Inspections	Prior to the start of any ground-disturbing activities, except for activities associated with the installation of BMPs at a site, the qualified MCB Hawaii Environmental inspector will inspect the site to verify BMPs have been properly installed to the SWPPP specifications. The inspector will document any site conditions having the potential for erosion and sediment runoff as a result of the project's construction activities. A spreadsheet will be used to verify all comments made by MCB Hawaii Environmental during the review process have been properly resolved.
Part D.1.d.(5)ii,	Inspection frequency	All contract, in-house and maintenance construction projects greater than one acre will be inspected at least monthly by an independent MCB Hawaii Environmental qualified construction inspector(s), who is familiar with the project SWPPP. Initial inspections will verify BMPs have been properly installed prior to the start of earth disturbing activities. The inspector(s) will use the attached "Construction Oversight Field Inspection Checklist" that will document any BMP deficiencies and inconsistencies between the approved SWPPP and project site conditions. The inspection form will include the date, inspection observations with photographs, potential noncompliance issue(s) and any necessary corrective actions needed to be addressed. Inspection forms will be sent (via email) to the construction contractor and the MCB Hawaii project manager(s) within 48 hours of the inspection (working business days). A photographic log will be kept to document all minor, major and critical issues observed on site. A response (via email) from the contracting project manager to MCB Hawaii Environmental verifying (with photographs, maps.ect) appropriate corrective action was taken to address the identified deficiencies is expected within 5 calendar days of receiving the inspection form.

		MCB Hawaii Environmental will track all inspections using an internal public share drive. Upon three successive monthly site inspections that indicate, in total, no critical or major project BMP and storm water control deficiencies or less than six minor deficiencies with no more than three minor deficiencies in one month, MCB Hawaii Environmental may decrease inspection frequency to quarterly per the permit. This will be at the discretion of the MCB Hawaii Environmental qualified inspector(s). However, If under quarterly inspection frequency, a critical deficiency is observed or three (3) or more minor deficiencies are detected, inspection frequency shall return to no less than monthly.
Part D.1.d(5).ii	Corrective actions and reporting	If any critical deficiencies are observed MCB Hawaii Environmental will immediately notify DOH verbally and in writing. MCB Hawaii Environmental will verbally notify the responsible construction contractor and ensure all critical deficiencies are addressed and adequately corrected before the close of business day on the day the deficiency is identified. In the event a major deficiency is detected, MCB Hawaii Environmental will immediately send a written notification with an attached inspection checklist containing photographs to the responsible construction contractor and MCB Hawaii project manager(s) explaining the site nonconformities. MCB Hawaii Environmental will ensure all major deficiencies are addressed or corrected as soon as possible, but in no event later than five calendar days after the deficiency is identified or before the next forecasted rain event, whichever is sooner. In the event a minor deficiency is detected, MCB Hawaii Environmental will document the issue using the approved inspection checklist, photograph log and internal project tracking system. The responsible construction contractor and MCB Hawaii project manager(s) will be notified verbally of any non-conformities at the end of the inspection and provided an emailed copy of the inspection form (with attached photographs) within 48 hours of the inspection (normal business days). A response from the contractor documenting the corrective action taken to address the identified issues is expected within 5 calendar days from receiving the completed inspection form. Per the permit, the MCB Hawaii Environmental i qualified construction inspector(s) will conduct follow-up inspections as needed, at least monthly to ensure site deficiencies have been properly addressed and all storm water controls are in proper working order. Inspections will also be conducted upon complaints

		from citizens or concerned groups. Unannounced and follow-up inspections will be conducted as necessary. For all projects, if the corrective measures are not completed, then the deficiency will be elevated to the MCB Hawaii Environmental Director.
	Record keeping	Electronic inspection reports, spreadsheets and supporting photographic logs will be kept on file with the MCB Hawaii Environmental Division. Records shall be kept for five (5) years in accordance with the NPDES permit.

APPENDIX 4-3

BMP Field Manuals

- Construction Best Management Practices Field Manual
  <reserved for future use>
- Maintenance Activities Best Management Practices Field Manual
  <reserved for future use>
- Storm Water Permanent Best Management Practices
  <reserved for future use>

APPENDIX 5-1

Plan for Requiring Low Impact Development in the Standards

March 2015

REQUIREMENT

In accordance with the Marine Corps Base (MCB), Hawaii Municipal Separate Storm Sewer System Permit Number HI S000007 effective October 15, 2015, Part D.1.e.(1), MCB Hawaii is required to submit a Plan for Requiring Low Impact Development (LID) in the Standards to the maximum extent practicable.

LID pertains to storm water management practices which aim to mimic a site's predevelopment hydrology by minimizing ground disturbance and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating storm water runoff close to its source. LID practices treat storm water as a resource rather than a waste product.

This plan will identify the following:

- Criteria for requiring implementation of LID
- Quantitative criteria for a specific design storm to be managed by LID techniques
- Infeasibility criteria for circumstances in which a waiver could be granted for the LID requirements
- List of alternatives that may be implemented when an LID waiver is granted
- Draft LID planning and design example checklist
- Draft LID and permanent post-construction Best Management Practice (BMP) inspection example checklists

CRITERIA FOR REQUIRING IMPLEMENTATION OF LID

Section 438 of the Energy Independence and Security Act of 2007 (EISA) enacted by Congress establishes strict storm water runoff requirements for federal development and redevelopment projects. The legislation reads as follows:

> Storm water runoff requirements for federal development projects. The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.

Resulting from the legislation, a Deputy Under Secretary of Defense, Installation and Environment memorandum defines Department of Defense (DoD) policy for implementation of EISA Section 438 using LID techniques and requires the policy be incorporated into applicable DoD Unified Facilities Criteria (UFC).

Per DoD policy the criteria for requiring implementation of LID is as follows:

> EISA Section 438 requirements apply to projects that construct facilities with a footprint greater than 5,000 gross square feet, or expand the footprint of existing facilities by more than 5,000 gross square feet. The project footprint consists of all horizontal hard surfaces and disturbed areas associated with the project development, including both

building area and pavements (such as roads, parking, and sidewalks). These requirements do not apply to internal renovations, maintenance, or resurfacing of existing pavements.

QUANTITATIVE CRITERIA FOR DESIGN STORM

The UFC system provides planning, design, and construction criteria for DoD projects. UFC 3-210-10, Low Impact Development, provides technical criteria for the planning and design of applicable projects to comply with storm water requirements under EISA Section 438.

UFC 3-210-10 (Appendix B: Chapter 4 – LID Design, Section 4-1.3) describes investigation into three principal approaches in determining the design storm to be managed by LID techniques:

Prince George's County Methodology (Soil Conservation Service, TR-55 Method):
As previously mentioned any rainfall over and above the initial abstraction will result in direct surface runoff. It is prudent to design and implement IMPs for that rainfall event that exceeds initial abstraction (Eq. 1) in the pre-development conditions. The design methodology would apply a modifying factor of 1.5 times the initial abstraction (as suggested in the Prince George's County LID manual) to serve as a practical approach to design LID-IMP features.

EPA Methodology:
See Technical Guidance on Implementing Section 438 of the Energy Independence and Security Act, Guidance prepared by EPA, December 2009 for Option 1 methodology.

First-Flush Water Quality Volume:
Many States and localities have adopted the conventional approach of collecting and treating the first-flush or water-quality depth of rainfall. These terms are defined by the local regulatory agency. In certain areas, this first flush depth is generally taken to be the first one inch of rainfall. In other localities with sensitive coastal or reservoir watersheds, the first-flush depth is taken to be the first 1.5 inches of rainfall. The water quality volume is equated to the volume of stormwater runoff generated by the first-flush rainfall depth. Therefore, it would be practical to design LID-IMP features to handle the first-flush rainfall depth. The stormwater runoff quality is further improved by the design of conventional SWM practices required to meet the state regulations.

Most Local and State stormwater regulations include a first-flush or water quality depth for 2-, 5-, 10-, 25-, 50-, or 100-year regulated storm events. State and Local requirements for stormwater management shall be met before the LID requirements are satisfied. The SWM BMPs shall be designed to control all regulated storm events, as stipulated by Local and State regulations to handle the peak rate and/or volume of discharge for flood control purposes.

Subsequent to describing the three approaches, UFC 3-210-10 (Appendix B: Chapter 4 – LID Design, Section 4-1.3) states the methodology chosen by DoD as follows:

> *DoD Accepted Methodology*:
> DoD has chosen to use the 95th percentile design storm event in UFC 3-210-10 criteria for determining the LID design volume. When in conflict with other State or Local requirements the most stringent apply.

UFC 3-210-10 (Appendix B: Chapter 4 – LID Design, Section 4-6) provides additional clarification that:

> The design storm event is based on the regional 95th percentile, annual 24-hour rainfall depth averaged over several years (a minimum of 10-year daily, 24-hour precipitation events would be used). The 'design storm' will be used to calculate pre- and post-development LID volumes in order to determine the amount of excess runoff that must be controlled on-site so that the site contributes no net increase downstream.

INFEASIBILITY CRITERIA FOR LID WAIVER

EISA Section 438 and DoD policy require LID to be implemented for applicable projects to the maximum extent technically feasible (METF). UFC 3-210-10, Section 2-2.2, defines METF as follows:

> The "maximum extent technically feasible" criterion requires full employment of accepted and reasonable stormwater retention and reuse technologies … subject to site and applicable regulatory constraints (e.g., site size, soil types, vegetation, demand for recycled water, existing structural limitations, state or local prohibitions on water collection).

All site-specific technical constraints that limit implementation of LID techniques to the METF shall be documented. Documentation shall include reference to the appropriate technical constraint listed below in Table 1, complete description of the limiting factors, supporting evidence such as design calculations and/or laboratory results, and the name and contact information of the waiver applicant.

Table 1 – Technical Constraints Limiting Implementation of LID to the METF	
A	Retaining stormwater on-site would adversely impact receiving water flows
B	Site has shallow bedrock, contaminated soils, high groundwater table, underground facilities or utilities
C	Soil infiltration capacity is limited
D	Site is too small to infiltrate significant volume
E	Non-potable water demand (irrigation, toilets, wash-water, etc.) is too small to warrant water harvesting and reuse system
F	Structural, plumbing, and other modifications to existing building to manage stormwater are infeasible
G	State or local regulations restrict water harvesting
H	State or local regulations restrict use of green infrastructure/LID
X	Other technical constraint documented by the developer/agent and documented as acceptable to the DPW storm drain engineer

(Note: A through H taken from UFC 3-210-10, Section 2-2.2)

LID WAIVER ALTERNATIVE MEASURES

LID waiver applicants shall also provide a description of alternative measures or non-LID BMPs that could be implemented if an LID waiver is granted due to a properly documented technical constraint.

Potential alternative measures include:

- Post-construction treatment control BMPs employing detention, filtration, settling, and/or hydrodynamic separation;
- Retention or biofiltration at an offsite location. (Note: offsite mitigation projects must undergo a proposal and review process and ultimately require DPW approval.)

DRAFT LID PLANNING AND DESIGN EXAMPLE CHECKLIST

An LID planning and design example checklist is being developed as part of the draft revised standards to be submitted to the DOH at a later date. A preliminary draft of the LID planning and design example checklist is provided in Attachment 1.

DRAFT LID AND PERMANENT POST-CONSTRUCTION BMP INSPECTION EXAMPLE CHECKLISTS

LID and permanent post-construction BMP inspection example checklists are being developed as part of the draft revised standards to be submitted to the DOH at a later date. Preliminary drafts of the LID and permanent post-construction BMP inspection example checklists are provided in Attachment 2.

REFERENCES

1. MCB Hawaii Municipal Separate Storm Sewer System Permit Number HI S000007, effective October 15, 2014.

2. Energy Independence and Security Act of 2007, Public Law 110-140, 2007.

3. Department of Defense Implementation of Storm Water Requirements under Section 438 of the Energy Independence and Security Act (EISA), Deputy Under Secretary of Defense (Installations and Environment) Memorandum, January 2010.

4. Unified Facilities Criteria, UFC 3-210-10 Low Impact Development, November 2010.

ATTACHMENT 1

Draft LID Planning and Design Example Checklist

LOW IMPACT DEVELOPMENT (LID)
PLANNING & DESIGN CHECKLIST

GENERAL PROJECT INFORMATION
Project Address: _____
Installation: _____ Building No. (if applicable): _____
Project Type: ❑ Residential ❑ Commercial ❑ Industrial ❑ Office / Agency
Project is: ❑ New Development ❑ Redevelopment / Retrofit ❑ Renovation
Project Description: _____
_____
Submittal: ❑ Design / Pre-Construction ❑ Construction Complete

APPLICANT INFORMATION
Agency/Company: _____
Contact Person: _____
Address: _____
Phone: _____ Email: _____

PROJECT FOOTPRINT
EISA Section 438 requirements apply to projects that construct facilities with a footprint greater than 5,000 gross square feet, or expand the footprint of existing facilities by more than 5,000 gross square feet. The project footprint consists of all horizontal hard surfaces and disturbed areas associated with the project development, including both building area and pavements (such as roads, parking, and sidewalks). These requirements do not apply to internal renovations, maintenance, or resurfacing of existing pavements.

Proposed New Facilities Footprint (square feet) _____
Proposed Expanded Footprint of Existing Facilities (square feet) _____
Total Proposed Project Footprint (square feet) _____

EISA SECTION 438 APPLICABILITY
Do EISA Section 438 requirements apply?
❑ Yes ❑ No (Yes if Total Proposed Project Footprint is 5,000 square feet or more. If No, LID techniques apply to the extent practical.)

DESIGN OBJECTIVE
The overall design objective for each project is to maintain predevelopment hydrology and prevent any net increase in storm water runoff. DoD defines "predevelopment hydrology" as the pre-project hydrologic conditions of temperature, rate, volume, and duration of storm water flow from the project site.

The Design Objective is (select one):
❑ Option 1: Total volume of rainfall from 95th percentile storm is to be managed onsite.
❑ Option 2: Determine predevelopment hydrology based on site-specific conditions and local meteorology by using continuous simulation modeling techniques, published data, studies, or other established tools. Determine water volume to be managed onsite.

LOW IMPACT DEVELOPMENT (LID)
PLANNING & DESIGN CHECKLIST

GENERAL PROJECT HYDROLOGY

The design storm will be used to calculate pre- and post-development LID volumes in order to determine the amount of excess runoff that must be controlled onsite so that the site contributes no net increase downstream.

Provide runoff volumes to demonstrate the design objective is being met. Note that complete analysis and calculations shall be provided separately in the project's engineering drainage report.

Pre-project Runoff Volume (cubic feet) _____

Post-project Runoff Volume (cubic feet) _____

Minimum Runoff Retention Volume to Be Managed Onsite (cubic feet) _____

LOW IMPACT DEVELOPMENT BMPs

Low Impact Development (LID) is a stormwater management strategy designed to maintain site hydrology and mitigate the adverse impacts of stormwater runoff and nonpoint source pollution. LID actively manages stormwater runoff by mimicking a project site's pre-development hydrology using design techniques that infiltrate, store, and evaporate runoff close to its source of origin.

Non-structural LID BMPs

Non-structural LID BMPs seek to reduce storm water runoff impacts through sound site planning and design practices that focus on conservation and minimizing impacts. Use of non-structural LID BMPs should be maximized prior to consideration of structural LID BMPs.

Review the following non-structural LID BMPs and indicate whether or not they will be incorporated onsite. If not incorporated, provide justification.

Minimize Total Disturbed Area ❑ Incorporated ❑ Not Feasible ❑ Not Applicable

Justification: _____

_____

Preserve Natural Flow Pathways and Patterns ❑ Incorporated ❑ Not Feasible ❑ Not Applicable

Justification: _____

_____

Protect Riparian Buffer Areas / Sensitive Areas ❑ Incorporated ❑ Not Feasible ❑ Not Applicable

Justification: _____

_____

Cluster Development ❑ Incorporated ❑ Not Feasible ❑ Not Applicable

Justification: _____

_____

Minimize Soil Compaction ❑ Incorporated ❑ Not Feasible ❑ Not Applicable

Justification: _____

_____

LOW IMPACT DEVELOPMENT BMPs (CONTINUED)
Non-structural LID BMPs (Continued)

Reduce Impervious Surfaces ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____

Site Fingerprinting ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____

Structural LID BMPs
Structural LID BMPs are small scale treatment controls close to the source of runoff that mimic natural processes. (For more information, refer to the Unified Facilities Criteria 3-210-10, 15 November 2010 and the Army Low Impact Development Technical User Guide, 4 January 2013.)

Review the following structural LID BMPs and indicate whether or not they will be incorporated onsite. If not incorporated, provide justification (refer to the Infeasibility Criteria listed in the Plan for Requiring LID in the Standards). Additionally, provide operations and maintenance requirements necessary for proper function of the BMP.

Bioretention ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

Vegetated Swale ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

LOW IMPACT DEVELOPMENT BMPs (CONTINUED)
Structural LID BMPs (Continued)

Infiltration Trench ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

Permeable Pavement ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

Rainwater Harvesting ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

Green Roof ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

LOW IMPACT DEVELOPMENT BMPs (CONTINUED)
Structural LID BMPs (Continued)

Other Structural LID BMP ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Description: _____
_____
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

ALTERNATIVE NON-LID POST-CONSTRUCTION BMPs
Non-LID post-construction treatment control BMPs employ detention, filtration, settling, and/or vortex separation to remove pollutants from storm runoff. Non-LID methods should be considered only if LID BMPs are determined to not be feasible per the Infeasibility Criteria listed in the Plan for Requiring LID in the Standards.

Review the following Non-LID post-construction BMPs and indicate whether or not they will be incorporated onsite. If not incorporated, provide justification. Additionally, provide operations and maintenance requirements necessary for proper function of the BMP.

Underground Detention / Retention Structure ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
(Note that underground structures that allow infiltration may require Underground Injection Control permitting with the State of Hawaii Department of Health. Please contact the DPW Environmental Division, Safe Drinking Water Program for more information.)
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

ALTERNATIVE NON-LID POST-CONSTRUCTION BMPs (CONTINUED)

Vortex / Hydrodynamic Separator ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

Other Non-LID post-construction BMP ❑ Incorporated ❑ Not Feasible ❑ Not Applicable
Description: _____
_____
Justification: _____
_____
Operation Requirements: _____
_____
Operation Requirements Frequency: _____
Maintenance Requirements: _____
_____
Maintenance Requirements Frequency: _____

LOCATION AND BOUNDARY DRAWING FOR LID AND NON-LID BMPs
A drawing showing the locations and boundaries of all incorporated LID and non-LID BMP features will assist inspectors and operations and maintenance staff with proper identification and assessment of the BMPs.

❑ Location and boundary drawing is attached. (Check box to confirm)

CERTIFICATION STATEMENT
Designer / Applicant: I certify that the design is complete, accurate, and addresses the specified requirements to the best of my knowledge.

Print Name: _____
Signature: _____ Date: _____

REVIEWED BY
Agency: _____
Print Name: _____
Signature: _____ Date: _____
Review Comments Attached: ❑ Yes ❑ No

ATTACHMENT 2

Draft LID and Permanent Post-Construction BMP Inspection Example Checklists

BIORETENTION INSPECTION CHECKLIST

BMP ID Number: _____ Installation: _____ Location: _____
Date: _____ Inspector: _____

Code Key:

NP = No Problem Observed	WN = Work Needed	N/A = Not Applicable

ASSESSMENT	CODE	COMMENTS
Inlet / Outlet		
Structural condition		
Debris accumulation		
Overflow catch basin debris accumulation		
Erosion control (e.g. rock, mat)		
Pretreatment for Sediment		
Device functioning to trap sediment		
Sediment accumulation		
Bioretention Surface		
Sediment accumulation		
Debris accumulation		
Erosion		
Vegetative cover		
Mulch cover		
Overall Functionality		
Is bioretention area functioning properly (professional landscape architect recommended)		

Additional Comments:

HYDRODYNAMIC SEPARATOR INSPECTION CHECKLIST

BMP ID Number: _____ Installation: _____ Location: _____
Date: _____ Inspector: _____

Code Key:

NP = No Problem Observed	WN = Work Needed	N/A = Not Applicable

ASSESSMENT	CODE	COMMENTS
Inflow Points		
Obstruction: vegetation / debris / sediment		
Structural condition		
Filter condition		
Separator Body		
Sediment / debris accumulation		
Separator structural condition		
Central shaft condition		
Oil accumulation		
Standing water		
Outlet Device		
Obstruction: vegetation / debris / sediment		
Erosion / undercutting		
Joint failure / loss of joint material		
Leaking device		
Emergency bypass condition		
Miscellaneous		
Trash / debris		
Access		
Odors present		
Other (describe)		

Additional Comments:

UNDERGROUND DETENTION STRUCTURE INSPECTION CHECKLIST

BMP ID Number: _____ Installation: _____ Location: _____
Date: _____ Inspector: _____

Code Key:

NP = No Problem Observed	WN = Work Needed	N/A = Not Applicable

ASSESSMENT	CODE	COMMENTS
Inflow Points		
Obstruction: trash / debris / sediment		
Structural condition		
Pipe condition		
Other (describe)		
Underground Vault		
Sediment / debris accumulation		
Access hatch condition		
Access ladder / steps condition		
Vault structural condition		
Baffles / weir condition		
Oil accumulation		
Blocked / damaged air vents		
Proper drainage		
Other (describe)		
Outlet Device		
Obstruction: vegetation / debris / sediment		
Erosion / undercutting		
Joint failure / loss of joint material		
Leaking device		
Control valve / bottom drain operation		
Emergency bypass condition		
Displacement / blockage of outlet or rock, apron, mat, etc.		
Other (describe)		
Miscellaneous		
Trash / debris		
Access		
Odors present		
Other (describe)		

UNDERGROUND DETENTION STRUCTURE INSPECTION CHECKLIST

Additional Comments:

APPENDIX 5-2

LID/EISA Constraints and Waiver Request

March 2015

LID/EISA Constraints Review and Waiver Request

[This page has notes written for your convenience, the fillable form has the notes embedded.]

(UNCLASSIFIED)

1. Request Date	1a. Date Needed Date at which construction schedule will be impacted if waiver not appr.	**2. Review Number: HI-20 -LID**001 Issued by TDC, sequentially numbered by FY

3. eProjects Work Order Number(s) _____ Fiscal Year _____ Project Number _____ MILCON P#, Special Project # or SPM#
If request covers projects at contiguous sites, all should be included in this form
Title: _____ as noted on DD1391; if no DD1391, title of the solicitation documents
Installation, City, State: _____
Fund Type: _____ MILCON, O&MN, NWCF, etc.

4. Construction Solicitation or Contract Number(s): N62478-
Task Order Number N/A TO# applicable only for MACC Modification Number(s) N/A if applicable

5. Execution Team: _____ as shown in eProjects record
Project Manager (PM): _____ " " " " " "
Design Manager (DM): _____ " " " " " "
Designer of Record (DOR) A/E Firm & Project Manager (*if applicable*):
_____ For DB this is construction contractor's A/E and there will not be any A/E contract number
A/E Contract # (*if applicable*): _____ T.O. # _____

PM Contact Information
Telephone: ( ) ext. N/A
DSN:
DOR (*provide DM information if DOR is In-House*):
Telephone: ( )

6. Construction Office: _____ as shown in eProjects record
Responsible Person (*Name & Title or Rank*): _____ PM&E, FEAD Director, or ROICC at Marine Corps installations

Contact Information
Telephone: ( ) ext. N/A
DSN:

7. Project Purpose and Description:
Very brief description of what the project is to provide

8. Attachments: ☐ Plans ☐ Stormwater Calculations ☐ Other Supporting Documentation

9. Has LID been used to manage any portion of the pre- to post-development increase in stormwater runoff volume or sediment/nutrient loading for the design storm event ? ☐ Yes ☐ No

10. What is the volume increase (for the design storm event) from pre-construction conditions? __ **%** increase from pre-development amount that is not being mitigated by LID

11. Storm Water Management Features (Planned or Actual, structural and non-structural) that will be implemented by this project: _____ List any features that this project will provide, including any that are off-site

12. Reason(s) that LID goals cannot be achieved for this Project:

- ☐ Technical:
  - ☐ Non-potable water demand (for irrigation, toilets, wash-water, etc.) is too small to warrant water harvesting and reuse systems
  - ☐ Retaining storm water on site would adversely impact receiving water flows
  - ☐ Site has
    - ☐ shallow bedrock
    - ☐ contaminated soils
    - ☐ high groundwater
    - ☐ underground facilities or utilities
  - ☐ Site is too small to infiltrate significant volume
  - ☐ Soil infiltration capacity is limited
- ☐ Economic
- ☐ Other:
  - ☐ State or local requirements restrict the use of green infrastructure/LID
  - ☐ State or local requirements restrict water harvesting
  - ☐ Structural, plumbing, or other modifications to existing buildings to manage storm water are infeasible

LID/EISA Constraints Review and Waiver Request

(UNCLASSIFIED)

1. Request Date	1a. Date Needed	**2. Review Number: HI-20 -LID001**

3. eProjects Work Order Number(s) _____ Fiscal Year _____ Project Number _____
Title: _____
Installation, City, State: _____
Fund Type: _____

4. Construction Solicitation or Contract Number(s): N62478-
Task Order Number N/A Modification Number(s) N/A

5. Execution Team: _____
Project Manager (PM): _____
Design Manager (DM): _____
Designer of Record (DOR) A/E Firm & Project Manager (*if applicable*): _____
A/E Contract # (*if applicable*): _____ T.O. # _____

PM Contact Information
Telephone: ( ) ext. N/A
DSN:
DOR (*provide DM information if DOR is In-House*):
Telephone: ( )

6. Construction Office: _____
Responsible Person (*Name & Title or Rank*): _____

Contact Information
Telephone: ( ) ext. N/A
DSN:

7. Project Purpose and Description:

8. Attachments: ☐ Plans ☐ Stormwater Calculations ☐ Other Supporting Documentation

9. Has LID been used to manage any portion of the pre- to post-development increase in stormwater runoff volume or sediment/nutrient loading for the design storm event ? ☐ Yes ☐ No
10. What is the volume increase (for the design storm event) from pre-construction conditions? __ **%**
11. Storm Water Management Features (Planned or Actual, structural and non-structural) that will be implemented by this project: _____

12. Reason(s) that LID goals cannot be achieved for this Project:
- ☐ Technical:
  - ☐ Non-potable water demand (for irrigation, toilets, wash-water, etc.) is too small to warrant water harvesting and reuse systems
  - ☐ Retaining storm water on site would adversely impact receiving water flows
  - ☐ Site has
    - ☐ shallow bedrock
    - ☐ contaminated soils
    - ☐ high groundwater
    - ☐ underground facilities or utilities
  - ☐ Site is too small to infiltrate significant volume
  - ☐ Soil infiltration capacity is limited
- ☐ Economic
- ☐ Other:
  - ☐ State or local requirements restrict the use of green infrastructure/LID
  - ☐ State or local requirements restrict water harvesting
  - ☐ Structural, plumbing, or other modifications to existing buildings to manage storm water are infeasible

LID/EISA Constraints Review and Waiver Request

(UNCLASSIFIED)

REVIEW CHAIN		Comments
Project Manager (PM) Name: Date: Signature: _____	☐ Concur ☐ **Do Not Concur**	
Design Manager (DM) Name: Date: Signature: _____	☐ Concur ☐ **Do Not Concur**	
Designer of Record (DOR) Name: If in-house DBB, DOR is DM Date: Signature: _____	☐ Concur ☐ **Do Not Concur**	
FEAD/ROICC (if Design Build) Name: Title/Rank: Date: Signature: _____	☐ Concur ☐ **Do Not Concur**	
Environmental Program Director (N45), NRH Name: Aaron Poentis Date: Signature: _____	☐ Concur ☐ **Do Not Concur**	
Civil Technical Discipline Coordinator, NAVFAC HI Name: Lawton Kaya Date: Signature: _____	☐ Concur ☐ **Do Not Concur**	
Chief Engineer, NAVFAC HI Name: Marc Wong Date: Signature: _____	☐ Concur ☐ **Do Not Concur**	
Regional Engineer (N4), NRH Name: John Coronado, CAPT CEC USN Date: Signature: _____	☐ APPROVED ☐ **DISAPPROVED**	

APPENDIX 6-1

Final Trash Reduction Plan

October 2015

Final

TRASH REDUCTION PLAN

Storm Water Management Plan

Marine Corps Base Hawaii

NPDES Permit No. HI 000007

Prepared by:

Marine Corps Base Hawaii

October 2015

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Tables

Table 1: Implementation Schedule 14

List of Acronyms and Abbreviations

BMP	Best Management Practice
C&D	Construction and Demolition
CWA	Clean Water Act
DoD	Department of Defense
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EO	Executive Order
HRS	Hawaii Revised Statutes
ISWMP	Integrated Solid Waste Management Program
MCB Hawaii	Marine Corps Base Hawaii
MCD	Facilities Maintenance Control Division
MCDC	Mokapu Central Drainage Channel
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
OPNAVINST	Chief of Naval Instruction
QRP	Qualified Recycling Program

1 Introduction

As of the effective date, October 15, 2014, the Marine Corps Base Hawaii (MCB Hawaii) is required to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HIS000007 (referred to hereinafter as the "MS4 Permit"). The MS4 Permit includes authorized storm water and specified non-storm water discharges into Kaneohe Bay, Nuupia Ponds, Kailua Bay, and the Mokapu Central Drainage Channel (MCDC). Per the MS4 Permit, Part D.1.f.(1).(v), MCB Hawaii is required to provide a Trash Reduction Plan. The MS4 Permit states:

> *Pollution Prevention/Good Housekeeping, Part D.1.f.(1).(v)*
>
> *"Trash Reduction Plan - Within three (3) years from the effective date of this permit, the Permittee shall develop and submit to the DOH for review and acceptance, a trash reduction plan which assesses the issue, identifies and implements control measures, and monitors the control measures to reduce trash loads from the MS4. The plan shall include, at a minimum and be formatted consistent with the following:*
>
> - *Quantitative estimate of the debris currently being discharged (baseline load) from the MS4, including methodology used to determine the load.*
> - *Description of control measures currently being implemented as well as those needed to reduce debris discharges from the MS4 consistent with short-term and long-term reduction targets.*
> - *A short-term plan and proposed compliance deadline for reducing debris discharges from the MS4 by 50% from the baseline load.*
> - *A long-term plan and proposed compliance deadline for reducing debris discharges from the MS4 to zero.*
> - *Geographical targets for trash reduction activities with priority on waterbodies listed as impaired for trash on the State's CWA Section 303(d) list.*
> - *Trash reduction-related education activities as a component of Part D.1.a. [Public Education and Outreach].*
> - *Integration of control measures, education and monitoring to measure progress toward reducing trash discharges.*
> - *An implementation schedule.*
> - *Monitoring plan to aid with source identification and loading patterns as well as measuring progress in reducing the debris discharges from the MS4.*
> - *The Annual Report shall include a summary of its trash load reduction actions (control measures and best management practices) including the types of actions and levels of implementation, the total trash loads and dominant types of trash removed by its actions, and the total trash loads and dominant types of trash for each type of action.*
>
> *The plan shall provide for compliance with the above short-term and long-term discharge limits in the shortest practicable timeframe."*

2 Trash Defined

For the purposes of this plan, “trash” will be considered analogous to “litter” as defined below by the Hawaii Revised Statutes (HRS) §391-1.

> *“Litter” means rubbish, refuse, waste material, garbage, trash, offal, or any debris of whatever kind or description, whether or not it is of value, and includes improperly discarded paper, metal, plastic, glass, or solid waste.*

A distinction is made that trash is not inclusive of non-man made materials, such as branches, leaves, and other vegetation, that is deposited into waterbodies naturally.

3 Marine Corps Solid Waste Policy and Program

3.1 Marine Corps Solid Waste Policy

The Marine Corps Solid Waste policies are guided by Executive Orders (EO) and the Department of Defense (DoD) strategic plans.

EO 13514 requires the head of each Federal agency to promote pollution prevention and eliminate waste by:

(1) minimizing the generation of waste and pollutants through source reduction;
(2) diverting at least 50 percent of non-hazardous solid waste, excluding construction and demolition (C&D) debris by the end of fiscal year 2015;
(3) diverting at least 50 percent of C&D materials and debris by the end of fiscal year 2015;
(4) increasing diversion of compostable and organic material from the waste; and
(5) reducing printing paper use and acquiring uncoated printing and writing paper containing at least 30 percent postconsumer fiber.

Based on this EO, the DoD developed a S*trategic Sustainability Performance Plan* (DoD, 2012). This plan established a policy goal for all DoD component installations to achieve diversion rates of 60 percent for C&D waste, and 50 percent for all other wastes, by fiscal year 2015 and thereafter through fiscal year 2020.

Implementation of these goals is achieved through the development of an Integrated Solid Waste Management Plan (ISWMP) as described in the following section.

Two other key MCB Hawaii base orders that apply to the management of solid waste are:

MCB Hawaii Base Order 5500.15B: MCB Hawaii Base Order 5500.15B Chapter 3, Litter and Trash Disposal, prohibits the disposal of hazardous wastes and recyclables in dumpsters. The order also outlines the landfill pass system and dumpster management system.

MCB Hawaii Base Order 4500.2: MCB Hawaii Base Order 4500.2 Solid Waste Reduction Qualified Recycling Program (QRP), provides policy, describes procedures, and assigns responsibilities to conduct resource conservation and recovery. This order establishes MCB Hawaii's recycling program as a QRP.

3.2 Marine Corps Base Hawaii Integrated Solid Waste Management Plan

The Marine Corps in conjunction with the Navy has adopted Chief of Naval Instruction (OPNAVINST) 5090.1D entitled *Environmental Readiness Program*. Chapter 28 of OPNAVINST 5090.1D is entitled *Solid Waste Management and Resource Recovery Ashore*, and is applicable to all Navy installations worldwide that generate one or more tons of solid waste per day. These installations must follow the solid waste reporting, solid waste management planning, recycling requirements, and affirmative procurement requirements outlined in this chapter. Chapter 28 specifically requires that an ISWMP and QRP (where economically feasible) be developed and implemented.

MCB Hawaii's updated ISWMP was completed in 2012 (NAVFAC 2012). The ISWMP established historic and existing solid waste generation and recycling quantities. In fiscal year 2010, MCB Hawaii generated 7,812 tons of non-hazardous solid waste without C&D debris and diverted 4,896 tons from the landfill

resulting in a diversion rate of 62.66%. In fiscal year 2010, MCB Hawaii generated 941 tons of C&D waste debris of which 125 tons were diverted through recycling efforts by contractors. With C&D wastes the overall facility's solid waste diversion rate in fiscal year 2010 was 57.36%. In 2010, MCB Hawaii recycled 5,021 tons of non-hazardous solid waste, including 1,201 tons that were recycled through the facility's Qualified Recycling Program (QRP). Also in 2010, 806 tons of green wastes from landscaping operations were sent off-site to commercial composting facilities. The soil generated from C&D operations was beneficially used as landfill cover material at the MCB Hawaii Kaneohe Bay Landfill. It was not included as solid waste in the diversion calculations, but should be deemed as an additional diversion.

The ISWMP presented a framework for MCB Hawaii to increase their solid waste diversion through the following means:

- Source reduction – includes recommendations for administration, custodians, dining facilities, barracks, shops, Exchange and Commissary, and Supply Department.
- Recycling – includes recommendations for increasing recycling.
- Green waste management – includes alternatives for green waste management.
- C&D demolition debris management – includes recommendations for source reduction and recycling of building materials.
- Sustainable acquisition – includes recommendations for acquisition of environmentally friendly products.
- Education – includes recommendations for public awareness outreach to workers and residents.

Additional information about the ongoing base initiatives to reduce solid waste are presented in the ISWMP.

4 Existing Control Measures and BMPs

MCB Hawaii has already implemented the following control measures to reduce trash.

4.1 Public Education and Outreach

Trash reduction and recycling initiatives are presented to workers and residents through the following means:

- Informational brochures in the orientation packet presented to new arrivals.
- BMP training as part of the "Environmental Standard Operating Procedures" class that is conducted every other month.

4.2 Litter Clean Up

A small team of base inspectors is responsible for daily base-wide monitoring and beautification, and pick up litter they encounter during their rounds.

Additionally, the MCB Hawaii Environmental Department (ENV) organizes community litter clean up events. These litter clean up events are currently held annually and encourage participation by workers and residents. ENV has also solicited the assistance of students and faculty of Mokapu Elementary School with stenciling of storm drain inlets.

4.3 Street Sweeping

The Facilities Maintenance Control Division (MCD) conducts routine street sweeping throughout the Base. The street sweeping is completed on a priority basis with industrial and commercial areas of the Base being swept at least twice a month.

4.4 Trash Pickup

Regular trash pickup is provided to assure proper disposal of solid wastes. Trash pickup in residential areas is performed by contractors twice per week. Trash pickup in industrial and commercial areas of the Base is performed by the MCD twice per week.

4.5 Structural BMPs

Structural BMPs for trash collection have been installed in a few select locations as follows.

- A concrete debris collector has been installed at the inlet to the sediment basin installed along the restored portion of the MCDC.
- Two debris/sediment collectors have been installed at discharge points into the HDPE lined drainage channel starting at Uli Street along Daly Road.

In addition, the MCD inspects and maintains the storm drain lines, manholes, and inlets/catch basins in accordance with a priority based schedule.

4.6 Inspections

MCB Hawaii Base Inspectors conduct daily patrols of the residential, industrial, and commercial areas of the Base. The inspectors will document and report any illicit dumping, including litter. Any illicit dumping observed by the inspectors will be reported to ENV for follow-up corrective actions. All litter is collected and properly disposed.

5 Estimation of Baseline Discharge Load

A Baseline Load Study will be initiated on April 11, 2016 (effective date of the Storm Water Management Plan) to quantitatively determine the Baseline Load discharging to the MS4. The study is expected to last eighteen (18) months.

The study will include a visual survey of representative sites and existing debris/sediment collectors. As a minimum, the outlets to the following debris/sediment collectors will be surveyed.

- Concrete debris collector installed at the inlet to the sediment basin installed along the restored portion of the MCDC
- Two debris/sediment collectors installed at discharge points into the HDPE lined drainage channel starting at Uli Street along Daly Road

In addition, four representative sites will be selected for monitoring, two representing housing areas and two representing industrial/commercial areas. The four representative sites will be selected based on an initial visual survey of the entire system for trash collection points and personal interviews with maintenance staff.

Monitoring will be conducted quarterly for eighteen (18) months to accurately determine seasonal variability. The survey will include documentation of the nature, type, and quantity (e.g., volume) of debris, and potential upstream sources. A survey inspection form, that details the data to be collected, is included as an Attachment.

During each quarterly survey event, trash will be removed from each observation point and quantified. In addition, records of trash removed during routine maintenance by the MCD, the Base Inspectors, and during special clean-up events will be collected for the corresponding quarter. The quantity of trash removed through routine maintenance and special clean-up events will be added to the observation point data to determine the Baseline Load.

The exact data collection methods will be refined after the first two quarterly survey events and may be subject to change throughout the eighteen (18) month survey period.

Following the completion of the survey, a technical report will be prepared to present the methodology, results, and the calculated annual Baseline Load. The survey results will be used to develop short term and long plans to meet the trash reduction objectives of the MS4 Permit.

6 Short Term Plan

The goal of the Short Term Plan is to reduce the debris discharges from the MS4 by 50% from the Baseline Load. The Short Term Plan consists of three steps: (1) establish the Baseline Load; (2) identify source and problem areas and determine preventative and corrective actions; and (3) implementation of actions.

6.1 Establish the Baseline Load

The first step will be to establish the Baseline Load. This will be accomplished by completing a Baseline Load Survey, as described in Section 5. One of the outcomes of the survey will be the identification of problem areas and potential sources. The data collected will help determine target areas of improvement to achieve the 50% reduction goal.

6.2 Data Analysis and Development of Reduction Actions

The Baseline Load Survey data will be analyzed to determine the location of trash accumulation areas and potential sources related to the accumulation areas. Based on the nature of the problem, alternative actions will be developed and prioritized for implementation. Alternative actions may be both preventative (i.e., eliminate the source of trash) and corrective (i.e., collection and disposal of trash). A Reduction Action Plan will be written detailing the selected alternatives.

6.3 Implementation of Short Term Actions

The Reduction Action Plan will present the short term actions to be taken to achieve the 50% reduction goal. Several actions that could be considered include:

- Public Education and Outreach – pamphlets and educational materials specific to trash reduction distributed to residents, workers, and schools.
- Implementation of Pollution Prevention BMPs – implement BMPs to reduce trash generation at the source.
- Implementation of Structural BMPS – construction of structural BMPs to capture trash and debris prior to discharge.
- Storm Drain System Maintenance – routine maintenance of the storm drain system that includes trash collection and disposal.
- Special Clean-up Events – continue litter clean-up events that involve residents and workers.
- Adopt-a-Neighborhood Program – engage residents, workers, and schools in an adopt-a-neighborhood program to foster public awareness and facilitate litter clean-up.

7 Long Term Plan

The goal of the Long Term Plan is to reduce debris discharges from the MS4 by 100% from the Baseline Load. The Long Term Plan consists of two steps: (1) develop a Long Term Implementation and Monitoring Strategy; and (2) implement Long Term Reduction Actions and Monitoring.

7.1 Long Term Reduction Implementation and Monitoring Strategy

The Long Term Reduction Implementation and Monitoring Strategy will specify how MCB Hawaii will achieve the 100% Baseline Load reduction goal. The strategy will consist of two components:

(1) Implementation Plan – will identify specific actions that will be implemented to achieve the 100% reduction goal. The actions will include public education and outreach, implementation of BMPs, and trash collection. It is envisioned that this will be an extension of the actions implemented during the Short Term Plan.
(2) Monitoring Plan – will present the monitoring and tracking required to demonstrate the efforts to meet the reduction requirements and to assess the effectiveness of the reduction actions.

The Implementation and Monitoring Plans will be developed following the Short Term Plan.

7.2 Long Term Reduction Implementation and Monitoring

The long term actions and monitoring will be implemented to achieve the 100% Baseline Load reduction goal. Progress towards meeting the goal will be evaluated annually and will be revised as necessary.

8 Geographical Targets

Priority target areas for trash reduction have been identified for initial survey in Section 5. These priority target areas may be subject to change based on the results of the initial survey, maintenance activity observations, and complaints from the public. At this time, none of the waterbodies that receive discharges from the MCB Hawaii MS4 are listed as impaired for trash on the State's Clean Water Act Section 303(d) list.

9 Trash Reduction Related Education Activities

Public education and outreach is an important component in achieving the Short Term and Long Term goals of this Trash Reduction Plan. As a component of Part D.1.a of the Permit and as outlined in Section 6.3, trash reduction education activities may include:

- Education Materials;
- Special Clean-up Events;
- School Outreach; and
- Adopt-a-Neighborhood Projects.

10 Measuring Program Success

Program success will be measured both quantitatively and qualitatively. Quantitative measures will include measurements of trash collected and monitoring for trash reduction. Qualitative measures will include number of educational materials distributed and increase in public participation in special clean-up events and projects. As previously mentioned, a Long Term Monitoring Plan will be developed to track the success of the program in meeting the reduction requirements and to assess the effectiveness of the trash reduction actions.

11 Implementation Schedule

The proposed implementation schedule is presented in Table 1 below.

Table 1: Implementation Schedule

Task	Completion Date
Short Term Plan	
Baseline Load Survey	October 15, 2017
Data Analysis and Reduction Action Development	April 11, 2019
Short Term Reduction Action Implementation	April 11, 2023
Long Term Plan	
Implementation and Monitoring Strategy	April 11, 2024
Long Term Reduction Action Implementation	April 11, 2034

12 References

1. *Integrated Solid Waste Management Plan, Marine Corps Base Hawaii*. Prepared for MCB Hawaii, by the Naval Facilities Engineering Command, Engineering Service Center. April 2012.
2. *Strategic Sustainability Performance Plan.* Department of Defense. 2012.
3. *Environmental Readiness Program, OPNAVINST 5090.1D.* Department of the Navy. January 10, 2014.

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Attachment

Trash Survey Inspection Checklist

Trash Survey Inspection Checklist

Inspection Date:		Name and phone # of those present during inspection:	
Time:			

Site Information

Site name:	Inlet/Outlet ID No.(*if available*):	
Location/Type of Structure:		
Date of Last Inspection:	Weather during inspection:	Amount of Rainfall in past 24 hrs (inches): _____
Site Drainage Description:		

General Observations/Notes:

_____

_____

_____

Describe Type of Trash Observed (if any):

☐ Plastic

☐ Metal

☐ Wood

☐ Rubber

☐ Disposable Food Containers/Wrappers

☐ Clothing

☐ Other *(describe)*:

_____

_____

_____

_____

_____

Estimate Quantity *(approximate volume, or no. of each item if feasible)***:**

Potential Source:

Photos Taken: Yes ☐ No ☐

Photo Reference IDs:

Recommendations/Additional Notes:

_____

_____

_____

_____

_____

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

APPENDIX 6-2

Final Action Plan for Retrofitting Structural BMPs

October 2015

Final

ACTION PLAN FOR RETROFITTING STRUCTURAL BEST MANAGEMENT PRACTICES

Storm Water Management Plan

Marine Corps Base Hawaii

NPDES Permit No. HI 000007

Prepared by:

Marine Corps Base Hawaii

October 2015

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOH	State of Hawaii Department of Health
ECE	Environmental Compliance Evaluation
EDOP	Effective Date of Permit
EISA	Energy Independence and Security Act, Public Law 110-140 (December 2007)
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
GIS	Geographic Information Systems
ID	Identification
INRMP	Integrated Natural Resources Management Plan
JBPHH	Joint Base Pearl Harbor-Hickam
LID	low impact development
MCB Hawaii	Marine Corps Base Hawaii
MCDC	Mokapu Central Drainage Channel
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
MSL	Mean Sea Level
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
SWMP	Storm Water Management Plan
TBD	To Be Determined
UFC	Unified Facilities Criteria
U.S.	United States

1 Introduction

As of the effective date, October 15, 2014, the Marine Corps Base Hawaii (MCB Hawaii) is required to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HIS000007 (referred to hereinafter as the "MS4 Permit"). The MS4 Permit includes authorized storm water and specified non-storm water discharges into Kaneohe Bay, Nuupia Ponds, Kailua Bay, and the Mokapu Central Drainage Channel. Per the MS4 Permit, Part D.1.f.(1).(iv), MCB Hawaii is required to provide an Action Plan for Retrofitting Structural Best Management Practices (BMPs). The MS4 Permit states:

> *Pollution Prevention/Good Housekeeping, Part D.1.f.(1).(iv)*
>
> *"Action Plan for Retrofitting Structural BMPs – The Permittee shall provide the DOH with an Action Plan for Retrofitting Structural BMPs within one (1) year from the effective date of this permit, which shall identify retrofits to be implemented, and include an explanation of the basis for their selection and an implementation schedule. The implementation schedule shall cover a five (5) year period and be updated annually to include additional retrofit projects with water quality protection measures. The annual updates to the implementation schedule shall be included in the Annual Report with a description of the projects status. The Action Plan may include, but not be limited to projects in compliance with any TMDL implementation and monitoring plan."*

The purpose of the Action Plan for Retrofitting Structural BMPs is to reduce storm water pollution by designing and constructing or installing appropriate and cost-effective structural BMPs (retrofits) in strategic locations and structures within the existing MS4.

2 Structural Best Management Practices (BMPs)

Structural BMPs are engineered systems designed to control or store runoff or remove pollutants from storm water runoff via a chemical or physically based treatment system. These systems improve storm water runoff water quality by addressing issues of erosion and trash. Examples include:

- Stabilization of Erodible Surfaces
- Detention/Infiltration Basins
- Retention Basins
- Sand Filters
- Infiltration Trenches
- Porous/Permeable Pavement
- Vegetated Swales
- Vegetated Buffers/Biofilters
- Bio-retention Cells
- Storm Water Inlet Water Quality Inserts
- Vortex Separation/Continuous Deflection Systems

3 Summary of Recent Improvement Projects

3.1 Prioritization of Improvement Projects

Various studies and surveys at MCB Hawaii have been conducted to identify improvement projects at MCB Hawaii, many of which have direct or indirect impacts on improving storm water runoff water quality. Prioritization of potential improvement projects include the following factors:

- Most immediate threat to public safety or potential to cause property damage;
- Level of onsite usage;
- Proximity to and potential impact on the ocean or receiving water; and
- Potential to route pollutants into receiving waters.

3.2 Documented Areas of Concern

3.2.1 MCB Hawaii Landfill

Erosion within the landfill is confined within the boundaries of the parcel (see Figure 1). In addition to storm water pollution concerns, erosion at the landfill is monitored with respect to regulatory agency rules regarding minimum and maintained fill and cover depths to prevent exposure of buried trash.

The main areas of concern are located along the access roads. The 2004 *Landfill and Northeast Crater Catchment Erosion Assessment Report and Recommendations* identified the following issues associated with erosion and sediment transport:

- At the main entrance, runoff from the roadway flows onto the shoulder of Middaugh Road.
- At the secondary access road (dump truck wash zone), runoff flows down the roadway and across Middaugh Road toward the ocean.
- Suspended solids may be transported offsite via spillway pipes.
- Dust control issues associated with vehicles and equipment entering, leaving, and working on the site.

3.2.2 Ulupau Crater

The Ulupau Crater Catchment area includes approximately 155 acres, ranging in elevation from 638 feet mean sea level (msl) to sea level (see Figure 1). Naturally formed gullies and cliffs, in addition to manmade features like military training berms, have the potential to contribute eroded sediment into the MS4 and receiving waters.

3.3 Summary of Recent Retrofit Projects

Various erosion assessment and recommendation studies have been conducted at MCB Hawaii, resulting in BMP projects that have had a direct impact on improving storm water runoff quality. The following list shows examples of retrofit improvement projects that have been implemented as a result of those studies:

	Issue Addressed by Corrective Action	
BMP Retrofit Project	***Erosion***	***Trash***
Southeast Ulupau Crater Shoreline: An unlined dirt ditch was lined with HDPE for runoff velocity dissipation.	X	
Southeast Ulupau Crater Shoreline: Stabilization of eroding slopes along southern shoreline cliffs with waddles.	X	
Southeast Ulupau Crater Shoreline: Drainage improvements at Weapons Range Parking Lot.	X	
North-facing Ulupau Crater Slopes: An unlined dirt ditch was lined with HDPE for runoff velocity dissipation.	X	
North-facing Ulupau Crater Slopes: The eroding slopes along the north-facing side of Ulupau Crater cliffs were stabilized with waddles.	X	
Sustain Weapons Range: Improvements to access road, drainage improvements, installation of erosion BMPs.	X	
Mokapu Central Drainage Channel (MCDC): Drainage improvement project. Three acres of weed-choked land along the west bank were replaced with a meandering, re-sloped corridor to increase flood storage capacity.	X	
MCDC: Sediment basin installed on the west side of MCDC, north of the footbridge near Seldon St.	X	
MCDC: Trash collector installed at inlet to sediment basin.	X	X
Drainage channel located along Daly Road at Uli Street: Channel lined with HDPE for runoff velocity dissipation.	X	
HDPE Drainage channel located along Daly Road at Uli Street: Two (2) concrete trash/sediment collectors installed at the two discharge points into the channel.		X
Drainage channel located along Daly Road at Middaugh Street: Channel lined with HDPE for runoff velocity dissipation.	X	
Golf course drainage channel perpendicular to Manning Street: Channel regraded with flattened slopes to allow for maintenance access.	X	X
Nuupia Ponds (wetlands): Sediment trap and retention basin installed upstream of discharge outlet into Nuupia Ponds	X	

SOURCE: SEE REFERENCES 2 & 3

	DATE: OCT 2015	PROJECT TITLE: MCB HAWAII STORM WATER MANAGEMENT PLAN - ACTION PLAN FOR RETROFITTING STRUCTURAL BEST MANAGEMENT PRACTICES
	FIGURE TITLE: DOCUMENTED AREAS OF CONCERN	FIGURE NO.: 1

4 Proposed Actions

MCB Hawaii's plan for retrofitting structural BMPs will continue to build on the improvements that have been implemented throughout the property. Low impact development (LID) is mandatory for all large development and redevelopment projects, in accordance with:

1. The Energy Independence and Security Act (EISA, Public Law 110-140), signed December 2007, which aims to increase the efficiency of products, buildings and vehicles, and establishes strict storm water runoff requirements for Federal development projects.
2. The Assistant Secretary of the Navy implemented policy for LID, dated November 2007, that sets an objective of "no net increase in storm water runoff volume and sediment or nutrient loading from major renovation and construction projects."
3. The Unified Facilities Criteria (UFC) 3-210-10N, Low Impact Development, published 6 April 2010, which presents the criteria necessary to comply with the 2007 policy and legislation updates regarding LID implementation.

4.1 Base-wide Survey

The initial step in the BMP retrofit process will be a base-wide survey to document:

1. Locations of existing structural BMPs.
2. Maintenance requirements for existing structural BMPs (including proprietary product information).
3. Areas with observed or potential storm water pollution issues.

4.2 Geographic Information System (GIS) Database

In conjunction with the preliminary base-wide survey, the MCB Hawaii Facilities Department's GIS database will be updated to create an inventory of structural BMPs. This database will be used to identify the maintenance and inspection requirements.

4.3 Assessment of Areas of Concern

Using the information gathered in the preliminary base-wide survey, the areas identified with potential storm water pollution issues will be prioritized by the MCB Hawaii Environmental Department (ENV) using the following steps:

- ENV will investigate whether the issue can be resolved through simple, cost-effective non-structural BMPs, such as increased awareness and education, or improved good housekeeping techniques.
- If the issue requires additional assessment for the design of a structural BMP, the site will be prioritized based on:
    - Most immediate threat to public safety or potential to cause property damage;
    - Level of onsite usage;
    - Proximity to and potential impact on the ocean or receiving water; and
    - Potential to route pollutants into receiving waters.
- If a permanent solution for a high priority hot spot cannot be constructed within 18 months of the effective date of permit (EDOP), the site will be addressed with temporary BMP controls, such as silt fences, bio-filter socks, geotextiles etc., and a work order request should be generated for increased frequency of maintenance at the site.

4.4 Evaluation of Existing and Installed BMP Structures

Following preliminary investigations and installation, structural BMP inspections will commence at an inspection frequency based on the outcome of previous inspections. If there are no reported high priority concerns after two consecutive rainfall events, a site will be downgraded to a reduced inspection frequency:

- Low priority sites shall be inspected at least once every five years.
- Medium priority sites shall be inspected at least annually.
- High priority sites shall be inspected at least semiannually.

Training will be provided to designers, contractors, and maintenance staff on optimizing use of BMPs, and to ensure the use of appropriate BMPs during all stages of the implementation of temporary and permanent BMPs.

All applicable documents and field manuals, provided with MCB Hawaii's Storm Water Management Plan (SWMP) update, will be used to guide implementation, inspection, and maintenance of new and existing structural BMPs.

Annual status reports will be used to evaluate and revise the Action Plan for Retrofitting Structural BMPs, as required by the MS4 permit.

5 Proposed Implementation Schedule

Based on the outcome of preliminary surveys and the number of high priority sites identified, if any, the following implementation schedule is proposed. The implementation year is the year in which the proposed retrofit project is scheduled to be completed; however, this schedule is subject to change due to funding availability, permitting delays, or other unforeseen circumstances. Changes to the implementation schedule will be provided in the Annual Report.

Table 1: Implementation Schedule

Task	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Conduct Base-wide Preliminary Inventory Survey	X				
Develop GIS Database and Tracking Database for Structural BMPs	X				
Develop a Prioritized Ranking of Hot Spots and Other Potential Retrofit Opportunities, if any	X				
Develop Maintenance and Field Inspection Plan		X			
Implementation of Temporary BMPs at High Priority Sites, as needed	X	X	X	X	X
Implementation of Maintenance and Field Inspection Plan		X	X	X	X
Design and Appropriation of Funding for Permanent BMPs:					
Priority #1		X			
Priority #2			X		
Priority #3				X	
Implementation of Permanent BMPs:					
Priority #1			X		
Priority #2				X	
Priority #3					X
Update Internal Database for Tracking of Maintenance and Inspections, as needed		X	X	X	X
Update GIS Database	X	X	X	X	X
BMP Retrofit Program Status Updates (in Annual Report) – Evaluation		X	X	X	X

6 References

1. *Final Marine Corps Base Hawaii Integrated Natural Resources Management Plan (INRMP), Update 2012-2016* (2011). Prepared for MCB Hawaii, by the Environmental Compliance and Protection Department MCB Hawaii and Sustainable Resources Group Int'l Inc. November 2011.
2. *Erosion Assessment with Recommendations: Outer Slopes and Southeast Shoreline, Ulupau Crater, Marine Corps Base Hawaii* (2007). Prepared for MCB Hawaii - ENV, by Sustainable Resource Group Int'l Inc. May 2007.
3. *Landfill and Northeast Crater Catchment Erosion Assessment Report with Recommendations* (2004). Prepared for the MCB Hawaii -ENV, by Sustainable Resource Group Int'l Inc. June 2004.

APPENDIX 6-3

Best Management Practices for Disposal of Waste Materials

Appendix 6-3
Options for Disposal of Waste Materials

Discharge/Activity	Disposal Priorities
General Construction and Painting; Street and Utility Maintenance	
Excess paint (oil-based)	1. Recycle/reuse. 2. Dispose waste in accordance with Federal, State and Local regulations.
Excess paint (water-based)	1. Recycle/reuse. 2. Dry residue of less than one inch of substance in cans, dispose as trash. 3. Dispose waste in accordance with Federal, State and Local regulations.
Paint cleanup (oil-based)	Wipe paint out of brushes, then: 1. Filter and reuse thinner and solvents. 2. Dispose waste in accordance with Federal, State and Local regulations.
Paint cleanup (water-based)	Wipe paint out of brushes, then: 1. Rinse to sanitary sewer.
Empty paint cans (dry)	1. Remove lids, dispose lid and can as trash.
Paint stripping (with solvent)	1. Dispose waste in accordance with Federal, State and Local regulations.
Cleaning of building exteriors which have hazardous material (e.g., mercury, lead in paints)	1. Use dry cleaning methods. 2. Contain and Dispose waste in accordance with Federal, State and Local regulations. (Suggestion: dry material first to reduce volume.)
Non-hazardous paint scraping or sandblasting	1. Dry sweep, dispose as trash.
Hazardous paint scraping or sandblasting (e.g., marine paints or paints containing lead or tributyl tin)	1. Dry sweep and dispose waste in accordance with Federal, State and Local regulations.
Soil from excavations during periods when storms are forecast	1. Should not be placed in street or on paved areas. 2. Remove from site or backfill by end of day. 3. Cover with tarpaulin, surround with hay bales, or use other runoff controls. 4. Place filter mat over storm water system. Note: Thoroughly sweep following removal of dirt in all four alternatives.
Soil from excavations placed on paved surfaces during periods when storms are not forecast	1. Keep material out of storm water systems and thoroughly remove via sweeping following removal of soil.

Discharge/Activity	Disposal Priorities
Cleaning streets in construction areas	1. Dry sweep and minimize tracking of mud. 2. Use silt ponds or similar pollutant reduction techniques when flushing pavement.
Soil erosion, sediments	1. Cover disturbed soils, use erosion controls, block entry to storm water system. 2. Seed or plant immediately.
Fresh cement, grout, mortar	1. Use/reuse excess. 2. Dispose to trash.
Wash water from concrete or mortar cleanup	1. Wash onto earthen area, spade in. 2. Pump and remove to appropriate disposal facility. 3. Settle, pump water to sanitary sewer system.
Aggregate wash from construction	1. Wash onto earthen area, spade in. 2. Pump and remove to appropriate disposal facility. 3. Settle, pump water to sanitary sewer system.
Rinse water from concrete mixing trucks	1. Return truck to yard for rinsing into pond or earthen area. 2. At construction site, wash into pond or earthen area.
Non-hazardous construction and demolition debris	1. Recycle/reuse (concrete, wood, etc.). 2. Dispose as trash.
Hazardous demolition and construction debris (e.g., asbestos)	1. Dispose material with shipping document into a regulated landfill.
Saw-cut slurry	1. Use dry cutting technique and sweep up residue. 2. Vacuum slurry and dispose off-site. 3. Block storm water system or berm with low weir as necessary to allow most solids to settle. Shovel out gutters; dispose residue to earthen area, construction yard or landfill.
Portable toilet waste	1. MCB Hawaii, Kaneohe Bay shall dispose to sanitary sewer as specified by the State.
Leakage from garbage dumpsters	1. Collect or contain leaking material. Eliminate leak, keep covered; return to leasing company for immediate repair. 2. If dumpster is used for liquid waste, use plastic liner.
Leaks from construction debris bins	1. Ensure that bins are used for dry non-hazardous materials only. (Suggestion: Fencing and covering help prevent misuse.)
Dumpster cleaning water	1. Clean at dumpster owner's facility and discharge waste through grease interceptor to sanitary sewer system. 2. Clean on-site and discharge through grease interceptor to sanitary sewer system.

Discharge/Activity	Disposal Priorities
Cleaning paved areas	1. Sweep and dispose as trash (dry cleaning only). 2. For vehicle leaks, follow this 3-step process: a. Clean up leaks with rags or absorbents. b. Sweep using granular absorbent material (cat litter). c. Mop and dispose of mop water to sanitary sewer system (or collect rinse water and pump to the sanitary sewer system). 3. Same as 2 above, except for 2c. Instead, discharge rinse water (no soap) to soil or grassy area.
Landscape/Garden Maintenance	
Pesticides	1. Use up. Rinse containers; use rinse water as product. Dispose rinsed containers as trash. 2. Dispose waste in accordance with Federal, State and Local regulations.
Garden clippings	1. Compost. 2. Take to landfill.
Tree trimming	1. Chip, if necessary, before composting or recycling.
Decorative fountains and ponds (no fish)	1. Do not use metal-based algicides (i.e., copper sulfate). 2. Recycle/reuse (e.g., irrigation). 3. Discharge to sanitary sewer system. 4. Determine chlorine residual = 0, wait 24 hours, and then discharge to storm water system.
Acid or other pool/fountain cleaning	1. Neutralize and discharge to sanitary sewer.
Swimming pool and decorative fountain filter backwash (Dechlorinated water only)	1. Reuse for irrigation. 2. Dispose on pervious areas. 3. Settle, dispose to sanitary sewer system.
Vehicle Wastes	
Used motor oil	1. Use secondary containment while storing.
Antifreeze	1. Use secondary containment while storing. Dispose waste in accordance with Federal, State and Local regulations.
Other vehicle fluids and solvents	1. Dispose waste in accordance with Federal, State and Local regulations.
Automobile batteries	1. Send to auto battery recycler. 2. Take to recycling center. 3. Store in appropriate storage containers or on containment pallets.
Construction trailer waste	1. Use holding tank. Dispose to sanitary sewer system.
Vehicle and boat washings (using detergent or other compounds)	1. Recycle. 2. Discharge to sanitary sewer system, never to storm water system.

Discharge/Activity	Disposal Priorities
Rinse water from dust removal at new fleet vehicles	1. Discharge to sanitary sewer system. 2. If rinsing dust from exterior surfaces for appearance purposes, use no soap (water only); discharge to soil or grassy area.
Vehicle leaks at vehicle repair facilities	Follow this 3-step process: 1. Clean up leaks with rags or absorbents. 2. Sweep, using granular absorbent material (cat litter). 3. Mop and dispose of mop water to sanitary sewer.
Other Wastes	
Spent fix from photo processing	1. Collect for hauling as hazardous waste. 2. Treat to silver discharge limit.
Cooling water and demineralized water	1. Recycle/reuse. 2. Discharge to sanitary sewer system.
Kitchen grease	1. Provide secondary containment, collect, send to recycler. 2. Provide secondary containment, collect, send to wastewater treatment plant by hauler.
Cleaning of kitchen floor mats, exhaust filters, and compressed air line flushings, etc.	1. Clean inside building and route discharge through grease trap to sanitary sewer system. 2. Clean outside in container or bermed area and route discharge to sanitary sewer system.
Cleanup wastewater from sewer backup	Follow this procedure: 1. Block storm water system, contain, collect, and return spilled material to the sanitary sewer system. 2. Block storm water system, rinse remaining material to collection point, and pump to sanitary sewer system. (No rinse water may flow to storm water system.)

Notes:
1. "Discharge to sanitary sewer" - Dispose into sink, toilet, or sanitary sewer clean-out connection
2. "Dispose as trash" - Dispose in dumpsters or trash containers for pickup or eventual disposal in landfill
3. "Dispose as hazardous waste" - Contract with a hazardous waste hauler to remove and dispose

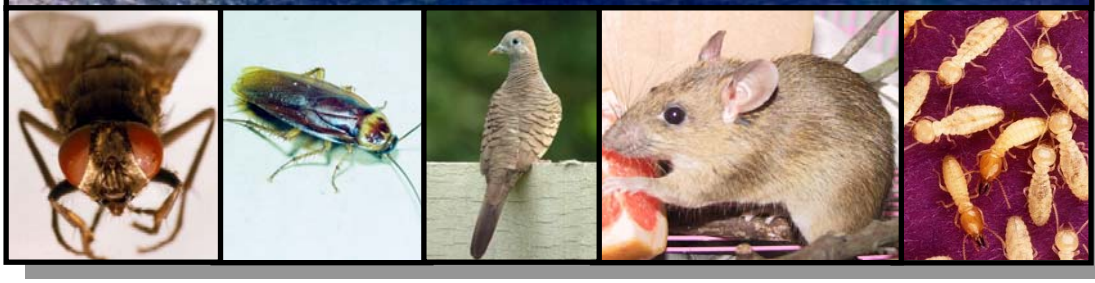
APPENDIX 7-1

Marine Corps Base Hawaii Pest Management Plan

January 2007

Marine Corps Base Hawaii

PEST MANAGEMENT PLAN



Kaneohe Bay

Final

January 2007

SIGNATURE PAGE

Marine Corps Base Hawaii:

Brigadier General S. A. Hummer
Commanding General

22 Jun 07
Date

Lieutenant Colonel Dean F. Levi
Director, Environmental Compliance and
Protection Department

15 May 07
Date

Lance Bookless
Installation Pest Management Coordinator
Natural Resources Program Manager

27 Apr 07
Date

Roy Murakami
Facilities Department
Pest Manager

07 MAY 07
Date

Clint Tolbert
MCCS Golf Course Maintenance
Superintendent

04 June 07
Date

J.O. Park
Family Housing Department
Director

10 May 07
Date

NAVFAC Hawaii

15 MAY 07

LT Tom J. Lyons
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LT Jennifer Remmers
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27 Apr 2007

Cory Campora
Consultant Entomologist

Date

~~Forest City Hawaii~~ Ohana Military Communities, LLC
By: FC Hawaii, Inc, its Managing Member

5/23/07

John C. Wallenstrom
Senior Vice President

Date

Annual Update Signature Sheet

YEAR	REVIEWER	DATE
FY-08	_____	_____
FY-09	_____	_____
FY-10	(TECHNICAL REVIEW) _____	_____
FY-11	_____	_____
FY-12	(REVISION)	

MARINE CORPS BASE
Semper Fidelis
HAWAII

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LIST OF ABBREVIATIONS

AAV	Assault Amphibious Vehicle
AQS	Animal Quarantine Station
BASH	Bird Aircraft Strike Hazard
BEQ	Bachelor Enlisted Quarters
BOQ	Bachelor Officer Quarters
BPA	Blanket Purchase Agreement
^{o}C	Degrees Centigrade
CBP	Customs and Border Protection
CFR	Code of Federal Regulations
CIS	Cholinesterase Inhibiting Substances
Cm	Centimeter
DENIX	Defense Environmental Network Information Exchange
DoD	Department of Defense
EA	Environmental Assessment
ESA	Emergency Service Authorization
^{o}F	Degrees Fahrenheit
HEAR	Hawaii Ecosystems At Risk
HDOA	Hawaii Department of Agriculture
ha	Hectares
IDQ	Indefinite Quantity
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPMC	Installation Pest Management Coordinator
ISMS	Invasive Species Management Study
ISSA	Inter Service Support Agreement
Km	Kilometer
m	Meters
MCAF	Marine Corps Air Field
MCBH	Marine Corps Base Hawaii
MCCS	Marine Corps Community Services
MCTAB	Marine Corps Training Area Bellows
MCO	Marine Corps Order
MBTA	Migratory Bird Treaty Act
MIL-HDBK	Military Handbook
MIL-STD	Military Standard
Mm	Millimeters
MOMs	Measures of Merit
MSDS	Materials Safety Data Sheet
MWR	Morale, Welfare and Recreation
NOAA	National Oceanographic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NDVECC	Navy Disease Vector Ecology and Control Center

LIST OF ABBREVIATIONS

NEPMU6	Navy Environmental and Preventive Medicine Unit 6
NAVFAC	Naval Facilities Engineering Command Instruction
NAVMED	Naval Medical
NAVFAC Pacific	Naval Facilities Engineering Command Pacific
BMC	Naval Branch Medical Clinic
NOSC	Naval Ocean System Center
OJT	On the Job Training
OPNAVINST	Office of the Chief of Naval Operations Instruction
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PMC	Pest Management Consultant
PMDS	Pest Management Data System
PMP	Pest Management Plan
PMQAE	Pest Management Quality Assurance Evaluator
PPE	Personal Protective Equipment
PPPC	Partner's Plan for Pest Control
PPV	Public Private Venture
QAE	Quality Assurance Evaluator
RBC	Red Blood Cell
RCRA	Resource Conservation and Recovery Act
RIFA	Red Imported Fire Ant
ROICC	Resident Officer-In-Charge of Construction
SECNAVINST	Secretary of the Navy Instruction
SJO	Standing Job Orders
TDA	Table of Distribution and Allowances
TG	Technical Guide (formerly TIM – Technical Information Memorandum)
UFGS	Unified Facility Guide Specifications
UH	University of Hawaii
USACE	United States Army Corps of Engineers
USARPAC	United States Army Pacific Command
USDA	United States Department of Agriculture
USDA-WS	United States Department of Agriculture Wildlife Services
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
WMA	Wildlife Management Area
WNV	West Nile Virus

EXECUTIVE SUMMARY

The Marine Corpse Base Hawaii (MCBH) Kaneohe Bay pest management plan serves as the framework through which an effective, economical, and environmentally acceptable pest management program is maintained at MCBH Kaneohe Bay. This plan applies to all activities and individuals working, residing, or doing business on MCBH Kaneohe Bay property and will be implemented to the maximum extent feasible.

The plan describes pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the pest management program. Information on pest management at MCBH Camp Smith properties is included as an appendix.

The MCBH Kaneohe Bay pest management program enables certified pesticide applicators to protect personnel, property, materiel, and the environment from the adverse effects of living organisms such insects, rodents, weeds, and other pests that cause economic loss or threaten public health and the environment. Without control, these organisms could interfere with the MCBH mission by exposing personnel to disease, causing damage to structures, diminishing quality of life, endangering federally protected animal species, and destroying stored commodities.

This plan is a working document and will be continually updated to reflect actual pest management practices.

1 BACKGROUND

1.1 MCBH

Marine Corps Base Hawaii (MCBH) is composed of eight properties: MCBH Kaneohe Bay, MCBH Camp Smith, Puuloa Training Area, Manana Housing Area, Marine Corps Training Area Bellows (MCTAB), Waikane Impact Area, Pearl City Annex, and the Molokai Training Facility (see Figure 1.1).

Historically, the pest management programs at these properties were covered under the following documents: (1) MCBH Pest Management Plan (PMP) Volume 1, Kaneohe Bay, which covered MCBH Kaneohe Bay and MCTAB; and (2) MCBH PMP Volume 2, Camp Smith, which covered MCBH Camp Smith, Puuloa Training Area, and Manana Housing Area. The current MCBH Kaneohe Bay PMP (January 2007) incorporates all properties into a single document by adding an appendix (Appendix A) that includes information previously covered in Volume 2. The Waikane Impact Area, Pearl City Annex, and Molokai Training facility are not specifically discussed in this plan due to the fact that these sites have no regularly scheduled pest management operations.

An additional plan, the Partner's Plan for Pest Control (PPPC) is included as Appendix C. This plan outlines the pest management program established by the public-private venture (PPV) entity in all MCBH housing areas.

1.2 PURPOSE

The purpose of this PMP is to serve as the guiding document through which an effective, economical and environmentally acceptable pest management program is established and maintained at MCBH Kaneohe Bay. The current plan is an update of the 2000 MCBH PMP and covers the next five years of pest management operations (Jan 2007 – Dec 2011). Adherence to the guidelines set forth in the PMP will assist pest management personnel to perform their work in accordance with applicable Federal and State laws and DoD and Marine Corps regulations.

1.3 AUTHORITY

DoD Directive 4150.7, DoD Pest Management Programs, 22 April 1996.

OPNAV Instruction 6250.4B, Pest Management Programs, October 1998.

MCO P5090.2A, Environmental Compliance and Protection Manual, Chapters 13 & 14 (Pesticide Pollution Prevention), 4 March 1999.

1.4 OBJECTIVE OF THE PLAN

The objective of the PMP is to provide guidance for an effective pest management program at MCBH Kaneohe Bay. The Plan shall be technically reviewed on a three-year cycle by the NAVFAC Pacific or Navy Environmental and Preventative Medicine Unit 6 (NEPMU6) entomologist with input from the MCBH Kaneohe Bay Facilities and Environmental Departments, the MCBH Camp Smith Environmental Coordinator, and the Branch Medical Clinic. The review will have three objectives: (a) identify new pest problems not covered in the existing PMP, (b) determine if there are any exceptions to the procedures and standards established in the PMP, and (c) evaluate the effectiveness of the pest management program. All of these objectives will be reported in an exit critique and written as an addendum to the PMP. Recommendations will be incorporated into the PMP on a five-year cycle.

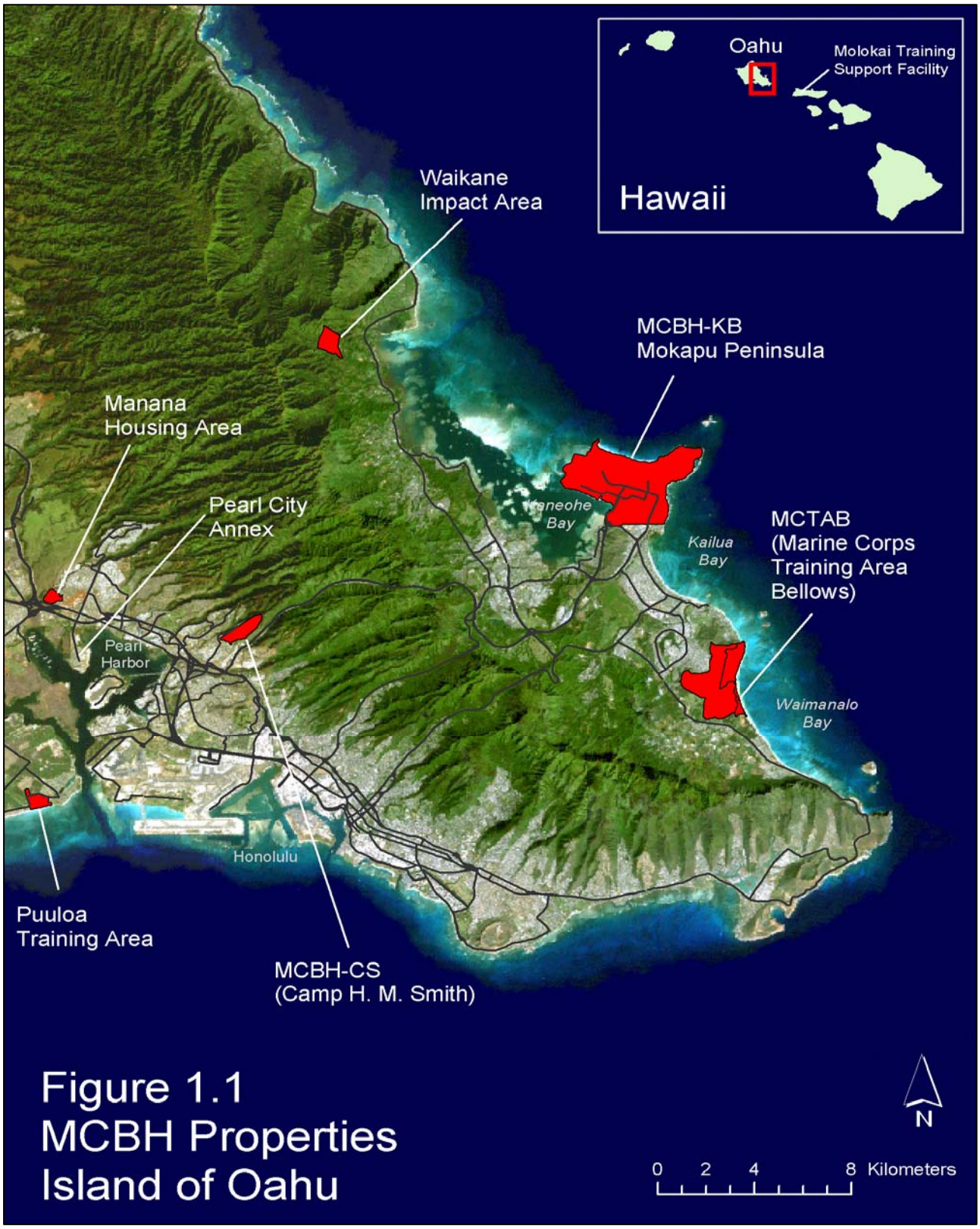


Figure 1.1
MCBH Properties
Island of Oahu

2 RESPONSIBILITIES

The administrative aspects of the MCBH Kaneohe Bay pest management program are generally the responsibility of the Installation Pest Management Coordinator (IPMC). The Facilities Department pest control shop, and the Golf Course Maintenance shop are responsible for actual day-to-day pest management operations. Additionally, the United States Department of Agriculture Wildlife Services (USDA-WS) is contracted to perform: (1) predator trapping in sensitive wildlife areas on Mokapu Peninsula, and nuisance animal damage control at Camp H. M. Smith for MCBH Environ Dept.; and (2) Bird Aircraft Strike Hazard (BASH) control assist for the Marine Corps Air Facility (MCAF). The MCBH Environmental Department retains general oversight of the BASH operation and retains the required US Fish and Wildlife Service-issued depredation permit for BASH.

Information provided in this section summarizes the specific roles and responsibilities of key personnel in the pest management program.

For reference purposes, an organizational chart for MCBH Kaneohe Bay is presented in Figure 2.1. Working relationships between activities are summarized in Figure 2.2.

2.1 COMMANDING GENERAL

The Commanding General has the following responsibilities:

- Designates an Installation Pest Management Coordinator for MCBH.
- Approves and supports the PMP.

The Commanding General is kept apprised of the status of ongoing pest management activities through the Installation Pest Management Coordinator.

2.2 INSTALLATION PEST MANAGEMENT COORDINATOR (IPMC)

The IPMC has the following responsibilities:

- Ensures that all pesticide applicators receive adequate training, and acquire and maintain the required pest management certifications.
- Ensures that installation pest management operations are conducted safely, effectively, and with minimal impact on the environment.
- Prepares or coordinates the periodic updating of the installation PMP.

Figure 2.1 Organizational Chart
(streamlined to show pest management activities)

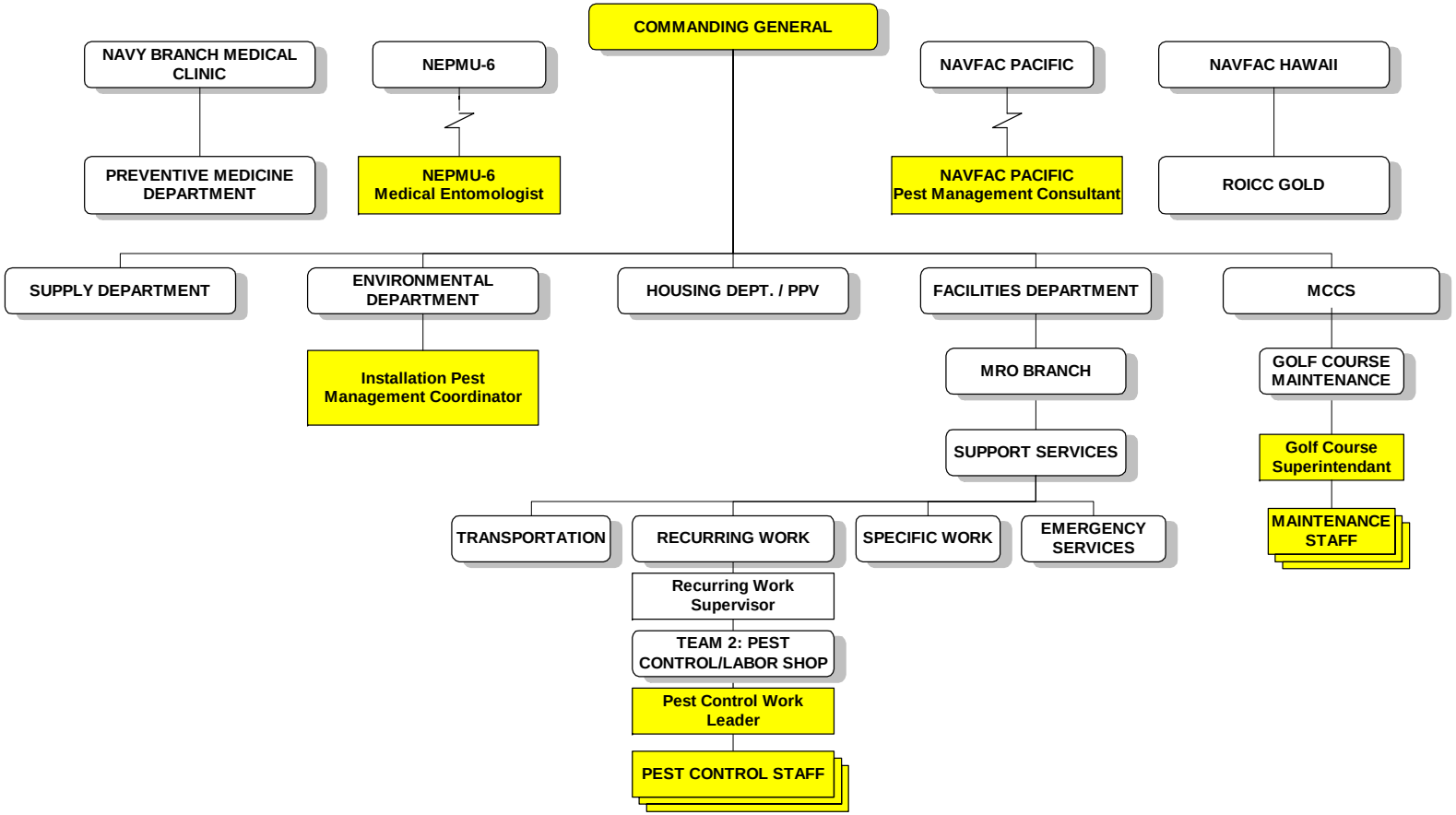
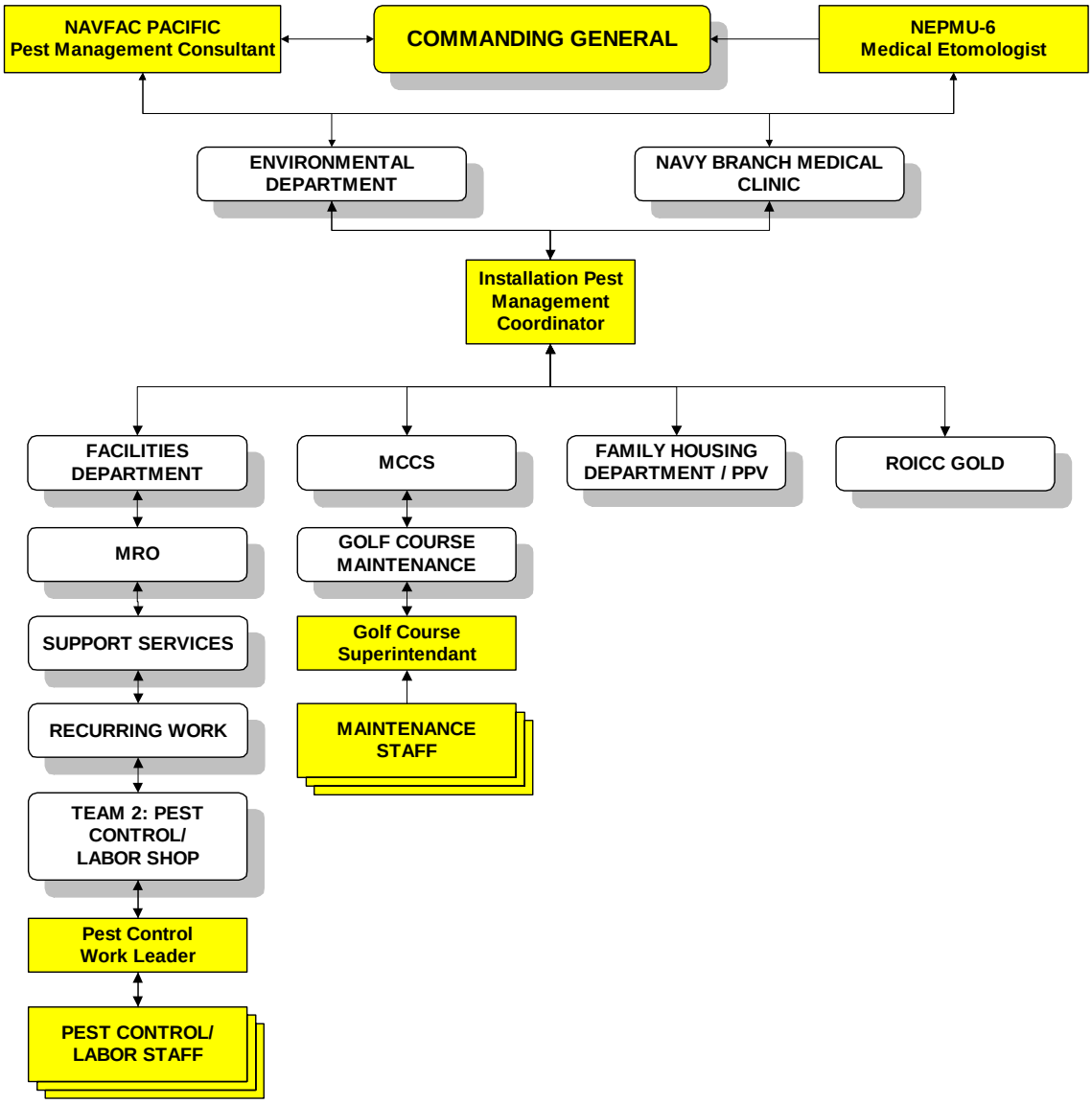


Figure 2.2 Working Relationships (streamlined to show pest management activities)



- Ensures that all applicable pest management information is recorded and reported to the NAVFAC Pacific Pest Management Consultant (PMC)/Consultant Entomologist by the installation tenant commands and activities as required by military directives and this plan.

- Oversees the sale, distribution and proper use of pesticides on the installation.

- Conducts periodic inspections of all MCBH facilities that store and apply pesticides. Inspections may also be carried out by the NAVFAC Pacific PMC/Consultant Entomologist.

- Functions as a point of contact between activities that store and apply pesticides and activities or individuals that document or deal with pesticide use in their programs.

- Assists the pest control shop foremen to secure the necessary funding for supplies, equipment, training, facilities improvements, and security in a timely manner.

- Ensures that pest management work is performed by or under direct supervision of DoD certified applicators.

- Ensures that all pest management contracts, including those purchased by non-appropriated funded activities and family housing residents, are monitored by DoD-certified pesticide applicators or pest management quality assurance evaluators.

- Ensures pesticides are approved by a DOD PMC before they are procured.

- Reviews contracts with pest management services listed as an item and ensures that a DOD PMC reviews and approves the contract documents for pest management operations before the contract is awarded.

2.3 FACILITIES DEPARTMENT

The Facilities Department, Maintenance Branch, Pest Control Shop (herein referred to as the Facilities Shop) is the principle activity involved in pest management on Base (excluding golf course related maintenance). The Facilities Shop is operated by the Pest Control Shop foreman (herein referred to as the foreman) and a staff of pesticide applicators (herein referred to as facilities applicators). The foreman has the following responsibilities:

- Ensures that applicators receive adequate training, periodic medical monitoring, and maintain their required pest management certifications.

- Ensures that integrated pest management (IPM) techniques are employed in daily pest management operations to the fullest extent (see page 4-1).

- Ensures that all pest management operations are conducted safely and have minimal impact on the environment.

- Assists the IPMC with the preparation, monitoring and updating of the installation PMP.

- Ensures that all applicable information is recorded and reported as required by this plan.

- Maintains effective liaison with Base environmental, medical, safety and security departments.

- Ensures that all pesticide applications are performed by, or under direct supervision of DOD certified applicators.

- Assists the IPMC in monitoring all pest management contract operations on Base.

- Obtains the assistance of the IPMC for securing of necessary funds for recurring shop activities (e.g., for supplies, training, equipment, and facilities improvements).

- Coordinates with the Environmental Department on all pest management activities in and around environmentally sensitive areas.

- Submits a list of pesticides to the PMC/Consultant Entomologist for approval prior to procurement. A copy of the list is submitted to the IPMC.

Applicators have the following responsibilities:

- Provide on-base pest management services in and around food service, industrial, institutional and housing areas that include ant, cockroach and rodent control in the galley, service clubs, Base Exchange and Commissary, ration warehouse, Branch Medical Clinic, and Child Development Center. Provide annual termite inspection of family housing, mosquito surveillance and control, and weed management in the wildlife management areas.

- Maintain adequate supplies of pesticides and pesticide dispersal equipment, and ensure that the equipment is properly maintained.

- Provide quality assurance evaluation (QAE) services for all pest control contracts, including those used by non-appropriated funded activities and family housing residents. (Note: Pest control in PPV housing is evaluated by the PPV partner and does not require MCBH QAE)

- Maintain records of all pest management operations.

- Determine pest management requirements for the Base (excluding golf course areas).

- Coordinate with the Environmental Department on all pest management activities in and around environmentally sensitive areas.

2.4 GOLF COURSE MAINTENANCE

Pest management activities related to the operation of the Base golf course (Klipper Golf Course) are handled by pesticide applicators (herein referred to as golf course applicators) from the golf course Maintenance Department (herein referred to as the Golf Course Shop) that work under the guidance of the Grounds Maintenance Superintendent (herein referred to as the Superintendent). Golf course applicators are subject to the same training and certification requirements as the Facilities applicators.

The Superintendent has the following duties:

- Ensures that golf course applicators receive adequate training, annual medical examination and maintain the required pesticide applicator certification.

- Ensures that IPM methodologies are employed in daily operation to the fullest extent.

- Ensures that all pest management operations are conducted safely and have minimal impact on the environment.

- Assists the IPMC to prepare, monitor and update of the installation PMP.

- Maintains effective liaison with Base environmental, medical, safety and security departments.

- Ensures that records for pest management operations and personnel training are adequately maintained.

- Ensures that pesticide applications are performed by or under direct supervision of DOD certified applicators.

- Obtains the assistance of the IPMC in securing necessary funds for recurring shop activities (e.g., for supplies, training, equipment, and facilities improvements).

- Ensure that the ponds on the golf course are properly maintained to enhance the pond habitat for protected waterfowl, as described in the MCBH Integrated Natural Resources Management Plan (INRMP) and Invasive Species Management Study (ISMP).

Golf course applicators have the following responsibilities:

- Secure and maintain adequate inventories of pesticides and pesticide dispersal equipment.

- Maintain landscaped golf course areas.

- Provide pest management services for golf course related buildings and facilities.

- Ensure that pesticide applications at the golf course are performed by or under the direct supervision of DoD certified applicators.

- Communicate with the Superintendent to determine golf course pest management requirements.

- Maintain and enhance the habitat of the ponds on the golf course for protected waterfowl use, as described in the INRMP and the MCBH ISMS.

2.5 BASE ENVIRONMENTAL DEPARTMENT

- Provides technical guidance on pest management procedures in environmentally sensitive areas.

- Assists the IPMC with the preparation, monitoring and updating of the installation PMP.

- Ensures consistency between the PMP and the INRMP/EA (2001) as updated in 2006 and coordinates the required efforts of the plans with activities affected by them

2.6 BUILDING OCCUPANTS

Building occupants include residents of family and bachelor housing, as well as occupants (military and civilian work force) in office buildings and industrial and institutional facilities.

Occupants are responsible for the following:

- Apply good sanitary practices in and around buildings to prevent pest infestations.

- Control minor nuisance pests in their own living space through the use of non-chemical and chemical pest control techniques to the fullest extent before requesting assistance from either the Pest Control Shop (in the case of office building and bachelor housing occupants) or PPV property management (in the case of family housing). Family housing and bachelor housing occupants are authorized, by current pest management instructions, to solicit the services of a commercial (licensed) pesticide applicator at their own expense. However, the use of commercial pest management services must be done with discretion and only after conferring with the housing office or PPV property management.

- Cooperate fully with Pest Control Shop personnel and contractors in scheduling pest management operations, including preparation of areas to be treated.

2.7 MCBH KANEOHE BAY BRANCH MEDICAL CLINIC

- Manages base vector surveillance programs and conducts surveillance for pests that could adversely affect the health and welfare of installation occupants and personnel.

- Coordinates with local health officials to determine the prevalence of disease vectors and other public health pests in the area surrounding the installation.

- Enforces proper procedure of pesticide sales at the Self-Service Supply Center, the Commissary, and the Post Exchange.

- Maintains and evaluates the public health aspects of the pest management program.

- Conducts quarterly inspections of the pest control shop and golf course maintenance shop.

- Prepares an emergency vector control plan that becomes part of the MCBH Kaneohe Bay PMP.

2.8 FAMILY HOUSING OFFICE

- Maintains inventory of self-help pest management items and monitors issuance of products to family housing residents. (Note: As of October 1, 2007, all family housing will be privatized under PPV and the Housing Office will no longer have this responsibility.)

- Maintains records of contracted pesticide usage and forwards reports to the pest control shop for incorporation in the shop's monthly summary of pesticides usage. (Note: As of October 1, 2007, all family housing will be privatized under PPV and the Housing Office will no longer have this responsibility.)

- Coordinates residential pest management operation provided by the pest control shop or by contract. (Note: As of October 1, 2007, all pest management in family housing will be privatized under PPV and the Housing Office will no longer have this responsibility.)

- Coordinates QAE of pest management performed by contract in family housing. (Note: Pest control in PPV housing is evaluated by the PPV partner and does not require MCBH QAE. As of October 1, 2007, all pest management in family housing will be privatized under PPV and the Housing Office will no longer have this responsibility.)

2.9 MARINE CORPS COMMUNITY SERVICES (MCCS) DEPARTMENT

- Provides funding for golf course maintenance training, pesticides and equipment purchases, and facilities improvements.

- Coordinates QAE of pest management performed by contract.

- Adheres to the requirements of commercial pesticide sales, pesticide storage, and disposal of expired pesticides in the MCX garden shop.

2.10 RESIDENT OFFICER IN CHARGE OF CONSTRUCTION (ROICC)

- Ensures all pesticides applied during any construction activity are properly documented by the government contractor and reported monthly to NAVFAC Pacific Environmental Engineering Department, Environmental Planning Division, Natural Resources Branch and the IPMC.

2.11 NAVY ENVIRONMENTAL AND PREVENTIVE MEDICINE UNIT (NEPMU) 6

- Provides support during a vector-borne disease outbreak or other medical pest problem that is beyond the capabilities of the branch medical clinic.

- Assists the branch medical clinic, when necessary, in providing deploying units with preventive medicine support such as uniform treatments and training on the use of personal insect repellents and the prevention of arthropod related injury and disease.

- Reviews and approves pest management plan revisions.

2.12 PUBLIC-PRIVATE VENTURE (PPV) PARTNER

- Ensure that contracted pest control operators are properly licensed and certified in accordance with federal, state and Department of the Navy policy.

- Educate tenants about hazard communication, sanitation, pest management options, and pesticide safety.

- Maintain records of all pesticide applications and an inventory of all pesticides used on the leased property with copies of respective MSDSs and pesticide labels.

- Ensure that all pesticides applied on the Leased Premises have been pre-approved by the CNRH Pest Management Coordinator, MCBH Pest Management Coordinator, and NAVFAC Pacific Environmental Business Line entomologists.

- Submit records of all pesticide applications to the CNRH Pest Management Coordinator, MCBH Pest Management Coordinator, and NAVFAC Pacific Environmental Business Line entomologists using the NAVFAC PMR spreadsheet on at least a quarterly basis.

3 GENERAL

3.1 MISSION STATEMENT

The underlying mission of MCBH Kaneohe Bay is to maintain and operate the facilities required to provide service and material support for the air and ground units currently stationed at the Base.

3.2 INSTALLATION DESCRIPTION

3.2.1 Location and Terrain

MCBH Kaneohe Bay is located on the Mokapu Peninsula of the island of Oahu (Figure 1.1). The peninsula is bordered on the north by the Pacific Ocean, Kailua Bay on the east, residential housing on the south, and Kaneohe Bay on the west. MCBH Kaneohe Bay occupies an area of approximately 2,951 acres (1,194 ha).

The topography of the peninsula ranges in elevation from 0 to 638 ft (196 m) above sea level. The three most prominent land features are Ulupau Crater, Pyramid Rock or Kuau, and Puu Hawaii Loa (Figure 3.2).

Ulupau Crater is the remnant of a volcanic event that formed most of Mokapu Peninsula. At its peak, the crater reaches an elevation of 638 feet above sea level. Pyramid Rock is a low outcropping of volcanic rocks located along the northwest shore of the peninsula. Puu Hawaii Loa is a 378-foot (116 m) cinder cone located approximately at the center of MCBH Kaneohe Bay. Both Pyramid Rock and Puu Hawaii Loa are geologically classified as post erosion lava remnants of Ulupau Crater.

3.2.2 Geology and Groundwater

Soil types range from dense silty clays to fine beach sand. The major soil types at MCBH Kaneohe Bay are Mamala stony silty clay loam, Makalapa clay, and fill land. The Mamala stony silty clay loam is a well-drained soil developed from coral, lava, and alluvium and provides a solid foundation for construction. The Makalapa clay is mainly found around Ulupa'u Crater. The soil is highly expansive and contractible, therefore it is undesirable for construction. The fill areas are generally in the runway and hangar areas where aircraft activity is high.

There are no potable groundwater sources located within the boundaries of the Base.

Figure 3.1 MCBH Kaneohe Bay Functional Areas and Land Use

Note: For a more detailed and accurate depiction of the Nu'upia Ponds and Ulupa'u Head WMAs see the 2006 INRMP (Figure 4, Appendix B).

3.2.3 Climate

There are only two seasons in Hawaii, summer (May to October) and winter (November to April). The summer season is characterized by warmer temperatures and mild winds - either mild northeasterly trade winds or southerly (Kona) winds. The winter season is characterized by cooler temperatures, stronger trade winds, and higher levels of rainfall. Annual rainfall at MCBH Kaneohe Bay averages about 40 inches (15.8 cm) per year. Temperatures in the area average between 72°F and 79°F (22°C and 26°C, respectively). The highest recorded temperature in the Kaneohe area is 93°F (34°C).

3.2.4 Wetlands and Wildlife Management Areas

MCBH Kaneohe Bay includes two designated wildlife management areas (WMA): Nu'upia Ponds and Ulupa'u Head (Figure 3.2). Several smaller man-made wetlands also exist. They are Klipper Golf Course Ponds, the recently-expanded Percolation Ditch wetland north of Nu'upia 'Ekolu pond, wetlands within Hale Koa Beach, and the Sag Harbor area near Waterfront Operations, as well as what is called "Motor Pool" wetland next to the Heavy Gun facility. A map of all these delineated wetland locations is displayed as Fig 6a in the 2006 INRMP Update.

The wetland areas provide needed habitat for endangered Hawaiian waterbirds such as the Hawaiian Stilt, or Ae'o (Himantopus mexicanus kundenseni); the Hawaiian Coot, or 'Alae Ke'oke'o (Fulica americana alai); the Hawaiian Gallinule, or 'Alae'ula (Gallinula chloropus sandvicensis); and the Hawaiian Duck, or Koloa (Anas Wyvilliana).

3.2.4.1 Nu'upia Ponds WMA

Nu'upia Ponds WMA encompasses an area of approximately 517 acres (195 ha). The area is located along the south boundary of the Base (Figure 3.2). Nu'upia Ponds are protected by Section 404 of the Clean Water Act. The area is cooperatively managed under the Federal Sikes Act by MCBH environmental staff, with technical assistance from the State Department of Land and Natural Resources, U.S. Fish and Wildlife Service (USFWS), National Oceanographic and Atmospheric Association (NOAA) Fisheries Service, and NAVFAC Pacific.

3.2.4.2 Ulupa'u Head WMA

The 25 acre (9.5 ha) Ulupa'u Head WMA was established to protect the resident breeding colony of redfooted boobies (Sula sula) on the northeast side of Ulupa'u Crater. The booby colony is one of only two nesting colonies in the main Hawaiian Islands. The area includes hillside and rock land with koa haole, kiawe, and buffelgrass covered areas.

3.3 INVENTORY OF LAND USE AND LAYOUT OF FACILITIES

There are three main functional areas located within MCBH Kaneohe Bay (Figure 3.2).

3.3.1 Operational/Maintenance

Operational/maintenance functional areas are generally located in the west portion of the Base, the Ulupa'u Crater and a small parcel in the southeast portion of the Base. Buildings in this functional area are typically one or two-story structures. Facilities and activities included in this functional group are:

- Aircraft Operational Facilities
  - Runways
  - Taxiways
  - Aircraft parking aprons
  - Other facilities that support aircraft operations

- Maintenance Facilities
  - Air and ground operations
  - Aircraft maintenance
  - Storage hangar spaces
  - Engine test cell facilities
  - Corrosion control hangar
  - Intermediate and mobile aircraft maintenance facilities

- Supply/Storage Facilities
  - General warehousing
  - III Marine Expeditionary Force (MEF) storage
  - Cold storage
  - Open storage
  - Fuel storage
  - And magazines for ordnance
  - (The main supply area is located near the eastside of the runway.)

3.3.2 Personnel Support/Recreation/Open Space

Personnel support functional areas are generally located in the central portion of the Base. These areas include administrative and personnel support facilities such as:

- Childcare
- Family services
- Red Cross/Navy Relief
- Youth center
- Continuing education
- Credit union
- Chapel
- Library

Recreation areas are generally located along the perimeter of the Base and in family housing areas. Other smaller open space areas can be found throughout the Base. Recreation/Open Space areas included in this functional area are:

- Baseball
- Basketball
- Football
- Tennis
- Volleyball
- Golf course
- Beaches
- Open fields
- Golf Course

3.3.3 Housing

This functional area includes troop barracks and family housing. Family housing is located in the north and east portions of the Base, between Ulupa'u Crater and Pu'u Hawaii Loa. Buildings are mainly low-rise single and multi-family units ranging from one to three stories high. Family housing areas are generally located away from the high noise zones. All family housing at MCBH and Camp Smith is in the process of being privatized as part of a public-private venture (PPV). The land beneath family housing is being leased to a PPV entity, and the housing will be maintained and managed by a private property management company directly associated with the PPV entity. A more detailed description of PPV is found in section 7.4 of this document.

3.4 PEST MANAGEMENT RESOURCES

This PMP describes MCBH Kaneohe Bay current pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety and environmental requirements of the program. The pest management program uses In-house, DOD-certified applicators employed at the Facilities Department pest control shop and at the non-appropriated, MCCS, Klipper Golf Course to provide the bulk of the required pest management services for the installation. The remaining pest management services are provided by State of Hawaii certified pesticide applicators under Indefinite Quantity (IDQ) and Blanket Purchase Agreement (BPA) soil treatment, structural fumigation, grounds maintenance contracts, and USDA WS rodent control.

Pests covered under this PMP include, but are not limited to, household pests such as cockroaches, ants and rodents; public health pests such as rodents, mosquitoes, flies and fleas; venomous arthropods such as bees, wasps, spiders, scorpions, and centipedes; structural pests such as termites and wood-destroying fungi; turf and ornamental pests and diseases; invasive vegetation such as introduced non-native trees, shrubs, vines and grasses; and vertebrate pests such as birds and feral / nuisance animals. Without control, these pests have the potential to interfere with the

military mission, increase maintenance costs, and expose Base personnel to disease, and damage property and infrastructure. Detailed pest management protocol, including pesticide-reducing IPM alternatives, is provided in Chapter 13 of this plan.

3.5 PLAN MAINTENANCE

This document shall be reviewed annually by the Installation Pest Management Coordinator and technically reviewed by the NAVFAC Pacific Pest Management Consultant/Consultant Entomologist or NEPMU6 Medical Entomologist every three years. Any changes shall be annotated during the reviews and incorporated when the plan is formally revised every fifth year.

The main objectives of annual reviews are:

(1) Identify pest problems not covered in the plan and provide recommended control measures accordingly;

(2) Determine if there are exceptions to the standards and requirements set forth in the PMP;

(3) Evaluate the effectiveness of control measures used by various activities; and

(4) Incorporate updates reflecting changes in Base activities/functions.

4 INTEGRATED PEST MANAGEMENT (IPM)

4.1 IPM BACKGROUND

Integrated Pest Management (IPM) is required in all DoD pest management programs. Conventional pest control relies heavily on the use pesticides to eliminate pests. In contrast, the goal of IPM is to manage pests at acceptable levels through the integration of all available pest control methods, with an emphasis on the reduction of chemical pesticide use.

4.2 IPM PROCESS

4.2.1 Identification

The first step in the IPM process is identifying the pest. The biology and behavior of many organisms is species specific, therefore it is very important to know the species of the organism being managed.

4.2.2 Development of a strategy

Once the correct identification is obtained, information may be gathered as to the biology and control options available for the species of pest in question. This information is then used to develop a plan to manage the pest in a manner that minimizes environmental, economic, and public health risks.

4.2.3 Surveillance

A critical aspect of an effective IPM strategy is surveillance of the pest population. Rather than apply scheduled treatments at the same time each month, under an IPM strategy, treatments are applied only after they are deemed necessary according to surveillance data. Pest populations can be monitored in a variety of ways, such as trapping (i.e. catching adult mosquitoes in light traps or catching cockroaches on sticky traps), or by looking for signs of damage or other indicators that signal the presence of pests (i.e. checking for rodent urine streaks and gnaw marks or tracking customer complaints).

4.2.4 Establishment of a Threshold

The decision to apply treatments to control a pest is made according to a predetermined action threshold. The action threshold is determined by the level of the pest population at or below which an acceptable amount of aesthetic, economic, or medical damage occurs. If surveillance reveals that a pest population is reaching numbers above the action threshold, then corrective action for that pest is undertaken. Careful

consideration should be given to the establishment of action thresholds. For most household and indoor pests, the action threshold is one, since the presence of a single pest in living or working areas is unacceptable to most people. Thresholds for outdoor pests are typically higher, unless they present an immediate health risk.

4.2.5 Application of Control Methods

Once the action threshold has been reached, corrective measures are initiated. In an IPM strategy, all available control measures are used in combination in order to minimize the use of chemical pesticides. Types of control measures may include:

- Cultural Control. Methods that involve modifying pests' hosts or habitats to make conditions less favorable for them. *Examples*: 1. Encouraging the tenants of a building experiencing a problem with cockroaches to keep their break areas clean and sanitary to reduce cockroach harborage and food resources. 2. Choosing native plants for landscaping. 3. Eliminating areas where water collects, e.g. buckets, bromeliads, gutters to prevent the growth of mosquito larvae.

- Mechanical Control. Methods utilizing devices that actively exclude, trap, or destroy pests. *Examples*: 1. Installing window screens and hanging sticky traps in a building experiencing fly problems. 2. Using a weed whacker to eliminate unwanted vegetation along a fence line. 3. Handpicking snails and slugs from ornamental plants. 4. Installing snap traps in areas of rodent infestation.

- Physical Control. Methods that use some aspect of the physical environment to exclude or destroy pests. *Examples*: 1. Heat treatment for the elimination of drywood termite infestations. 2. The use of high pressure steam cleaners for crack and crevice control of cockroaches in food preparation areas. 3. The use of noisemaking devises to scare off or modify bird behavior on and around airfields.

- Biological Control. Methods that make use of parasites, predators, or pathogens to reduce pest populations. Classical biological control deals with situations where pest populations are unchecked due to the absence of the pests' natural enemies. In these cases, natural enemies are imported from the pests' original geographic range. The legal importation of natural enemies is a very long process requiring much administrative effort and scientific research; therefore it is typically not an option for small-scale pest problems. However, many biological control agents already occur naturally and only require assistance to increase their effectiveness. Some common predators and parasites can be purchased commercially and released in an area to augment the existing population. (Note: Care should be taken in Hawaii not to release any new species of predators or parasites into the state) Efforts can also be made to conserve natural enemies through protecting their habitat, reducing the use of broad-spectrum insecticides, and educating the public on their importance as beneficial insects. *Examples*: 1.

The release of ladybird beetles to control scale insects. 2. The use of nematodes to control turf pests. 3. Releasing moths and beetles to control the spread of ivy gourd (*Coccinius grandis*) 4. The use of mosquito fish to control mosquito breeding in sewage treatment facilities.

- Regulatory Control: Methods that utilize state and federal regulations to prevent the spread of pest organisms. *Examples*: 1. Implementation of inspection and quarantine laws and procedures for commodities entering the State of Hawaii. 2. Implementation of an inter-island quarantine.

- Chemical Control: Methods involving the application of conventional chemical pesticides. The judicial use of chemical pesticides can be an extremely beneficial and cost effective strategy to control pests, however, chemicals are a potential risk to the environment and human health; therefore, in most cases (except during public health emergencies) the use of chemical pesticides should not be the first option exercised in response to a pest problem. After all other control methods have been evaluated, chemicals may be used to mitigate pest problems. Care should be taken to choose the least toxic and most selective chemical products possible, so that their impacts on non-target organisms are minimal. Furthermore, repeated applications of the same chemical may result in target pest populations developing resistance. Techniques such as baiting and precision targeting can minimize the amount chemical used. *Examples*: 1. The reduction of mosquito populations through the application of briquettes containing an insect growth regulator (methoprene) to aquatic breeding sites. 2. The use of baiting systems for cockroaches, ants, and termites. 3. The use of a selective herbicide (triclopyr) to kill broad leaf weeds.

4.2.6 Record Keeping

In addition to maintaining the required records of pesticide use, it is important to keep records of all pest control operations conducted at the installation, including surveillance data. Data from pest control operations should be used to assess the efficacy of the installation's pest control methods. This information should also be analyzed to identify trends in pest populations that can help increase the timing and targeting of control operations. Geographic Information System (GIS) software is a useful tool in displaying and analyzing this type of information and should be used if possible.

4.2.7 Evaluation

Control measures should be evaluated on a regular basis to ensure that the current practices are reducing the pest population, cost effective, and up to date with the latest pest control technologies.

4.3 IPM at MCBH

Information regarding IPM practices for each major pest category is provided in Chapters 11 and 12 of this document. The success of IPM at MCBH is dependent on the coordinated efforts of all Base personnel. If executed properly, IPM has the potential to minimize risk to base occupants and the environment, reduce the need for pesticides, minimize pesticide waste, and save money.

5 HEALTH AND SAFETY

5.1 MEDICAL SURVEILLANCE OF PEST MANAGEMENT PERSONNEL

All personnel involved with the application of pesticides must be included in a medical surveillance program. The program must consist of the following:

5.1.1 Initial Monitoring

A pre-employment physical examination is required for all new pest management personnel. The purpose of this pre-employment examination is to:

(1) Determine if the individual is physically capable of wearing a respirator; and

(2) Establish a baseline plasma or serum and red blood cell (RBC) cholinesterase level.

Failure of this initial physical examination is basis for disqualification for pest management work.

5.1.2 Annual Monitoring

An annual physical examination, of the same scope as the initial monitoring exam, is conducted once a year for all applicators. Annual examinations are processed by the Occupational Health Department. Pesticide applicators that are currently being monitored are listed in Table 7.1.

5.1.3 Cholinesterase Inhibiting Substance Use Monitoring

When cholinesterase-inhibiting substances (CIS), such as carbamate or organophosphate pesticides, are used, the RBC cholinesterase levels are monitored at least twice a year (before and after heavy spraying periods). Examinations are done more frequently when CIS are heavily used or when an individual exhibits symptoms of CIS poisoning.

Removal from work is instituted when the RBC cholinesterase level is depressed to 75 percent, or less, of the baseline level. Return to work is permitted when the level has returned to 80 percent, or higher, of the baseline level. Some of the common symptoms produced by CIS are listed in Table 5.1.

TABLE 5.1 Common Symptoms Produced by Cholinesterase Inhibiting Substances		
MILD POISONING	MODERATE POISONING	SEVERE POISONING
Anorexia	Nausea	Diarrhea
Headache	Salivation	Pinpoint, non-reactive pupils
Dizziness	Lacrimation	Respiratory difficulty
Weakness	Abdominal cramp	Pulmonary edema
Anxiety	Vomiting	Cyanosis
Tremors of tongue and eyelids	Perspiration	Loss of sphincter control
Mios	Slow Pulse	Convulsions
Impairment of visual acuity	Muscular tremors	Coma
		Heart block

5.2 HAZARD COMMUNICATION

MCBH Kaneohe Bay pest management personnel shall be given initial hazard communication training. Training shall include discussion of hazardous materials in the workplace. Following initial hazard communication classes, additional training shall be given to new employees or when new hazardous materials are introduced into the work place.

Initial hazard communications training is provided by the MCBH Safety Office on an as needed basis and refresher training is provided annually as required. The facilities shop foreman and golf course superintendent shall maintain records listing the names and dates of personnel receiving hazard communication training. The list shall also include the sponsoring office/group for the training class.

Hazard communication training has been provided for the pest management personnel listed in Table 7.1.

Materials Safety Data Sheets (MSDS) for all pesticides on inventory are kept at the Facilities Shop and the Golf Course Shop.

5.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

5.3.1 Equipment Supply and Use

Pest management personnel shall be supplied PPE by the Government. PPE equipment provided includes, but is not limited to, half-face respirators with appropriate cartridges, safety goggles/glasses, nitrile gloves, coveralls, rubber boots, and safety shoes. PPE is to be used as indicated by pesticide labels and MSDSs. PPE shall be purchased through the federal supply system or through local vendors.

5.3.2 Care and Maintenance

Pest management personnel shall each be responsible for the care and maintenance of their own PPE. Procedures for the maintenance and care of PPE are provided in pesticide applicator certification and recertification courses and other training manuals. (Refer to section 7.6 of this plan for additional information on certification.) Pesticide contaminated clothing will be laundered on-site in dedicated washing machines. PPE shall be stored in the locker room or vehicles, separate from pesticides.

Pest management personnel shall be respirator fit-tested annually and also perform a fit-test (negative pressure) before each use.

Further guidance on safe pesticide handling practices and the use of safety equipment is presented in Appendix B.

5.4 PESTICIDE STORAGE

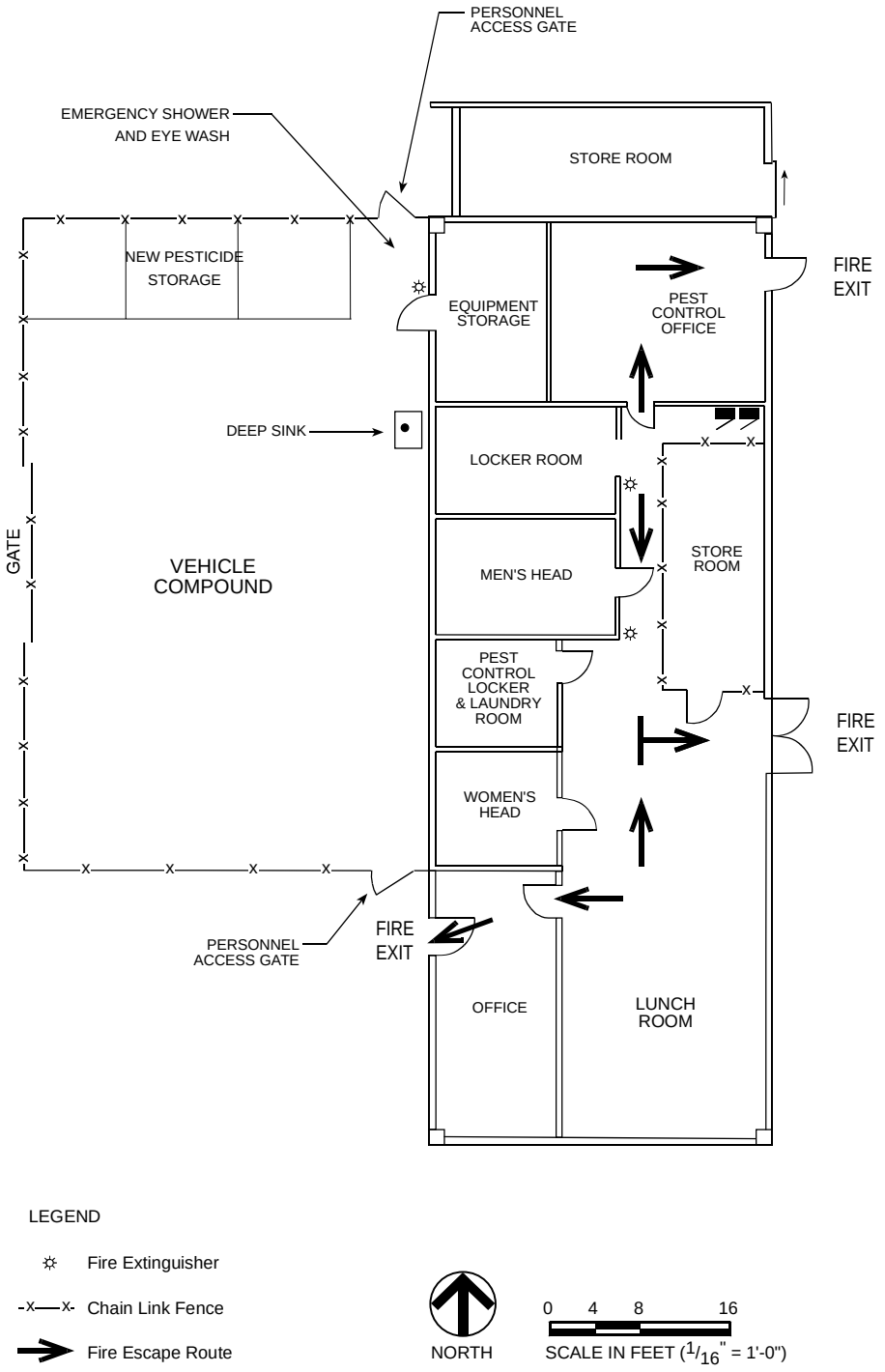
All pesticides used by the Facilities Shop are stored in a dedicated storage facility, Building 6522, constructed adjacent to the previous storage area in Building 203, at the north end of the vehicle compound (Figure 5.1). The facility has three compartments for the separate storage of insecticides, herbicides and flammable materials. The structure is in compliance with current military design and construction criteria for pest management facilities, including a fully contained (bermed), epoxy coated, concrete floor. Location of fire extinguishers and fire escape routes for the building are shown on Figure 5.1. An inventory of pesticides stored in the pesticide storage facility is provided in Appendix G.

Building 6522 – Facilities Pesticide Storage

Pesticides and other chemicals used by Golf Course Maintenance Department are stored in Building 4004, a secured storeroom in the Golf Course Maintenance Compound. The facility was designed in accordance with Military Handbook 1028/8A, Design of Pest Management Facilities, and is in compliance with current, military pesticide storage requirements. The pesticide inventory at the golf course is provided as Appendix H.

Building 4004 – Klipper Golf Course Pesticide Storage

Figure 5.1
Facilities Maintenance Pest Control Shop
Building 203 - Floor Plan



5.5 FIRE PROTECTION

The Base Fire Department conducts annual inspections of pesticide storage facility and is familiar with the facility floor plan (Figure 5.1). Periodic updates of the inventories maintained by the facilities are provided to the Fire Department.

The Facilities pesticide storage building utilizes a chemical fire suppression system. Water should not be used to suppress fires in the pesticide storage facility. Flammable materials should be stored separately from non-flammable materials.

5.6 PEST CONTROL EQUIPMENT AND VEHICLES

An inventory of the major equipment of the Facilities pest control shop is provided as Appendix F.

Facilities shop pesticide vehicle, with NAMCO 100 gallon power sprayer.

Dedicated pest control vehicles, equipped with utility compartments for the safe transportation of pesticides on base, are assigned to the Facilities Shop. Care shall be taken to secure pesticides -- to prevent damage to the containers and chemical spills. At no time shall pesticides be left unsecured in unattended vehicles. Pesticides or contaminated equipment shall not be transported in cabs of vehicles. Portable eyewash, spill kit, and labels and MSDSs for all pesticides transported shall be carried in each vehicle. An inventory of the vehicles is available for review from the facilities shop foreman.

SDI 200 gallon power sprayer

6 ENVIRONMENTAL CONSIDERATIONS

6.1 PROTECTION OF THE PUBLIC

The following measures shall be taken:

- Proper precautions shall be taken before (preparation), during, and after (cleanup and reentry) all pesticide applications to protect public health and safety, on and off Base.
- Care shall be taken during outdoor pesticide applications to ensure that spray drift is not a problem to the public, wildlife and the applicator.
- Pest management personnel shall coordinate their efforts with building occupants before and during indoor applications.
- Discretion shall be used when applying in and around quarters occupied by a pregnant woman or infant a year old or younger, to include the Child Development Center and Elementary school.
- Pest management personnel shall wear appropriate PPE when applying pesticide.
- Pest management personnel shall not be permitted in an area where a pesticide is being or has been applied unless they have met medical monitoring standards.

6.2 SENSITIVE RECEPTOR AREAS

The following measures shall be taken in regard to sensitive receptor areas:

- Sensitive receptor areas listed on pesticide labels shall be identified before pest control operations are undertaken.
- Application of pesticides in sensitive receptor areas shall be done in accordance with instructions listed on the label.
- Special care shall be taken when pesticides are applied in or around areas such as child-care centers, health clinics, or in family housing areas where newborn infants are present.

6.3 ENDANGERED/PROTECTED SPECIES AND HABITATS

The natural resources at MCBH Kaneohe Bay are managed per the 2006 MCBH Integrated Natural Resources Management Plan Update to the 2001 MCBH INRMP/EA. The INRMP Update provides the most up to date information on all protected species and habitats within MCBH properties. The information presented in this chapter of the pest management plan is a short summary of the endangered/protected species and habitats that exist on the base. If there is a possibility that protected natural resources may be affected by pest management activities, the 2006 INRMP Update is the document must be consulted.

Pest management activities within identified endangered/protected species habitats must be coordinated between the Base Environmental Department and Pest Control Shop personnel. No pesticides shall be applied directly to wetlands and other sensitive water areas unless the proposed application is covered by the pesticide label and approved by the Base Environmental Department. Pesticides used in these areas are subject to prior approval through the Base Environmental Department.

6.3.1 General Summary

Endangered and protected species habitats in MCBH Kaneohe Bay are located primarily in two WMAs -- Nuupia Ponds and Ulupau Head (see Figure 3.2). The 482-acre Nu'upia Ponds WMA is one of the few remaining coastal wetlands in Hawaii and is an important habitat for endangered, threatened, or otherwise protected waterbird species such as Hawaiian black-necked stilts, *Himantopus mexicanus knudseni* (protected under the Endangered Species Act); wedge-tailed shearwaters, *Puffinus pacificus*; red footed boobies, *Sula sula rupribes*; great frigatebirds, *Frigata minor palmerstoni*; and black-crowned night herons (*Nycticorax nycticorax hoactii*). Additionally, sixteen native fish species find sanctuary in the ponds, such as mullet or ama'ama, and milkfish or awa. The 25-acre Ulupau Head WMA is one of only two red-footed booby colonies in the main Hawaiian Islands. This seabird is not a listed endangered species but is federally protected under the MBTA. On Mokapu's Klipper Golf Course, three freshwater ponds (approximately one-half acre each) have attracted three endangered Hawaii waterbirds – the Alae ula, or the Hawaiian gallinule; the Alae keokeothe, or the Hawaiian coot; and Koloa, or the Hawaiian duck. The Iwa, or migratory great frigatebird, and Aukuu, or native black-crowned night herons, also visit these ponds.

Threats to these environmentally sensitive resources include the following:

- Wildfires -- In the Ulupau Head WMA, wildfires are of particular concern. Weapons fire during training exercises, in combination with the generally arid conditions in the area, increase the potential for wild fires. A wildfire in this WMA has the potential to kill, injure and destroy/displace nesting boobies.

- Cattle Egrets and Herons -- Potential adverse impacts of cattle egrets and herons include: (1) preying on endangered birds (in particular the chicks); and (2) serving as carriers of salmonella that may spread to other protected birds.

- Predatory Mammals -- Animals that prey, to varying degrees, on birds, their eggs, and young include the polynesian and roof rats, house mice, mongooses, and feral cats.

- Invasive Plants -- Invasive plant species such as the daisy-like *Verbesia encelioides* form dense stands in coastal areas and prevent seabirds from nesting. *Batis maritima,* pickleweed or akulikuli-kai, also can form mats that are impenetrable for most species of birds. Pickleweed has overgrown portions of critical mudflat habitat in the Nu'upia Ponds WMA. Other invasive plants such as mangrove, *Rhizophora mangle*, encroach on shoreline areas of Nuupia Ponds, as well as wetlands and shoreline fronting Kaneohe Bay. As these plants overgrow sensitive mudflat habitats, they deprive birds such as the Hawaiian stilt from their natural feeding and nesting areas. In addition, these plants increase the rate of siltation of the pond. Ivy gourd, *Coccinius grandis*, chronically threatens to engulf the nesting trees of the Red-footed booby. The climbing vine deprives boobies of nesting areas in trees and can eventually kill entire nesting trees.

- Insect Vectored Diseases – Diseases such as West Nile virus (WNV) which are vectored primarily by mosquitoes in the genus *Culex*, could potentially devastate native Hawaiian bird populations which have not had prior exposure to the virus. WNV is currently not present in Hawaii, however its recent rapid spread from coast to coast in the continental U.S., suggest that its arrival in Hawaii is a valid concern. Potential routes of entry of WNV into the state could include infected migratory birds, infected birds illegally imported into the state, or infected mosquitoes transported inadvertently via commercial or military aircraft.

- Avian Influenza (Bird Flu Virus) -- Avian influenza is a disease caused by a virus that infects domestic poultry and wild birds. Wild birds, including shorebirds and waterfowl, are natural reservoirs for more than 140 avian influenza viruses. Most strains are classified as low pathogenicity and cause few symptoms in infected birds; however, certain strains are can be fatal and easily transmissible between susceptible bird species. The strain that is currently of concern in Asia, Europe, and Africa is the highly pathogenic H5N1 virus. This strain has not been detected in North America or Hawaii, but because Hawaii is considered Asia's gateway to the United States there is serious concern that the H5N1 will come to the islands. This disease could also have devastating effects on native endangered and protected bird species

[*Note: Alien or invasive species issues are addressed in further detail in the 2002 Invasive Species Management Study (ISMS) available from the Base Environ. Dept.*]

6.3.2 Pest Control Measures

Pest control measures implemented to protect environmentally sensitive resources in MCBH Kaneohe Bay include the following:

- Bird Air Strike Hazard (BASH) Program – generally, includes trapping and other non-destructive removal of pest birds from areas where they pose a risk to aircraft. Trained and authorized Natural Resources staff may use lethal means, such as baiting and shooting, but only as a last resort after other behavior altering actions have proved ineffective. This program also includes the control of nuisance birds in the aircraft hangars.

- Wildlife Management Program - includes trapping of mongoose, and cats; Placement and monitoring of bait stations (baited with diphacinone) for rats and mice.

- Vegetation Management Program:

  - Annual assault amphibious vehicle (AAV) training exercises provide vegetation management in portions of Nu'upia Ponds. The AAVs physically break the strands of pickleweed, clearing areas for use by birds such as the Hawaiian Stilt. Heavy equipment and hand pulling are also used to eradicate the undesirable vegetation in the area.

  - Ulupa'u Head herbicide applications along roads and fuelbreaks are accomplished by the facilities shop. Due to the highly invasive nature of the vegetation growing in the Crater, a re-vegetation program to replace the non-native grasses with more fire resistant native vegetation had limited success.

  - Other areas of concern include the Klipper Golf Course ponds that provide habitat for the endangered Hawaiian gallinule and coot. The ponds have been dredged twice since 1998 to reduce the eutrophication occurring in the ponds due to fertilizer run-off from the golf course.

- Mosquito Surveillance - mosquito larvae are monitored in storm drains, catch basins, and other potential breeding sites. Other areas are tested upon request to the Preventive Medicine Department located at the Base Medical Clinic. If an average of 3 or more larvae or pupae is captured from 10 dips at a location, then corrective action is taken. The first course of action is to eliminate the breeding site. If this is not possible, an environmentally safe insecticide, such as the insect growth inhibitor Altosid (methoprene), is used. Adult mosquitoes are monitored on a weekly basis by the Branch Medical Clinic using gravid traps. Appendix B of this document, Emergency Vector Control Plan, outlines the responsibilities and required procedures during an outbreak of an insect vectored disease.

6.4 ENVIRONMENTAL DOCUMENTATION

The pest management program at MCBH Kaneohe Bay falls under a categorical exclusion listed in MCO 50902A, thus an EA is not required according to Navy regulation. An EA or Environmental Impact Statement (EIS) may be required for non-routine pest management operations that are not described in the PMP.

6.5 PESTICIDE SPILL AND REMEDIATION

6.5.1 Requirements

MCO 5090.2A, Chapters 13 & 14, establish procedures for response, clean up, and reporting of hazardous substance spills. Detailed guidance on spill management is included in the Spill Response and Prevention Plan for MCBH Kaneohe Bay.

For any spill over two gallons of a hazardous material (including most concentrated pesticides) the Fire Department shall be notified immediately by calling 911.

For any spill of a dilute pesticide of more than 10 gallons or when there is a potential for environmental or property contamination, the Fire Department will also be notified.

Chapter 13, Section 5.3b of OPNAVINST 5090.1B CH-2, requires that pesticides be included in the MCBH Kaneohe Bay Hazardous Substance Spill Contingency Plan.

6.5.2 Preparation

Facilities and Golf Course pesticide applicators need to be familiar with emergency spill management procedures and prepared to respond to any pesticide spill in accordance with the installation Hazardous Substance Spill Contingency Plan and the Armed Forces Pest Management Board (AFPMB) Technical Guide (TG) No. 15, Pesticide Spill Prevention and Management.

6.5.3 Pest Control Shop (Building 203)

The Shop Foreman shall maintain appropriate pesticide spill kit(s) in appropriate locations where pesticides are stored and handled (mixed) and on each vehicle used to transport pesticides.

The Foreman shall also post spill management procedures in the pesticide facility and all vehicles that transport pesticides.

6.5.4 Golf Course Maintenance (Building 4004)

The course Superintendent shall maintain appropriate spill kit(s) in pesticide storage and handling areas of the facility. The Superintendent shall also post spill management procedures in the facility.

6.6 POLLUTION CONTROL/ABATEMENT PROJECTS

No ongoing pollution control/abatement projects related to pesticides have been identified at MCBH Kaneohe Bay's Pest Control Shop or the Golf Course Maintenance Shop.

6.7 POLLUTION PREVENTION (P2)

The pest management program at MCBH Kaneohe Bay, as outlined in the P2 plan, complies with Executive Order 12856 (3 August 1993), Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements. The control of pests with pesticides is considered only after non-chemical methods have been exhausted. Therefore, IPM strategies, emphasizing alternative non-chemical control methodology, form the basic framework for the pest management program.

6.7.1 Pest Management Programs

The facilities shop and golf course shop have been required, since 1994, to exercise three pesticide pollution prevention initiatives or Measures of Merit (MOMs) issued by the Deputy Undersecretary of Defense (Environmental Security). The current MOMs include:

1) Implementation of Pest Management Plans for all installations by FY 2010,

2) 100% certification of installation pesticide applicators within 2 years of employment, and

3) Maintenance of the 55% pesticide use reduction achieved from FY 1993 to FY 2003 (including pesticide applications by contractors).

7 ADMINISTRATION

7.1 JOB ORDERS

Pest management at MCBH Kaneohe Bay is conducted under several standing job orders (SJOs). The standing job orders are provided for managing general pests such as cockroaches, ants, flies, rodents and stored products pests in the galleys, service clubs, snack-bars, Commissary and Exchange facilities. Additionally, SJOs are provided for managing mosquitoes, undesirable vegetation in right-of-ways and the WMA, and termites in all stations (non-housing areas). All pest management services, performed under SJOs or otherwise, must be preceded by inspection or surveillance to evaluate the problem before any pesticide may be used. When pesticide use is warranted, the least toxic but effective available product should be used. Current regulations and pesticide labels prohibit routine or preventative applications of pesticides. In ant and cockroach management, baits are generally preferred over conventional broadcast pesticide applications. Current pest control shop standing job orders are provided in Chapter 11.

Other Job requests not included in the standing job order are performed under emergency service authorization (ESA, limited to 16 hours of service). All job requests requiring over 16 hours shall be submitted under specific work authorization.

Emergency service tickets, or “trouble tickets”, are recorded on computers by the trouble desk throughout the day. All jobs are monitored through completion.

7.2 INTERSERVICE SUPPORT AGREEMENT AND OFF-BASE SERVICES

Although MCBH Camp Smith is under the jurisdiction of MCBH Kaneohe Bay, pest management operations there are provided through an inter-service support agreement (ISSA) with NAVFAC Hawaii Facilities Sustainment and Services (see Appendix A, MCBH Camp Smith Pest Management Plan). The MCBH Kaneohe Bay facilities shop provides pest management services for other off-base MCBH buildings and family housing units on an as needed basis.

7.3 AGRICULTURAL OUTLEASES

Not Applicable.

7.4 PUBLIC-PRIVATE VENTURE (PPV)

In 1996, under the provisions of the Military Housing Privatization Initiative, Congress authorized the legislation for a Public-Private Venture (PPV) partnership with the private sector. As a result, MCBH formed a partnership with Ohana Military Communities, LLC to enable homes to be constructed faster and more efficiently and enhance the quality of life for Marines and Sailors. Approximately half of MCBH’s family housing inventory was privatized under PPV in on 1 October 2006. The remaining family housing areas

will be privatized under PPV on 1 October 2007.

All family housing resident matters, including maintenance, are handled by a property management company (Forest City Residential Management, Inc.) that is associated directly with the PPV partner. The PPV partner conducts pest management under its own plan, the Partner's Plan for Pest Control (PPPC). This plan is included as Appendix C and covers all PPV housing at MCBH and Camp Smith. The PPPC shall be updated based on changes to applicable federal and state laws and Department of the Navy or Marine Corps policy or through a request from the Department of the Navy or the Marine Corps.

The partner's plan provides the basic pest management requirements for the PPV partner. In summary, the partner must ensure that: 1) All pesticides used on the property are pre-approved by the MCBH IPMC and NAVFAC Pacific Consultant Entomologist; 2) All contracted pesticide applicators are properly licensed and certified in accordance with federal, state, and Department of the Navy policy; 3) Records are kept of all pesticide applications and forwarded at least quarterly to the MCBH IPMC and NAVFAC Pacific Consultant Entomologist; 4) Integrated Pest Management (IPM) is practiced; 5) No pesticides or pesticide wastes are disposed of on the leased premises; and 6) All pest management activities are in compliance with the MCBH Pest Management Plan.

7.5 RESOURCES (CURRENT AND PROPOSED)

7.5.1 Staffing

MCBH Kaneohe Bay uses trained and DoD-certified, in-house pesticide applicators to carry out the required pest control services that are not performed under contract. The current staffing level ensures compliance with the requirement that a minimum number of DoD-certified pesticide applicators are available at an activity to perform all required pest management operations. A list of current DoD-certified pesticide applicators staffed for the pest control and golf course maintenance shops is provided in Table 7.1.

7.5.2 Equipment and Materials

Pesticide dispersal equipment, safety equipment and other pest management devices shall be provided as approved in the current Table of Distribution and Allowances (TDA) and as recommended by the Pest Management Consultants/Consultant Entomologists at NAVFAC Pacific or EPMU-6 Pearl Harbor. Pesticides and other pest management materials are provided as approved by the Pest Management Consultants/Consultant Entomologists at NAVFAC Pacific or EPMU-6 Pearl Harbor. Pesticides are ordered, as required, to maintain at least a 1-month supply, but not more than a three-month supply, in stock. Current inventories of pesticides and pesticide application equipment are maintained by the respective pest management shops. Standard pesticides available to DoD components and federal agencies are listed in Appendix I.

TABLE 7.1 Pesticide Applicators

Staff Name	Position ID No.	Responsibility	Activity
Roy Murakami	WL-5026-09	Work Leader (Foreman)	Pest Control Shop
Warren Visher	WG-5026-09	Pesticide Applicator WG-9	Pest Control Shop
Carl Tamanaha	WG-5026-05	Pesticide Worker WG-5	Pest Control Shop
Clyde Chibana	WG-5026-05	Pesticide Worker WG-5	Pest Control Shop
Michael Sakamoto	WG-5026-05	Pesticide Worker WG-5	Pest Control Shop
Guy Naito	WG-5026-05	Pesticide Worker WG-5	Pest Control Shop
Clint Tolbert	NA-7	Superintendent	MCCS Golf Course
Derrold Mark	NA-7	Pesticide Applicator	MCCS Golf Course
Lance Bookless	GS-11	Installation Pest Management Coordinator	Environmental Dept

7.5.3 Facilities (Mixing and Storage Sites)

Pesticide mixing and storage are located at the following sites:

- Building 6522 Pesticide Storage
- Buildings 203 Pest Control and Janitorial Services Building
- Building 4004 Golf Course Maintenance

7.6 REPORTS AND RECORDS

DOD 4150.7 and MCO 5090.2A (Chapter 14) require that daily records of pest management operations be recorded using DD Form 1532-1 or a computer-generated equivalent and kept with the organization responsible for applying pesticides or involved in oversight management of pesticide applications. In the case MCBH Kaneohe Bay, this includes the facilities shop, golf course shop, family housing, unaccompanied personnel housing, and the ROICC.

- Facilities and golf course shops shall report pesticides applied by their applicators.

- The ROICC shall report pesticides applied by persons on all MCBH construction projects for which they provide oversight management.

- Family housing will report pesticides applied by persons under housing contracts.

Monthly reports summarizing pesticide application shall be submitted to the Base Facilities Pest Control Work Leader for collation and forwarding to the NAVFAC Natural Resources Division. Reporting of pesticide usage may be done with the Microsoft Excel spreadsheet program developed by the NAVFAC Pacific Applied Biology program for maintaining daily records and generating monthly reports. The report form is reproduced in Appendix L. An electronic copy of the form can be obtained by contacting the Installation Pest Management Coordinator. Contact information is found in Appendix N. If restricted-use pesticides are used, a separate log must be kept.

Monthly summaries shall be produced using the spreadsheet found in Appendix L. Electronic copies of the report will be forwarded to NAVFAC Pacific, Code EV22, via the Facilities Shop Foreman. The purpose is to generate data for regulatory, DoD, Federal, or state data calls; for Marine Corps program review and oversight; and for the DoD Measures of Merit on pesticide pollution prevention. Installation commanders must ensure that these records are archived after two years for permanent retention.

Termite inspection reports (Form DD 1070) are recorded for all termite inspections and treatments. Copies of the termite inspection reports are filed in Building 203 - Pest Control Shop office.

7.7 TRAINING

All pesticide applicators who are assigned to the facilities shop and the golf course shop will be required to attend pesticide applicator training for pesticide applicator certification or recertification training to ensure pesticides are applied properly and safely in accordance with DODINST 4150.7. DoD requires “line of sight” supervision between the certified applicator and non-certified applicator(s), that is, personnel who have not been trained and do not possess a valid Certificate of Competency (DD Form 1826) to handle, mix, or apply pesticides. Uncertified personnel hired as pesticide applicator trainees, must receive applicable training, including formal DoD certification training, within two years of employment.

7.7.1 On-the-Job Training (OJT)

The shop foreman will train any new employee who has been assigned to the pest control shop on pest management activities with assistance from other certified applicators on staff. The untrained and uncertified employee will be assigned to the work leader or to the most qualified pesticide applicator for hands on training on the proper and safe application of pesticides as well as the proper use of pesticide dispersal equipment to attain the required field experience. The foreman may conduct classroom training which outlines the applicator’s responsibilities, covers general pest biology and identification, provides information for the proper application and safe use of pesticides, storage, mixing and disposal procedures, and reviews other pertinent information that is required to deliver pest management services effectively.

On the job training will continue for 6 to 12 months depending on the proficiency of the new employee. A written and practical examinations can be good tools to determine the trainee's level of performance. After the OJT has been completed and the trainee's performance has been determined by the foreman to be satisfactory, the new employee will be eligible to enroll in the pesticide applicator certification course.

7.7.2 Pesticide Applicator Certification Training

Initial certification training is available through the Navy Disease Vector Ecology and Control Center (NDVECC) Jacksonville, NEPMU5, San Diego, or U.S. Army Academy of Health Sciences, Fort Sam Houston. The same training by the above training schools may also be arranged on site in Pearl Harbor or Ft. Shafter with the assistance and support of NAVFAC Pacific or USARPAC. Uncertified pest controllers will be required to attend this training after completing OJT. Personnel who fail to obtain a passing grade on the examination will be allowed to continue their OJT until they are ready to re-take the examination. Pest controllers who fail to attain a passing grade the second time around will be considered unqualified and personnel action will be taken to remove them from performing pest management functions.

There are eleven categories of DoD pesticide applicator certification:

- Category 2 Forest Pest Control
- Category 3 Ornamental and Turf Pest Control
- Category 3a Soil Fumigation
- Category 5 Aquatic Pest Control
- Category 6 Right-Of-Way Pest Control
- Category 6a Grassland and Non-crop Agricultural Land
- Category 7 Industrial, Institutional, Structural, and Health Related Pest Control
- Category 7a Stored Product Fumigation
- Category 8 Public Health Pest Control
- Category 10 Demonstration and Research Pest Control
- Category 11 Aerial Application Pest Control

Pesticide applicators in the facilities shop are required to maintain certification in categories 3, 5, 6, 7, and 8.

Pesticide applicators in the MCS golf course shop are required to maintain certification in categories 3, 5, and 6.

Preventive Medicine Technicians in the Branch Medical Clinic are required to maintain certification in category 8.

7.7.3 Applicator Pesticide Re-certification Training

Each pesticide applicator possessing a Certificate of Competency must be recertified

every 3 years. NAVFAC Pacific will provide this re-certification training with support from the other services. Personnel who fail to attain a satisfactory grade on the recertification examination or personnel who are not able to attend the training will be given an opportunity to take a follow-up examination within 120 days. Pesticide applicators that fail to attain a satisfactory grade on the follow-up examination will be subject to personnel action for transfer to appropriate work within the command.

7.8 INSPECTIONS

Periodic inspections will be conducted of all MCBH facilities that store and apply pesticides. The inspection will cover: record keeping, facilities upkeep, maintenance of pesticide dispersal equipment, pesticide storage practices, health and safety, mixing operations, and spill response procedures. A checklist identifying specific items or areas of the pesticide shop that will be inspected is provided in Appendix O.

The IPMC should also conduct periodic inspections of all locations on base that sell pesticides to ensure that pesticides are stored in safe manner and are sold in accordance with federal and state reguations and best management practices. A guide to inspecting retail sales of pesticides is provided as Appendix M.
DoD pest control shops and stores that sell pesticides are subject to occasional pesticide compliance inspections conducted by the Hawaii Department of Agriculture (HDOA). The HDOA has authority under a Memorandum of Understanding (MOU) between the State and the DoD (see Appendix E). The pesticide shop or store selling pesticides will be notified by the HDOA prior to a visit. If one of the pesticides shops or stores selling pesticides is notified of an upcoming visit by the HDOA, then the shop or store shall notify the IPMC and the NAVFAC Pacific PMC/Consultant Entomologist.

7.9 CONTRACTS

DODI 4150.7, Pest Management Program, 22 April 1996, states that installations “shall use pest management contracts when cost-effective or when advantageous for non-routine, large-scale, or emergency services, especially when specialized equipment or expertise is needed.”

Proposed contracts involving pest management activities aboard MCBH properties must be submitted to NAVFAC Pacific entomologists or NEPMU6 medical entomologists and MCBH’s IPMC for review and approval prior to advertising.

The policies implemented by DODI 4150.7 apply to all pest management operations, including contracted activities; therefore contractors are required to comply with all DoD policies in addition to State of Hawaii regulatory requirements. Because DoD requirements are generally more stringent than State requirements, they must be specified in all contract documents to ensure compliance by the contractor.

At a minimum, all contracts must specify requirements in the following areas:

- Certification
- Reporting
- Quality Assurance Evaluation
- Safety
- Integrated Pest Management

7.9.1 Certification

Contractors performing pest management work on the base must be certified by the State of Hawaii in the applicable pesticide application categories. Pesticide applications conducted by non-certified applicators under the supervision of a certified applicator and On-the-Job-Training (OJT) are not allowed with contractors - every individual applicator that will be performing pest management must be certified prior to the beginning of the contract.

The State of Hawaii commercial pesticide applicator categories are:

- Commercial 1a (Agricultural Plant Pest Control)
- Commercial 1b (Agricultural Animal Pest Control)
- Commercial 2 (Forest Pest Control)
- Commercial 3 (Ornamental and Turf Pest Control)
- Commercial 4 (Seed Treatment Pest Control)
- Commercial 5 (Aquatic Pest Control)
- Commercial 5a (Sewer Line Chemical Root Control)
- Commercial 6 (Right-of-Way Pest Control)
- Commercial 7a (Fumigation Pest Control)
- Commercial 7b (Termite Pest Control)
- Commercial 7c (General Pest Control)
- Commercial 7d (Industrial and Institutional Pest Control)
- Commercial 7e (Vault Fumigation Pest Control)
- Commercial 8 (Public Health Pest Control)
- Commercial 9 (Regulatory Pest Control)
- Commercial 10 (Demonstration and Research Pest Control)
- Commercial 11 (Aerial Pest Control)

Certification in category 7c (General Pest Control) is sufficient for the majority of work contracted at MCBH; however, more specialized activities often require certification in additional categories. For example, termite baiting or applying soil termiticides will require certification in category 7b (Termite Pest Control). If a building is being tented for fumigation, certification in category 7a (Fumigation Pest Control) is required. Certain contracts may also require certification in categories 3 (Ornamental and Turf Pest Control), 5 (Aquatic Pest Control), and 6 (Right-of-Way Pest Control) depending on the

nature of work to be performed. Certification requirements for contractors applying pesticides shall be reviewed by pest management consultants as contract documents are submitted to NAVFAC Pacific for review.

7.9.2 Reporting

Contractors must submit reports of all pesticide applications and non-chemical pest management activities to the Resident Officer-In-Charge of Construction (ROICC) Contracting Office and Installation Pest Management Coordinator (IPMC). Reports must be submitted using DD Form 1532-1 or a computer generated equivalent such as the NAVFAC Pacific pesticide reporting spreadsheet.

The ROICC contracting office shall maintain contractors' pest management reports and forward them up to NAVAFAC Pacific, Applied Biology on at least a quarterly schedule for review and oversight. Pesticide usage reports shall be archived by the ROICC contracting office after two years and maintained for permanent retention on the base. The intent of these records is to provide a historical record of pest management activities and pesticide use for each building, structure, or outdoor areas on the base.

7.9.3 Quality Assurance Evaluation

Quality Assurance Evaluators (QAE), trained in pest management, are required to monitor and evaluate contractor performance for pest management services. Contractors must cooperate fully with QAEs and allow them to be present upon request at all job sites during pest management activities.

As sated in section 14.7.5, QAEs must be present when any fumigation is scheduled. All fumigations performed at MCBH are contracted, therefore the ROICC Contracting Office shall notify the IPMC ahead of time so that the required QAE can be performed.

Pest management contracted for PPV housing does not require quality assurance evaluation. The PPV partner will be responsible for overseeing the contractors that it uses. Periodic evaluations of pest management at PPV housing will be made in conjunction with technical reviews of the MCBH pest program by the MCBH IPMC and NAVFAC Pacific Consultant Entomologists.

7.9.4 Safety

To ensure the safe use of pesticides, contractors must handle and apply pesticides in accordance with the products' label directions. This includes wearing the prescribed Personal Protective Equipment (PPE) during pesticide mixing and application.

Contractors shall not store any pesticides on the base. Pesticides used by contractors must be transported onto the base from off-site storage facilities. Vehicles shall be marked on the exterior with warning signs and/or placards identifying the types of materials being transported in accordance with state and federal requirements.

Vehicles shall be equipped with a fire extinguisher, spill and decontamination kit, and emergency wash water. Vehicles that transport pesticides must also be equipped with lockable storage compartments to secure all pesticides transported onto the base. All pesticides being transported to the job site must be in the original sealed and labeled container as supplied by the manufacturer. Labels and MSDSs must also accompany all pesticides being transported in vehicles.

The contractor is not permitted to dispose of pesticide or pesticide-contaminated material on base. This includes the disposal of waste pesticide, pesticide containers, and pesticide contaminated materials. All pesticide waste generated by the contractor must be disposed of at an off-site location.

7.9.5 Integrated Pest Management (IPM)

The DoD has mandated that IPM, as described in chapter 4 of this document, be incorporated into all aspects of pest management as a means to reduce pesticide risk and prevent pollution. Installations are required to ensure that contracts involving pest management reflect IPM methodology (DODI 4150.7, 5.3.22.8). Certain aspects of IPM, such as education and regulatory control, are outside the responsibility of the contractor; however, the concept of using targeted, sustainable (effective, economical, environmentally sound) pest control methods that minimize economic, health, and environmental risks is applicable to contracted services.

Contractors are required to select effective, least-hazardous pesticides when choosing a pesticide for services performed. Rather than simply choosing the cheapest pesticide that kills the target pest, thought must be given to all aspects of a pesticide such as its relative toxicity, its effects on the environment, and its effects on non-target organisms. Lists of pesticides proposed for use in contracts shall be submitted by the contractors to NAVFAC Pacific or NEPMU6 entomologists, with a copy to the MCBH IPMC, for review and approval prior to any pesticide application.

Pest management consultants (NAVFAC Pacific, Applied Biology or NEPMU6) shall review and approve contract documents for pest management operations including augmentation contracts to ensure that appropriate pest management standards and IPM are specified.

7.10 DESIGN/REVIEW OF NEW CONSTRUCTION

As a part of the IPM effort, design and renovation of new and old facilities, such as family housing, shall be reviewed by NAVFAC Pacific Applied Biology, Code EV22. The intent of these reviews is to ensure that building plans incorporate features that exclude or minimize pest access into structures. For example, in Hawaii, where termites are a serious problem, it is essential that new and revitalization construction incorporate the necessary physical and chemical barriers, pressure treated lumber, and positive sloping for good drainage for the long term management of termite problems.

7.11 FIVE YEAR PLAN

This plan shall be reviewed annually by the MCBH Kaneohe Bay IPMC and technically reviewed (on-site) by the NAVFAC Pacific or NEPMU6 pest management consultant every three years (see section 3.5). The Information provided from annual review memoranda and triennial technical reviews shall be incorporated into an official revision of the plan on a five-year cycle. In addition, the five-year revision is performed to reflect current laws and regulations, practices, technology and compatibility with the Base INRMP and other pertinent documents.

8 SALE, DISTRIBUTION AND DISPOSAL OF HOUSEHOLD PESTICIDES

8.1 SELF HELP REUSE ROOM

There is currently no pesticide self-help program at MCBH, however certain pest management products may be available free of charge at the MCBH Self Help Reuse Room. The Reuse Room is a place where housing residents can take their useable, but unwanted, pesticides. Any military or civilian person living or working aboard MCBH can go to the Reuse Room and take pesticides for their personal use. The Reuse Room is located in Self Help Building 1505 on Cushman Ave, just off Lawrence Rd. next to the golf course maintenance shop, and is open from 0800 to 1630 Monday through Friday and 0800 to 1200 on Saturday.

Building 1505 – Self Help

The Reuse Room accepts only EPA registered, Navy approved, and non-restricted products and supplies.

8.2 BASE COMMISSARY AND EXCHANGE STORES

The Base commissary and Exchange stores stock and sell ready-to-use, EPA registered pesticides for family housing residents. The inventories are subject to periodic inspection by the IPMC to ensure that pesticides are displayed in a safe manner, spills are addressed effectively, and restricted-use and hazardous products are not sold. Significant findings during these inspections are reported to MCBH Environmental and the Branch Medical Clinic. An inspection checklist for the retail sale of pesticides is provided as Appendix M.

8.3 HOUSEHOLD PESTICIDE DISPOSAL

For questions concerning disposal of household pesticides contact the Pollution Prevention Division at the Environmental Department at 257-6920 x239.

9 PUBLIC LAWS AND REGULATIONS

The following laws, regulations, and military instructions and memoranda are applicable in governing operations, usage, and proper disposal of pesticides and their containers and ensuring the health and safety of personnel and the protection of natural resources at MCBH Kaneohe Bay.

9.1 FEDERAL LAWS

(a) Federal Insecticide, Fungicide and Rodenticide Act of 1972 as amended, Public Law 92-516. Regulates pesticide use in the United States by specifically requiring: registration of pesticide products, specific labeling criteria, minimum standards for applicator competency, and certification in specific categories of pest management when certain pesticides are used.

(b) Federal Facility Compliance Act of 1992, 42 U.S.C. 6901 note, 6908. Waives immunity for Federal facilities under solid and hazardous waste laws (CERCLA & RCRA) by allowing States to assess fines and penalties for violations.

(c) Federal Water Pollution Control Act as amended by the Clean Water Act of 1977 33 U.S.C. 1251. Provides for protection of surface waters from contamination by pesticides in wastewater and in surface runoff waters.

(d) Federal Noxious Weed Act of 1974, 7 U.S.C. 2801 et. Seq. Provides for the control of noxious plants on land under the control or jurisdiction of the Federal government.

(e) Resource Conservation and Recovery Act of 1976 (RCRA) as amended, Public Law 94-580. Broadly covers solid waste disposal and hazardous waste management that includes pesticides. The intention is to involve strict controls of every aspect of hazardous waste management, from cradle to grave.

(f) Endangered Species Act of 1973 as amended, Public Law 93-205. Provides for the protection of threatened and endangered species and their habitats. Under the Act, EPA is required to ensure that pesticide use is not likely to jeopardize endangered species or adversely modify critical habitats. This protection is implemented through pesticide labels and the labeling process.

(g) Occupational Safety and Health Act of 1970 (OSHA) as amended, Public Law 91-596. Established to assure safe and healthful working conditions. It requires employers to establish and maintain effective and comprehensive occupational safety and health programs consistent with standards promulgated by the Secretary of Labor.

(h) Plant Quarantine Act of 1912 as amended, 7 U.S.C.151 et seq. Provides the basis authority from which all plant quarantine regulations are derived.

(i) Migratory Bird Treaty Act, 16 U.S.C. 703. Protects migratory birds and parts thereof, their nests and eggs from being hunted, captured, purchased, or traded.

9.2 FEDERAL REGULATIONS

(a) 29 CFR 1910, Occupational Safety and Health Standards.

(b) 40 CFR 150-189, Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticides Containers.

(c) 40 CFR 262, EPA Regulations for Hazardous Waste Generators.

(d) 50 CFR 17.11 and 17.12, Fish and Wildlife Service List of Endangered and Threatened Wildlife and Plants.

9.3 EXECUTIVE ORDERS

(a) Executive Order 12088, 13 October 1978. Federal Compliance with Pollution Control Standards. Provides that the head of each federal agency is responsible for compliance with applicable pollution control standards, defined as the same substantive, procedural and other requirements that would apply to a private person.

(b) Executive Order 13112, 3 February 1999. Invasive Species. Seeks to prevent the introduction of invasive species and provide for their control to minimize the economic, ecological, and human health impacts that invasive species cause. Requires federal agencies to prevent the introduction of invasive species, control their populations, restore native species and habitats in ecosystems that have been invaded, and promote public education on invasive species.

9.4 HAWAII REVISED STATUTES

(a) Chapter 142, Animals, Brands, and Fences. Includes establishing authority for promulgating rules and regulations for the importation, transportation, inspection, quarantine, disinfection, and destruction of animals, property and effects associated with such animals.

(b) Chapter 149A, Hawaii Pesticides Law. Includes establishing authority for promulgating rules for the registration and licensing of all pesticides sold and used in Hawaii, establishing procedures for the disposition of pesticides, certification for the use of restricted use pesticides, establishing limitations and conditions for the application of pesticides, and establishing record keeping and use guidelines.

(c) Chapter 150A, Plant and Non-Domestic Animal Quarantine. Regulates the importation of plants and non-domestic animals into Hawaii, including granting authority to establish rules and regulations.

(d) Chapter 152, Noxious Weed Control. Establishes the authority to establish rules and regulations necessary to control or eradicate noxious weeds.

(e) Chapter 183D, Wildlife. Establishes authority for promulgating appropriate administrative rules for protecting wildlife in Hawaii

(f) Chapter 195D, Conservation of Aquatic Life, Wildlife, and Land Plants. Establishes authority for promulgating appropriate administrative rules for managing and protecting aquatic life, wildlife, and plants in Hawaii.

(g) Chapter 460J, Pest Control Operators. Establishes authority for promulgating appropriate administrative rules regulating pest control operations. Licensing requirements for pest control operators are also established.

9.5 HAWAII ADMINISTRATIVE RULES

(a) Title 13, Chapter 124, Administrative Rules of the Department of Land and Natural Resources.

(b) Title 4, Subtitle 6, Chapter 66, Pesticides. Administrative rules to implement Hawaii Revised Statutes Chapter 149A, which provides for the registration, licensing, certification.

(c) Title 16, Chapter 94, Pest Control Operators. Regulates commercial pest control operators.

9.6 MILITARY DIRECTIVES, MILITARY STANDARDS, AND HANDBOOKS

(a) DoD Instructions 4150.7, April 22, 1996. DOD Pest Management Program. Establishes the DOD policy and overall guidance for DOD pest management programs. Provisions govern DOD pest management and control operations performed worldwide, both for DOD and contractor personnel for all appropriated and non-appropriated fund activities.

(b) DoD Instruction 4150.7-P, September 1996. Plan for Certification of Pesticide Applicators. This document is the agency plan for the DOD and applies to all DOD employees applying any restricted use pesticides on DOD property. Policies also apply to contractors for commercial pest control services. Minimum competency standards for pesticide applicator training are set forth.

(c) DoD Instruction 4150.7-M, April 1997. Pest Management Training and Certification. This manual describes the DOD Pest Management Training Program. It is designed to establish training goals, provide a uniform training process, training standards, and procedures to prepare DOD pest management personnel to meet DOD pest management policy objectives, as stated in DOD Instruction 4150.7.

(d) MIL-STD-904-B, March 10, 2000. Guidelines for Detection, Evaluation, and Prevention of Pest Infestation of Subsistence. This standard is intended to furnish guidance in detection, evaluation, and prevention of infestation/contamination of subsistence from insects, rodents, birds, and other animals.

(e) MIL-HDBK-1028/8A, November 1, 1991. Contains basic criteria to design military installation pest management facilities and includes operational information for certain design features. A facility so designed will support operations and provide for safe storage of pesticides, safeguard the health and safety of employees, and prevent environmental contamination, contain spillage and be secure against theft and vandalism.

(f) TG No. 7, Aug 2003, Installation Pesticide Security. Provides guidance for safeguarding pesticides and pesticide application equipment in the context of installation security.

(g) TG No. 14, March 1992, Personal Protective Equipment for Pest Management Personnel. Provides supply and other data necessary to request and effectively use pest management protective equipment. It also contains a methodology pest management supervisors may use to help determine personal safety equipment requirements.

(h) TG No. 15, June 1992, Pesticide Spill Prevention and Management. Provides basic guidelines to developing plans for pesticide spill prevention, control and cleanup.

(i) TG No. 16, June 1981, Pesticide Fires: Prevention, Control, and Cleanup. Assists installation personnel to deal with fires involving pesticides by presenting general standards of good practice.

(j) TG No. 18, March 2003, Installation Pest Management Guide. Provides information on installation pest management programs and guidance for evaluation of these programs.

(k) TG No. 21, Pesticide Disposal Guide for Pest Control Shops. Provides specific guidance on procedures for the minimization and disposition of excess pesticides, pesticide-related wastes, and pesticide containers.

(l) TG No. 27, May 2005, Stored-Product Pest Monitoring Methods. Provides current information that DoD personnel can use to establish a stored-product insect monitoring program.

(m) TG No. 29, July 1994. Integrated pest Management In and Around Buildings. Provides guidelines for the implementation of IPM practices. Provides general guidelines for commonly found pest problems.

(n) TG No. 37, January 1996, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States. Provides guidelines for the removal of feral/stray cat populations on military installations in the United States in order to prevent injury or disease to DoD personnel and pet animals kept on the installation. Also provides for the welfare of feral/stray cats themselves and of wildlife on the installation, and provides recommendations on how to develop a cat control program that obtains general public input and assistance.

(o) TG No. 42, September 1999. Self-Help Pest Management. A guide for installation personnel who wish to establish and maintain a self-help pest management program.

(p) NAVFACINST 6250.4B, February 18, 1982. Preservative-Treated Wood. Discusses the different procurement methods available to users for obtaining treated wood products, and provides guidance in the selection of the correct product for the intended use. Also offers guidance for handling and use of treated wood products.

(q) NAVFAC Notice 6250 June 10, 1993. Quality Assurance of Treated Wood Products. To emphasize quality assurance by an accredited oversight inspection agency in the procurement of treated wood products.

(r) NAVFACINST 6250.14A, December 19, 1990. Self-Help Pest Control. Provides information on self-help pest control for Navy Family Housing, Bachelor Officer Quarters, and Bachelor Enlisted Quarters residents.

(s) NAVMED P-5010-8, September 1987. Manual of Naval Preventive Medicine. Describes the specific activity responsibilities of Navy medical departments and medical entomologists.

(t) SECNAVINST 6210.2A, January 24, 1992. Medical Service Quarantine Regulations of the Armed Services. Implements current quarantine policies and procedures of the U.S. Public Health Service and the U.S. Department of Agriculture in military programs. It also outlines compliance requirements for foreign quarantine regulations. The regulations are intended to prevent the introductions and dissemination, domestically or elsewhere, of diseases of humans, plants and animals, prohibited or illegally taken wildlife, arthropod vectors, and pests of health and agricultural importance.

(u) OPNAVINST 5100.23D, October 1994. Navy Occupational Safety and Health Program Manual. Covers respiratory protection devices for pest control operations, including guidance on the proper selection, fitting, and maintenance of respirators and training required for their use.

(v) OPNAVINST 6250.4B, August 1998. Pest Management Programs. Provides Navy and Marine Corps policies and procedures for implementing pest management programs.

(w) NAVFAC P-930, March 19, 1995. Family Housing Manual. Along with DOD Directive 4150.7 and OPNAVINST 6250.4A, establishes requirements for self-help programs for household pests by residences of military housing.

(x) NAVFACPACIFICINST 6250.10D, September 2005. Soil Treatment for Subterranean Termites. Provides guidance for the control of subterranean termites under constructed facilities by the sub-slab and trenching/rodding application of termiticides.

(y) Marine Corps Order P5090.2A. The Environmental Compliance and Protection Manual, Chapters 13 & 14, Pesticide Pollution Prevention.

(z) Final Marine Corps Base Hawaii Integrated Natural Resources Management Plan Update (MCBH INRMP) 2007-2011, November 2006.

9.7 MISCELLANEOUS REFERENCES

(a) Final Fish and Wildlife Management Plan for MCAS, Kaneohe Bay, Hawaii, Mark J. Rauzon, December 1992, Volumes I & II.

(b) Pollution Prevention Plan, Marine Corps Base Hawaii, Ken Kaempffe, Barbara Levins, and Aviva Speceal, December 1995.

(c) Final Environmental Assessment for the Implementation of Fire Management Actions at Ulupa'u Head Wildlife Management Area, U.S. Marine Corps, Marine Corps Base Hawaii Kaneohe Bay, May 1994.

(d) Final Report Environmental Study of Nu'upia Ponds Wildlife Management Area,

Marine Corps Base Hawaii, Kaneohe Bay, April 24, 1995.

(e) Final report Endangered Hawaiian Stilt Survey & Assessment for Improved Management Options, Marine Corps Base Hawaii, Marine Endeavors, August 1995

(f) Marine Corps Base Hawaii Invasive Species Management Study (MCBH ISMS), December 2002.

(g) Marine Corps Base Hawaii Integrated Natural Resources Management Plan and Environmental Assessment (MCBH INRMP/EA) 2002-2006, November 2001.

(h) UFGS 02360 Soil Treatment for Subterranean Termites.

(i) UFGS 02362 Basaltic Termite Barrier.

(j) UFGS 02363 Termite Control Barrier System.

(k) UFGS 07620 Mesh Termite Barrier.

10 REGULATED PESTS

10.1 QUARANTINE PESTS

Transportation of plants and animals to Hawaii from foreign and domestic sources is prohibited without the expressed approval of appropriate federal, military or state authorities. Federal laws and regulations prohibit the movement of animals, plants, plant or animal material, soil, or other biological material from foreign origins without prior written approval.

Approved articles shall be subject to inspection, treatment, and, in some cases, quarantine upon arrival in Hawaii. Similarly, State laws and regulations require that all plant material be declared for inspection upon arrival from domestic origins, although prior approval for the entry is not normally required except for certain restricted plant groups. However, the entry of most non-domestic animals is prohibited except for certain caged birds, tropical fishes and mammals that are allowed entry by permit.

Examples of prohibited non-domestic animals include hamsters, snails, lion fish, snakes, green iguanas, and other exotic animals. In order to prevent the introduction of rabies, the entry of domestic animals such as cats and dogs into the State is strictly regulated. Dogs and cats meeting specific pre and post arrival requirements may qualify for 5-day-or-less quarantine or direct release at Honolulu International Airport after inspection. Dogs and cats not meeting all of the specific 5-day-or-less program requirements are quarantined for up to 120 days upon arrival In Hawaii. All other domestic animals such as livestock animals are permitted entry only by prior arrangement with AQS and compliance with State quarantine regulations.

Any questions pertaining to the introduction of plants and animals should be directed to MCBH's Natural Resources Manager, NAVFAC Pacific PMC/Consultant Entomologist or to the regional or local offices of the U.S. Customs and Border Protection (CBP) Agriculture, or HDOA.

10.2 RETROGRADE CARGO

U.S. CBP Agriculture shall be contacted prior to the arrival of retrograde cargo for procedural guidance. Retrograde cargo received at MCBH Kaneohe Bay is inspected inside the common carrier (i.e., aircraft) used for transport. If any signs of live animal, plant or soil material are found, the shipping container is sealed and impounded to prevent discharge of the contents. The local USDA inspector shall determine the disposition of the material following inspection and analysis.

11 REGULARLY SCHEDULED IPM ACTIVITIES

11.1 DESCRIPTION OF SCHEDULED WORK

Regularly scheduled IPM work performed by the facilities pest control shop under standing job orders falls under the following six general categories:

- Indoor vector and nuisance arthropod surveillance
- Weed management
- Sewer pest management
- Mosquito abatement
- Filth fly management
- Termite Inspection

No work or inspection activities are scheduled for housing areas such as family housing and bachelor quarters. Services in these areas are provided on emergency service calls.

11.1.1 Indoor vector and nuisance arthropod IPM

Involves management of cockroaches, rodents, ants, stored product pests, and other miscellaneous urban pests. The inspections generally consist of checking surveillance equipment, identifying pest problems relative to established thresholds (see chapter 12), employing IPM techniques to manage identified problems, and installing new surveillance equipment.

Table 11.1 provides a list of buildings that receive routine inspections for vector control and nuisance pests and the scheduled frequency of those inspections. (NOTE: Buildings may be added or deleted from this list as required)

11.1.2 Weed Management

Involves surveillance of weed problems and the implementation of corrective measures which best conform to the principles of IPM (see section 12.9, Pest Vegetation and Noxious Weed Control, for more detailed information.)

Table 11.2 provides a list of areas that receive routine weed surveillance and the scheduled frequency of those surveillance activities. (NOTE: Areas may be added or deleted from this list as required)

11.1.3 Sewer Pest Management

Inspections consist of monitoring cockroach and rodent populations in sewer manholes.

Table 11.1 Buildings Requiring Scheduled IPM for Vectors of Disease and Other Nuisance Arthropods

Bldg No.	Description	Category[1]	Inspection Frequency[2]			
			W	Bi-W	M	Q
144	Flight Line Snack Bar	FHB		X		
208	Rations Warehouse	MISC	X	X		
219	Theatre Snack Bar	FHB		X		
301	Subway	FHB		X		
502	Officer's Club	FHB	X			
579	Child Care Center	INST		X		
1089	Mess Hall	FHB	X			
1255	Chinese Garden	FHB		X		
1298	Golf Course Refreshment Stand	FHB		X		
1601-14, 6171	Beach Cottages	MISC			X	X
1629	EM Club	FHB	X			
1666	Bowling Alley Snack Bar	FHB		X		
3038	Temporary Lodging Facility	MISC			X	X
3071	7-Day Store /Package Store/Subway	FHB		X		
3088	SNCO Club	FHB	X			
6088	Commissary and Warehouse	FHB	X			
6111-15	Child Development Center	INST		X		

[1]FHB = Food Handling Building, INST = Institution, MISC = Miscellaneous
[2]W = weekly, Bi-W = bi-weekly, M = monthly, Q = quarterly (Some buildings require certain services more often and are therefore scheduled for two inspection frequencies)

Table 11.2 Areas of the Base Requiring Scheduled Weed Management

Area Description	Inspection Frequency[1]			
	M	Q	S	A
Roads, Gutters, and curbs			X	
Station[2] Ditches		X		
Airfield (Westfield)		X		

[1]M = monthly, Q = quarterly, S = semiannually, A = annually
[2]Stations are identified structures that are not part of housing

If rat and cockroach populations are found to be above the established action threshold, surveillance activities are followed by the implementation of corrective measures which best conform to the principles of IPM (see sections 12.2, Cockroach Control, and 12.4 Rodent Control, for more detailed information). All sewer manholes are inspected on a monthly schedule.

11.1.4 Mosquito Abatement

Inspections consist of monitoring the amount of mosquito larvae in storm drains and catch basins. If larval numbers exceed the established action threshold, corrective measures complying with IPM principles are undertaken (see section 12.8, Mosquito Control, for more detailed information).

All storm drains and identified breeding sites [224 total (based on 2003 data)] are inspected. Ideally, inspections should be made on at least a monthly basis, with the frequency increasing to weekly inspections during wet periods. Due to funding and manpower constraints, however, the current standing job order is for quarterly inspections. More frequent inspections may be made at the request of the Branch Medical Clinic.

11.1.5 Filth Fly Management

Inspections consist of monitoring the amount of filth flies breeding in dumpsters and trashcans. Corrective measures complying with IPM principles are undertaken if fly numbers exceed the established action threshold (see section 12.3, Ants and Other Nuisance Arthropod Control, for more detailed information.)

All identified garbage and trash sites [163 total (based on 2003 data)] are inspected. Ideally, inspections should be made on at least a monthly basis, with the frequency increasing when fly problems are detected. Due to funding and manpower constraints, however, the current standing job order is for quarterly inspections. More frequent inspections may be made at the request of the Branch Medical Clinic.

11.1.6 Termite Inspection

Inspections consist of identifying conditions conducive to termite infestation and identifying active infestations. Recommendations are made to eliminate conducive conditions if they exist (see section 12.7, Termite Control, for more detailed information.) For active drywood termite infestations, corrective action is taken in the form of spot treatments for individual colonies, or in the case of large-scale infestations a recommendation is made to the supervisor to fumigate the structure. Subterranean termite infestations are reported to the supervisor for future ground treatment or structure fumigation.

All stations [non-housing structures – 457 total (based on 2003 data)] are inspected on an annual schedule.

12 IPM INFORMATION FOR MAJOR PESTS AT MCBH

12.1 INTRODUCTION

This chapter provides information that outlines procedures for the integrated pest management (IPM) of pests that commonly occur at MCBH Kaneohe Bay. The information addresses the following points for each major pest group:

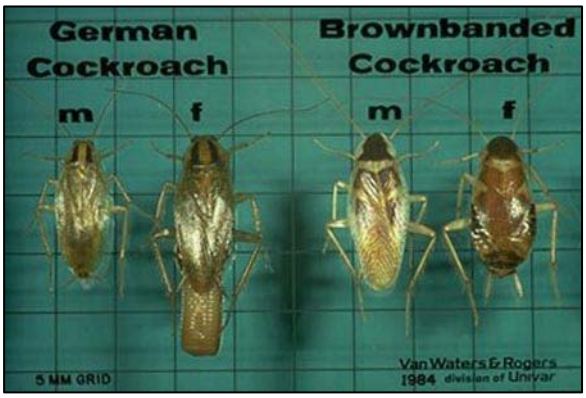
- what surveillance techniques may be used
- when corrective actions should be taken (action threshold)
- what pest management activities may be performed
- who is responsible for performing pest management activities
- which non-chemical methods may be used
- which pesticides may be used

The major pest groups are:

(1) Cockroaches
(2) Ants and other nuisance arthropods
(3) Rodents
(4) Stored product pests
(5) Venomous arthropods
(6) Termites
(7) Mosquitoes
(8) Weeds
(9) Vertebrates

12.2 COCKROACH CONTROL

TARGET PESTS:	Cockroaches: primarily the German, and brown banded, and American roaches



12.2.1 SURVEILLANCE

TECHNIQUES:

- Visual inspections using flashlights and flushing agents
- Sticky trap surveys
- Customer complaints

RESPONSIBLE PARTY:

- The Facilities pest control staff performs routine surveillance in the areas listed in Table 11.1 and in sewer manholes. In all other areas it responds to trouble calls.
- The Branch Medical Clinic, Kaneohe Bay monitors general sanitation and reports conditions conducive to cockroach infestations.

ACTION THRESHOLD:

- Two or more of any stage or 1 or more egg capsules (either loose or attached to a female) per survey per room

12.2.2 NON-CHEMICAL CONTROL METHODS

METHOD	SITES	SCHEDULE	RESPONSIBLE PARTY
Cultural control: Improve sanitation - food handling	Kitchens, dishwashing areas, service lines, eating areas, bars, heads, food storage areas	Thorough cleaning should be performed at the end of each business day	Galley and building managers
Cultural control: Improve sanitation - other	Heads, storage closets, near coffee messes, tunnels, utility rooms, crawl spaces, kitchens	General cleaning: daily. Thorough cleaning: weekly. Clean trashcans and dumpsters weekly.	Building managers or residents
Mechanical control: Vacuuming (using custom vacuum cleaners to pick up pests)	Office spaces	As designated by pest control personnel and building managers	Facilities pest control staff
Mechanical control: Pest proofing (eliminating entry and harborage areas)	All areas as noted above	As designated by pest control personnel and building managers	Initiated by base Facilities Department and performed by Facilities pest control staff
Biological control: Parasitic wasps	Indoor and outdoor	Naturally occurring	N/A

12.2.3 CHEMICAL CONTROL

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	Bait stations and bait gels should be used to the maximum extent possible. Emphasis should be placed on known or suspected harborages, feeding sites, or passageways such as utility lines, pipe chases, drain line access ways, under and behind baseboards, and behind cabinets. Non-residual flushing agents may be used during surveys. For persistent infestations, small amounts of a residual pesticide spray (or dust) may be used. The Preventive Medicine Department of the Branch Medical Clinic shall be notified if an application of residual pesticide is made in a food service area.
SITES:	Based on survey information, pesticides shall be applied as required to areas harboring pest numbers over the action threshold.
SENSITIVE AREAS:	The application of a pesticide with residual activity will not be made in areas with exposed food products or food containers. Additionally, they will not be applied on counter tops or on any surface where food may be stored or processed. Liquid pesticides will not be applied while building occupants or residents are present. Discretion shall be used when applying pesticides in or around quarters occupied by pregnant women or infants under the age of one year.

12.2.4 AUTHORIZED PESTICIDES

NOTE: Additional approved materials may be found in the pesticide inventories provided in Appendix G and Appendix I.

CHEMICAL	TRADE NAME/DESCRIPTION	EPA No.
Hydramethylnon	Maxforce Insect Granules	64248-6
Hydramethylnon	Maxforce Roach Gel	64248-5
Fipronil	Maxforce Roach Bait Stations	64248-11

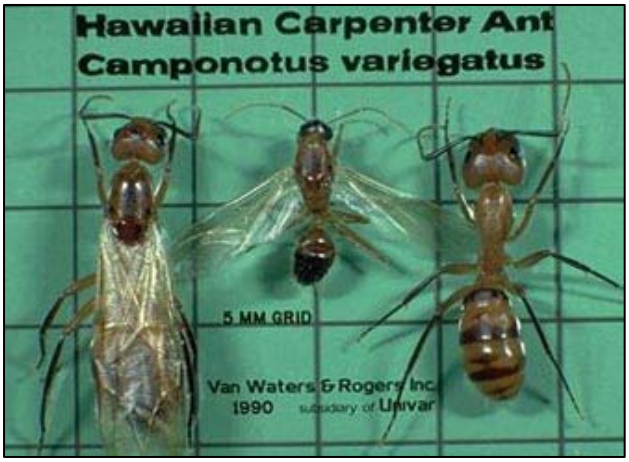
CHEMICAL	TRADE NAME/DESCRIPTION	EPA No.
Fipronil	Maxforce Roach FC Gel	64248-14
Propoxur	Baygon 2% Bait	31250-121
Pyrethrins	CB 80 Extra	9444-175
Imidacloprid	Pre-empt (reservoir)	3125-525
Imidacloprid	Premise Gel (cartridge)	3125-54
Abamectin	Avert Roach Gel	499-410
Boric Acid	Perma-Dust	499-384

12.2.5 REMARKS AND COMMENTS

Food service facility managers should generate service requests for caulking, grouting, or other roach proofing procedures. Facilities pest control staff should also initiate these efforts. Food service personnel will be responsible for preparing spaces for treatment and cleanup after treatment.

12.3 ANT AND NUISANCE ARTHROPOD CONTROL

TARGET PESTS:	Ants and other nuisance arthropods including fleas, millipedes, silverfish, filth flies, and brown dog ticks



12.3.1. SURVEILLANCE

TECHNIQUES:

- Visual inspections
- Sticky trap surveys
- Customer complaints

RESPONSIBLE PARTY:

- Facilities pest control staff shall respond to trouble calls. Infestations will also be noted while performing scheduled cockroach, rodent, and stored product pest surveys.

ACTION THRESHOLD:

- Ants: 3 or more per area
- Fleas: any evidence of biting reported
- Filth flies (food handling bldgs): 1 or more per building
- Filth flies (other bldgs): 4 or more per building

12.3.2 NON-CHEMICAL CONTROL METHODS

PEST	METHOD	SITES	RESPONSIBLE PARTY
All pests, esp. ants and filth flies	Cultural control: improve sanitation	Food facilities, restrooms, cellars, tunnels, utility rooms	Mess and building managers
All pests, esp. ants and filth flies	Mechanical control: pest proofing (eliminate points of entry, eliminate moisture areas, replace outside hollow core doors with solid doors.)	All areas as noted above	Facilities Maintenance initiated: facilities maintenance or contract pest control personnel
Filth flies	Mechanical control: electrified grids (filth flies - indoors only)	Galleys and other areas where food is prepared	Under direct guidance of Preventive Medicine
Filth flies	Mechanical control: air doors and/or hanging plastic strips (filth flies)	Buildings where doors are kept open (i.e. warehouses)	At discretion of Public Works Office
Fleas	Cultural control: pet owner education (teach tenants to take house pets to veterinarian at first sign of flea infestation)	Housing	Pet owners

PEST	METHOD	SITES	RESPONSIBLE PARTY
Fleas	Mechanical control: vacuuming (vacuum cleaner bags should be disposed of immediately after use)	All carpeting, basements, areas where pets frequent	Resident or building managers
Fleas	Physical control: pest proofing (eliminate areas where vertebrate hosts may gain entry to buildings)	All buildings	Facilities Maintenance
Ticks (outdoors)	Cultural control: landscaping (cut grass close to buildings, remove leaf litter and debris near perimeter of structures)	All buildings	Facilities Maintenance and housing occupants
Ticks (brown dog ticks - indoors)	Physical control: pest proofing (caulk cracks and crevices to remove potential areas where ticks may be reproducing)	All buildings	Facilities Maintenance

12.3.3 CHEMICAL CONTROL

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	Ant Control: Bait stations and bait gels should be used to the maximum extent possible. Emphasis should be placed on trails and feeding sites. For persistent infestations, small amounts of a residual pesticide spray (or dust) may be used. Pharaoh Ant Control: Only baits will be used for pharaoh ant control. Liquids may not be used. Fly Control: Residual insecticides may be applied to dumpsters as required. Indoor applications should be made only for existing fly problems. (NOTE: In food service areas, pesticide applications for filth flies should be followed up by a Medical Department survey with recommended actions for exclusion. See section 12.3.5 or additional information regarding filth fly control.)
TYPES OF PESTICIDES USED AND METHODS OF APPLICATION	Flea Control: Residual pesticides and insect growth regulator (IGR) sprays may be applied to all known or suspected areas (tank mixes of an IGR with a "knockdown" agent are recommended). Treatment of outdoor sites may be necessary. Repeated treatments may be required. To prevent reinfestation, tenants owning pets should have their animals treated by a veterinarian concurrent with the application of pesticides to their home. Pest control personnel must never apply pesticides to pets. (NOTE: See section 12.3.5 for additional information regarding flea control.)

	Tick Control: Residual pesticides may be applied to outdoor areas where surveys have determined the presence of ticks. Personnel working in tick-infested areas should be provided with insect repellents containing DEET and Permanone. (NOTE: the Medical Department should instruct personnel in the proper application of these chemicals and other personal protection procedures) Chemical control measures indoors should be used only for existing infestations. [NOTE: Ticks are usually brought indoors by pets or individuals returning from tick infested areas (except for the brown dog tick). Veterinarians should be consulted for ticks on pets.]
SITES:	Pesticides shall be applied as required based on survey information indicating areas where pests are harboring.
SENSITIVE AREAS:	Residual treatment will not be made to exposed food products, food containers, on counter tops, or on any surface where food may be stored. Liquid pesticides will not be applied while building occupants or residents are present. Discretion shall be used when applying pesticides in or around quarters occupied by pregnant women or infants under the age of one year.

12.3.4 AUTHORIZED PESTICIDES

NOTE: Additional approved materials may be found in the pesticide inventories provided in Appendix G and Appendix I.

CHEMICAL	TRADE NAME	EPA No.
Sulfluramid	Advance Dual Choice	499-459
Abamectin/Avermectin	Advance Granular Ant Bait	499-370
Hydramethlynon	Maxforce Insect Granules	64248-6
Fipronil	Maxforce Ant Bait Stations	64248-10
Carbamate	CB Invader HPX	9444-186
DeltaGard T&O	Bayer	432-836-45639
Cypermethrin	Demon WP	10182-71
Permethrin	Permethrin Pro	51036-287

Cyfluthrin	Tempo 20 WP	3125-380
Boric Acid	Gourmet Ant Bait Gel	73766-1
Orthoboric Acid	Drax Liquidator	9444-206

12.3.5 REMARKS AND COMMENTS

Facility managers and pest control personnel should generate service requests for caulking, grouting, or other pest exclusion procedures.

Filth fly infestations in food handling establishments observed during Medical Department sanitation inspections will be documented. Copies of the sanitation report and recommended corrective actions will be provided to the food service manager and Facilities Department. Control of fly populations within buildings can be obtained through exclusion. Screens on windows and doors will be utilized to exclude flies from buildings. Satisfactory control through exclusion requires inspections to ensure that windows, doors, and other potential entrances are properly sealed.

Fly control is best achieved through maintenance of a high level of sanitation. Garbage cans will be lined with plastic liners, covered when not in actual use, and cleaned regularly to prevent the buildup of fly breeding media. All garbage placed in dumpsters will be in plastic bags. All doors on dumpsters will remain closed to prevent the entry of adult flies. Dumpsters should be emptied at least once a week and should be steam cleaned every week during the summer.

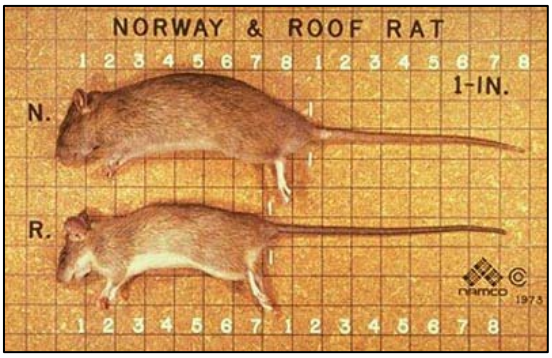
The use of outdoor flying insect electrocuting devices is prohibited. Indoor devices for electrocuting flying insects may be used when selected, purchased, located, and used in accordance with Armed Forces Pest Management Board guidelines. The NAVFAC Pacific PMC/Consultant Entomologist or NEPMU6 entomologist should be consulted prior to purchasing any electronic insect control device.

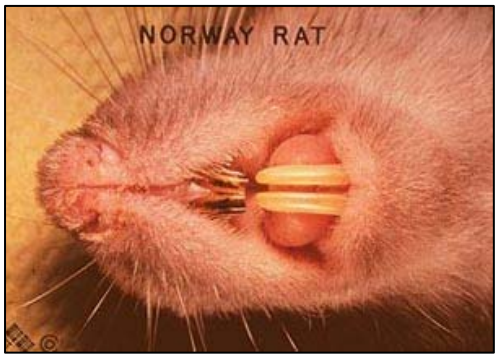
Flea infestations are normally associated with the presence of a vertebrate host. Identification of the host animal and the source of the infestation are essential. Good housekeeping practices and vacuuming carpets and furniture will help reduce organic material on which flea larvae feed. The removal of feral dogs and cats will also help in reducing flea problems on the installation.

Flea infestations may require pesticide applications to significant portions of office and living areas. Precautions must be taken to reduce pesticide exposure particularly to children, the elderly, and pets. Occupants must be made aware of post treatment re-entry times (if called for by the pesticide label). It is essential to obtain building occupants' cooperation in preparing spaces for treatment and completing post treatment cleanup.

12.4 RODENT CONTROL

TARGET PESTS:	Rats and mice: including the Norway rat, roof rat, polynesian rat, and the house mouse





12.4.1 SURVEILLANCE:

NOTE: Rodent surveillance should be performed simultaneously with cockroach surveillance.

TECHNIQUES:

- Visual inspections using flashlights (signs include burrows, rub marks, fecal droppings, runways, gnaw marks, commodity destruction, or tracks)
- Traps
- Glue boards
- Customer complaints

RESPONSIBLE PARTY:

- Pest control personnel shall respond to trouble calls and shall perform surveys for rodents.
- Medical personnel shall monitor sanitation in food handling facilities and record sightings or signs of rodent infestations.

ACTION THRESHOLD:

- Any sign of rodent infestation or rodent sighting

12.4.2 NON-CHEMICAL CONTROL METHODS

METHOD	SITES	SCHEDULE	RESPONSIBLE PARTY
Cultural control: Improve sanitation	Kitchens, dishwashing areas, service lines, eating areas, bars, heads, food storage areas, trash areas, dumpsters	Thorough cleaning should be performed at the end of each business day	Mess, service clubs and building managers
Mechanical control: Pest proofing (eliminating points of entry – see section 12.4.5 for more information)	All areas as noted above	As required	Facilities pest control staff and Maintenance Department
Mechanical control: Trapping (snap traps, glue boards, etc…see section 12.4.5 for additional information)	All areas as required	As needed	Facilities pest control staff and housing occupants
Physical control: Water source reduction	All areas as required	As required	Maintenance Department
Physical control: Food source exclusion	Pack all foods in rodent-proof containers	As needed	Resident or building manager

12.4.3 CHEMICAL CONTROL

TYPES OF PESTICIDES AND METHODS OF APPLICATION:	Rodent bait will be placed only in distinctively marked, tamper-proof bait stations which are inaccessible to children, pets, and wildlife. The only exception to this rule is the addition of bait directly to rodent burrows, in which case the burrows are sealed immediately after treatment (reopened burrows shall be retreated and resealed until all rodent activity ceases.) Moldy or otherwise unacceptable or spilled bait shall be removed and disposed of in accordance the pesticide label. **Rodenticide use should be avoided in buildings as poisoned rodents often die in inaccessible areas where they decompose, generate foul odors, and attract scavenging insects such as flies.**
SITES:	Base wide with special emphasis in areas of known rodent activity.
SENSITIVE AREAS:	Bait stations will not be placed in areas where food is served, near vending machines, in coffee messes, or other similar locations. Special care shall be taken where children, domestic animals or other non-target organisms may gain access to rodent bait. Additionally, the use of rodent bait in the WMA is only allowed through MCBH natural resources rodent control programs that are reviewed by the PMC/Consultant Entomologist.

12.4.4 AUTHORIZED PESTICIDES

NOTE: Additional approved materials may be found in the pesticide inventories provided in Appendix G and Appendix I.

COMMON NAME	TRADE NAME	EPA REG. #
Brodifacoum	Talon G Pellets	100-1052
Brodifacoum	Talon Weather Blok XT	100-1055

12.4.5 REMARKS AND COMMENTS

Proper sanitation and rodent proofing are the primary control measures to be used; use of snap traps and glue boards are secondary. Rodenticides should only be used after non-chemical techniques have been performed.

Rodent proofing should be accomplished whenever feasible. Twenty-four gauge galvanized sheet steel should be installed around doors to eliminate openings larger that 1/4 inch thus excluding rodents. Wood, rubber, aluminum, or lead should not be used because rodents can gnaw through these materials. The practice of banding trees to prevent rodents from climbing up is no longer permitted as it has not been proven to be an effective method of exclusion. Additionally, bands on trees are often forgotten, resulting in tree deformation and, in some cases, the obstruction of phloem (girdling).

Trashcans should be covered tightly and emptied daily. All garbage placed in dumpsters should be secured in plastic bags. Dumpsters should be kept closed at all times and the drains should be rodent- proofed.

Traps should be serviced daily in areas of known rodent activity. Once the rodent population has been reduced, traps should be serviced at least twice a week. Migration of rodents from neighboring areas may necessitate perimeter-baiting programs.

12.5 STORED PRODUCT PEST MANAGEMENT

TARGET PESTS:	Indian meal moth, confused flour beetle, red flour beetle, cigarette beetle, drug store beetle, and other stored product pests.

12.5.1 SURVEILLANCE

TECHNIQUES:

- Visual inspections using flashlights (dead insects, droppings, silken webbing, cast insect skins, holes bored into packaging, etc…)
- Use of pheromone traps
- Use of light traps/suction light traps
- Sticky traps
- Customer complaints

RESPONSIBLE PARTY:

- Army Veterinarian shall perform random inspections of incoming food and surveys of food products stored in warehouses.
- Branch Medical Clinic shall monitor sanitation, conduct periodic joint inspection with Army food inspectors and report conditions conducive to pest infestations.
- Facilities pest control staff shall perform general surveillance with food inspectors and/or Branch Medical Clinic technicians and undertake corrective measures as needed.

ACTION THRESHOLD:

- Based on thresholds established by MIL-STD 904 for different pests ranging from 1-7 individuals of a species in a pound of infested packaged commodity. Action levels can be altered at the discretion of the Army Veterinarian.

12.5.2. NON-CHEMICAL METHODS

METHOD	SITES	SCHEDULE	RESPONSIBLE PARTY
Cultural control: Improve sanitation	All food storage areas	General cleaning shall be performed routinely	Warehouse managers
Cultural control: Commodity rotation (First in - First out)	All	As required based on expiration dates	Warehouse and store managers
Cultural control: Increased surveillance	All food storage areas	Samples from each lot should be inspected as commodities are received	Army food inspectors
Cultural control: Commodity destruction	Infested goods	As required	Food storage managers under direction of Army Veterinarian
Cultural control: Improve storage practices (allow for wide aisles between stacks)	All	All	Building managers
Mechanical control: Pheromone traps (see section 12.5.5 for more information regarding pheromone traps)	All food storage areas	As required	Army food inspectors, Facilities pest control staff

12.5.3 CHEMICAL CONTROL

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	Treatments with residual pesticides may be implemented to control exposed adult and immature stages of active infestations. Fumigation may be required to control large infestations or pests inside product containers if the value of the infested commodity is greater than the cost to save it (see section 12.5.5 for additional information regarding fumigation.)
SITES:	All food storage areas and food storage warehouses. Based on historical and current surveillance information, pesticides may be used in preventive or remedial applications.
SENSITIVE AREAS:	The Preventive Medicine Department of the Branch Medical Clinic shall be notified if an application of residual pesticide is made in a food service area. Residual pesticides must never be applied directly to any food products. Extreme care shall be taken with any fumigation process. This includes notifying the Army Veterinarian and the MCBH Fire Department.

12.5.4 AUTHORIZED PESTICIDES

NOTE: Additional approved materials may be found in the pesticide inventories provided in Appendix G and Appendix I.

COMMON NAME	TRADE NAME	EPA REG. #
Cyfluthrin	Tempo 20 WP	3125-380

12.5.5 REMARKS AND COMMENTS

The Food Inspection Office Army Veterinary Detachment is responsible for the initial inspection for stored product pests at MCBH Kaneohe Bay. Food Inspectors randomly inspect incoming food items. Insects found are forwarded to NEPMU6 Pearl Harbor via the Branch Medical Clinic for identification. Infested materials that can be salvaged are either frozen or fumigated to kill the insects.

Buildings 208 (Subsistence Warehouse) and 6088 (Commissary Store and Warehouse) are used to store highly infestable products (flour, cereals, cookies, snack foods, pet food, etc.). For food storage facilities, pheromone traps should be used to supplement visual inspections. Pheromone traps are very effective in trapping Indian meal moths and cigarette and drugstore beetles, and moderately effective for confused and red flour

beetles. (Indian meal moths are usually attracted within a few hours of trap placement.) Pheromone traps are ineffective for saw-toothed grain beetles. TG 27 includes information on stored-product pest monitoring methods.

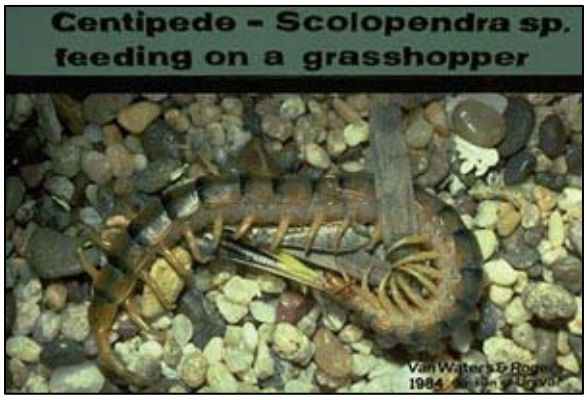
Fumigation is usually effective in killing insects in salvageable food products. Using aluminum phosphide, pests in materials held under fumigation for 96 hours can be 99+% controlled.

All fumigation operations shall be conducted by or under the supervision of a certified pest controller.

The maintenance of good records is an important practice in stored product pest management. In case of repeat infestations, records should be consulted to determine if trends exist for certain dates relating to the infested commodities (e.g. receipt dates and expiration dates). If records indicate that the distributor is the source of an infestation, the distributor should be notified of the problem. If a distributor is unwilling or unable to rectify pest problems, then a new distributor should be sought.

12.6 VENOMOUS ARTHROPOD CONTROL

TARGET PESTS:	Venomous arthropods: bees and wasps, centipedes, spiders, and scorpions



12.6.1. SURVEILLANCE

TECHNIQUES:

- Visual inspections
- Sticky traps
- Customer complaints

RESPONSIBLE PARTY:

- Pest control personnel shall respond to trouble calls.

ACTION THRESHOLD:

- Any bee or wasp infestation (nests) in work areas or quarters
- Centipedes: 1 or more per building
- Spiders: 1 or more per building depending on species
- Scorpions: 1 or more per building

12.6.2 NON-CHEMICAL CONTROL METHODS

PEST	METHOD	SITES	RESPONSIBLE PARTY
Bees and wasps	Cultural control: Improve sanitation (cover trash cans, put lids on soda cups, eliminate food sources)	All outdoor areas around buildings and recreation areas	Building managers
Centipedes	Cultural control: Landscaping (remove debris around buildings such as boards, rocks, and wood piles)	All buildings esp. family housing	Building occupants, family housing residents, and maintenance personnel
Scorpions	Cultural control: Landscaping (remove debris around buildings such as boards, rocks, and stacked wood)	All buildings	Building occupants, family housing residents, or maintenance personnel
Bees and wasps	Mechanical control: Nest and swarm removal	All honey bee hives	Facilities pest control staff
Bees and wasps	Mechanical control: Trapping	Outdoor sites where people congregate i.e. picnic grounds, playgrounds, etc.	As designated by Branch Medical or Facilities pest control staff
Bees, wasps, centipedes, spiders, and scorpions	Mechanical control: Pest proofing (see section 12.6.5 for additional information)	All buildings esp. family housing	Building occupants, family housing residents, and maintenance personnel

PEST	METHOD	SITES	RESPONSIBLE PARTY
Bees and wasps	Mechanical control: Exclusion (screens and other pest exclusion devices)	All areas where bees and wasps may gain entry to structures	Facilities pest control staff should initiate process for Maintenance Department to install devices
Spiders, scorpions	Mechanical control: Vacuuming (using custom designed vacuum cleaners to suck up the pest)	Office spaces	Facilities Maintenance, Facilities pest control staff

12.6.3 CHEMICAL CONTROL

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	Bees and wasps: efforts should be scheduled in the early morning or evening hours when they are least active. Personnel without protective clothing should not be present during treatments. Personnel involved in the control effort will wear appropriate protective clothing. Centipedes: residual insecticide may be applied to outdoor harborage sites and around foundation of buildings/quarters. Scorpions: scorpions should be removed manually. Outdoor areas can be treated with residual pesticides. Spiders: spiders, webs, and egg cases should be removed manually, primarily by vacuuming.
SITES:	As designated by pest control or medical personnel.

SENSITIVE AREAS:	Pesticide application at nests may agitate bees and wasps into a stinging frenzy. Unprotected personnel should be distanced from the site prior to initiation of control efforts. Outside entrances to bee and wasp nests in walls should not be sealed off until they have been killed or flushed out of the wall. Discretion shall be used when applying pesticides around quarters occupied by pregnant women or infants under the age of one year.

12.6.4 AUTHORIZED PESTICIDES

NOTE: Additional approved materials may be found in the pesticide inventories provided in Appendix G and Appendix I.

COMMON NAME	TRADE NAME	EPA REG. #
Pyrethrins	CB Stinger Wasp Spray	9444-181
Pyrethrins	Drione	432-992
Cypermethrin	Demon WP	10182-71
Allethrin, Phenothrin	Wasp Freeze	499-362

12.6.5 REMARKS AND COMMENTS

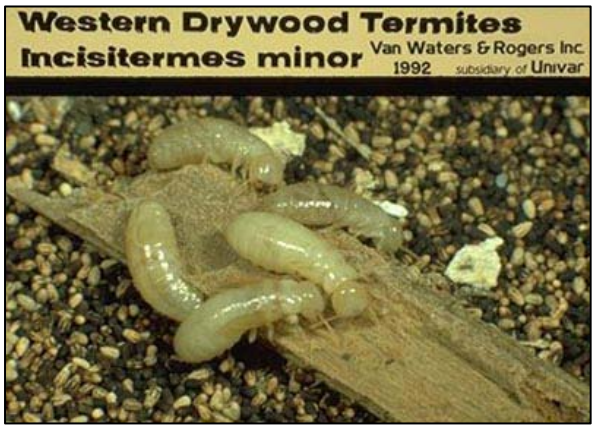
Wasps and bees nesting on or entering buildings present a hazard to personnel. Paper wasps that nest in trees, shrubbery, and utility sheds in remote service areas are a threat to Facilities Maintenance Department personnel that service these areas.

Certain construction features found in buildings are conducive to wasp infestations. Buildings with corrugated roofs often have gaps between the roof and walls. Improperly installed or insufficiently caulked drip caps, window and door frames, or ventilators may allow the entry of wasps or bees into buildings or wall voids. Permanent closure of all openings after elimination of the infestation is the only permanent method to prevent reinfestation.

Properly screening houses usually keeps centipedes out. Doors and window screens should fit tightly and be kept in good service. Area sanitation to reduce their normal prey is helpful. Residual applications of pesticides labeled for outdoor use (e.g. cypermethrin) are effective for their control

12.7 TERMITE CONTROL

TARGET PESTS:	Subterranean and drywood termites



12.7.1 SURVEILLANCE

TECHNIQUES:

- Visual inspection using flashlight, an awl, and a sounding tool for detecting mud tubes, infested wood, cast wings and droppings.
- Moisture meter will help to detect moisture problems that may be related to paint peeling, discoloration and warping.
- Borescope inspection in double wall construction
- Customer complaints (swarmers)

RESPONSIBLE PARTY:

- Facilities pest control staff shall perform annual inspections of stations (non-housing structures)
- IDQ termite contractor performs some inspection of housing structures

ACTION THRESHOLD:

- Detection of any active termite infestation

12.7.2 NON-CHEMICAL CONTROL METHODS

PEST	METHOD	SITES	RESPONSIBLE PARTY
Subterranean termites	Cultural control: Landscaping (keep vegetation at least five feet away from building perimeters)	All buildings	Facilities Maintenance, Facilities pest control shall record/report deficiencies during inspections
Subterranean termites	Mechanical control: Exclusion [install termite-proof barriers (Basaltic Termite Barrier /Termi-Mesh at time of construction, install termite shields between foundation and wood components, and use post tension cables in slabs]	When buildings are constructed or repaired.	Architect and design engineers. New construction plans and specs shall be reviewed for termite management options by the NAVFAC Pacific entomologist.
Subterranean termites	Physical control: Eliminate soil-wood contact (Excavate soil that is in contact with wood, erect concrete barriers or permanent polymer barriers between soil and wood)	Whenever there is soil-wood contact.	Facilities pest control shall record/report deficiencies during inspections.
Subterranean termites	Physical control: Reduce moisture content of soil and wood [repair rain gutters, install water shields at	All buildings	Moisture control shall be included in all new and revitalization construction projects. Facilities pest control shall report

PEST	METHOD	SITES	RESPONSIBLE PARTY
Sub. termites (cont.)	gutter downspouts, ensure adequate ventilation in crawlspaces, install moisture barriers (pre-construction) between soil and foundation of building]		deficiencies to housing office or property manager.
Drywood termites	Cultural control: Inpsect lumber (Inspect all lumber, esp. second hand lumber, prior to construction. Use of acceptable alternative to wood construction materials.)	New construction, renovations, and repairs.	Building contractors with oversight by ROICC office.
Drywood termites	Mechanical control: Pest proofing (Screen windows to prevent winged termites from entering buildings and establishing colonies.)	All buildings	Building managers, Facilities Department and maintenance contractors.
Drywood termites	Physical control: Heat treatment, cold treatment, microwave treatment	Areas of infestation within buildings	Contracted commercial pest control company

12.7.3 CHEMICAL CONTROL

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	New Construction Pre-Treatment: During the construction of all new structures or construction of additions to existing structures, it will be standard operating procedure that the entire surface of the soil/substrate to be covered by the slab or along the inside and outside of the foundation walls, around piers, or in plumbing and utility services will be pretreated according to label specifications with an approved liquid termiticide. Properly calibrated equipment will be used. An additional chemical exclusion system, known as the Impasse System, may be installed during construction. This system functions in manner similar to Termi-mesh, however instead of a stainless steel screen, Impasse consists of a chemically (lambda-cyhalothrin) impregnated plastic sheet sandwiched between two layers of hard plastic. An entire sheet may be laid under the slab, or individual “blockers” may be placed around slab penetrations (i.e. plumbing pipes). Existing Structures Post-Treatment: It is recommended that for structures infested with subterranean termites, a non-repellent soil termiticide (i.e. Premise, Termidor, etc…) or a baiting system (see below) be used according to label instructions. In addition to eliminating infestations, these products will kill large proportions of termite colonies’ foraging populations. If a traditional repellent termiticide is used, correct application is critical to create the necessary continuous chemical barrier. For slab-on-grade foundations, apply per label directions by sub-slab drilling/injection along interior walls, especially load bearing walls and walls containing utility (plumbing) chases, plumbing penetrations in baths, kitchen and laundry rooms. The outside foundation perimeter may be treated by trenching/rodding. For hollow block foundations or voids in masonry resting on footing, treat per label instructions to provide a continuous chemical barrier in the voids at the footing. Bath traps and inaccessible crawl spaces: Treat per label directions.

	Treated Wood: Pressure treated lumber will be used in construction to prevent termite infestations. Lumber treated with Chromated Copper Arsenate (CCA) will not be used in housing areas or areas where building occupants will be in contact with wood. Existing unpainted wood inside structures can be treated with a boric acid product labeled (Timbor, Boracare) for wood protection. Baiting Systems: Active subterranean termite infestations may be eliminated through baiting foragers with an attractive food product that contains an undetectable toxicant. This is accomplished through use of a baiting system that typically consists of (1) establishing termite activity at feeding stations installed in the ground (2) delivery of a slow acting toxicant (e.g., sulfluramid) or insect growth regulator (IGR) (e.g., novaflumaron) termite bait to active stations (3) continued monitoring for the presence of termite activity after control/elimination has been achieved. Numerous baiting systems are commercially available, but to date only the Sentricon System (Dow Agrosciences) has been scientifically proven to be effective in Hawaii. Other baiting products may be effective, however, at present there is little research supporting their efficacy. Spot Treatments: For use against drywood termites only. Individual areas of activity or “spots” are treated with ready to use aerosols (e.g., Air-Devil HPX, PT-279) or compressed-air sprayer equipped with injector nozzle for dispensing the various EC and WP formulations of termiticides that are approved for spot treatment of voids, galleries and other localized areas of infestation. Fumigation: Recommended for large scale infestations of multiple drywood colonies. Performed by licensed contractors using Vikane (Sulfuryl fluoride).
SENSITIVE AREAS:	Buildings with sub-slab or intra slab ductwork. Any area near surface water. Any below-grade plumbing, electrical, phone, or cable lines.

12.7.4 AUTHORIZED PESTICIDES

NOTE: The chemicals listed here are not kept in inventory by the facilities pest control shop due to the fact that most jobs involving the application of termiticide are contracted. This list is only comprised of chemicals recommended for remedial treatment of termite infestations by contractors. Authorized chemicals for pretreating soil are pyrethroids that are registered for pretreatment by the EPA and State of Hawaii. Organophosphates such as Dursban (chlorpyrifos) are not authorized for pretreatment or remedial treatment.

COMMON NAME	TRADE NAME	EPA REG. #
Fipronil	Termidor SC	432-901
Imidacloprid	Premise 75 WSP	3125-455
Noviflumuron	Recruit III (Sentricon)	62719-453
Noviflumuron	Recruit III AG (Sentricon – above ground)	62719-454
Sulfuryl fluoride	Vikane (fumigant)	62719-4

12.7.5 REMARKS AND COMMENTS

Because of the extremely high incidence of termites at MCBH Kaneohe Bay, it is imperative that all new buildings and building renovations include termite pretreatment. In addition, all lumber used shall be pressure treated by an approved treatment plant bearing a third party inspection seal in accordance with current American Wood-Preservers' Association Standards. Non-wooden construction materials such as steel framing and synthetic composites meeting Federal guide specifications are acceptable.

It should be noted however that even non-wooden structures might harbor termite infestations. Concrete, hollow masonry tile and other non-wooden buildings are susceptible to damage of interior contents containing wood (cellulose) components such as furniture, cabinetry, paper, storage crates etc. and disruption of operations due to swarming.

Inspectors must have access to a ladder to get to high places such as ceilings and attics and must be able to get into crawl spaces to perform inspections. Inspectors need to be aware of other wood destroying organisms during their termite inspections such as fungi, powder post beetles, etc, and make note of their presence.

Termiticides used for ground treatment of subterranean termites in and around buildings shall be a water-based emulsion of a product containing an approved active ingredient. Diluents shall not include any other pesticide residues or rinse water. As noted in 12.7.3, for traditional repellent termiticides, the application shall establish a continuous soil treatment barrier. At the time of application with such termiticides, the soil shall be in a condition with low moisture content to allow uniform distribution of the treatment

solution throughout the soil. Soil termiticides of any type, repellent or nonrepellent, shall not be applied during or immediately following heavy rains, or when conditions will cause runoff and create an environmental hazard.

When any fumigation is scheduled, the ROICC Contracting Office shall notify the pest control shop ahead of time so the required QAE can be performed. Appropriate emergency services such as the Base Safety and Fire Departments also need to be properly informed. All chemical applications shall be warranted by inspection.

12.8 MOSQUITO CONTROL

TARGET PESTS:	All blood feeding species of mosquitoes (Primarily the forest day mosquito, *Aedes albopictus*, and the southern house mosquito, *Culex quinquefasciatus*)

12.8.1 BIOLOGY

Mosquitoes go through four distinct life cycles in their development: Egg, Larval, Pupal, and Adult. Eggs may be laid on the surface of water in rafts (*Culex*) or singly (*Wyeomyia*). The *Aedes* species deposit eggs in dry areas that are frequently flooded such as tree holes, artificial containers, and floodlands. These eggs may remain viable for extended periods of time between flooding. Eggs typically take one to two days to hatch, after which the larval and pupal stages last for a combined period of approximately 8 to 10 days. The larval and pupal stages occur entirely in the water. Newly emerged adults are free flying with flight ranges generally of 100 yards to 5 miles depending on the species. Female mosquitoes must bite hosts and take blood meals to obtain the necessary nutrients for the development of their eggs. Male mosquitoes do not bite, and may be distinguished from females by the long feathery hairs on their antennae compared to the females whose antennae only have short whorls of hairs. Adult mosquitoes typically live for one to two months. Biting by female mosquitoes may occur during the day or night depending on the species.

The three day-biting mosquitoes in Hawaii are *A. albopictus*, *A. aegypti*, and *W. mitchellii*. These species have a very short migratory range, therefore, they are usually found flying not far from their breeding sites. They live in relatively clean water found in tree holes, plants, rock holes, and all types of man-made containers. They do not breed in ground pools or in water that contains soil. *W. mitchellii* breeds almost exclusively in leaf axils of bromeliads. *A. albopictus* and *A. aegypti* are black mosquitoes with white markings. *W. mitchellii* is brown with an abdomen that is white on the lower half. *A. albopictus* is the most common day biting mosquito. *A. aegypti* is thought to be found only on the islands of Hawaii and Molokai.

The remaining two species, *C. quinquefasciatus* and *A. vexans* are active only at night. These mosquitoes have a longer migratory range; therefore, their presence may not indicate a nearby breeding site. *C. quinquefasciatus* will breed in all types of human-made containers but prefers ground water containing rotting organic matter. Adult *C. quinquefasciatus* have a flight range of up to three miles. *A. vexans* breeds exclusively in flood waters. Its eggs, laid in dry, lowland soil, remain dormant until flooding causes them to hatch. Adult females of *A. vexans* may travel up to 20 miles from their breeding site in search of a blood meal. Both *C. quinquefasciatus* and *A. vexans* are brown mosquitoes, but only *Aedes vexans* has white stripes around its leg joints. *C. quinquefasciatus* is found on all islands and is the most common night-biting mosquito in Hawaii.

12.8.2.1 SURVEILLANCE

12.8.2.1 Adults

Adult surveillance using a variety of trapping techniques such as gravid and/or light traps can be an effective way to determine the mosquito species present in an area and to ascertain the relative densities of those species. Adult mosquito collections can also be screened for the presence of viruses and provide quantifiable indexes of viral activity during an outbreak. Adult mosquito density (number collected per trap night) and infection rate (number of individual mosquitoes estimated containing virus per 1,000 specimens tested) should be recorded at representative trapping locations to track mosquito density and virus incidence.

Adult mosquito abundance is a key factor contributing to the risk of disease transmission. Monitoring the abundance of adult mosquito populations provides important information on the size of the vector population as it responds to changing climatic factors and mosquito control activities. Surveillance of adult mosquitoes should be conducted at least once a week. The Preventive Medicine Department of the Installation Branch Medical Clinic has primary responsibility for adult mosquito surveillance at MCBH. The Branch Medical Clinic is currently being equipped with gravid traps to fulfill this responsibility.

12.8.2.2 Larvae

Mosquito abundance can also be estimated through the collection of the larval and pupal stages. This is typically accomplished with a “dipper” or long handled ladle that is used to collect water samples. The number of larvae and pupae are then counted to obtain density estimates. Larvae and Pupae can also be used for species identification. These data are used to identify breeding habitats and serve as a basis for control efforts involving chemical larvicides. A larval surveillance program should include information on 1) location description and date of the sample 2) the species collected; and 3) number of larvae collected per dip. The facilities maintenance pest control shop conducts surveillance on the presence of mosquito larvae and pupae in storm drains and catch basins on base.

TECHNIQUES:

- Mosquito larval surveys (dipping techniques)
- Mosquito adult surveys (light traps and gravid traps)
- Mosquito adult surveys (landing counts)
- Customer complaints

RESPONSIBLE PARTY:

- The installation Branch Medical Clinic has primary responsibility for mosquito surveillance and providing guidance to the Facilities pest control shop on control operations.

ACTION THRESHOLD:

- Adults: 10 females per trap per night (light traps)
- Landing counts: 5 per minute
- Larvae: 3 per dip (based on averaging 10 dips)

NOTE: The Preventive Medicine Department of the Installation Branch Medical Clinic conducts weekly surveillance of adult mosquitoes at MCBH. The facilities pest control shop conducts larval surveillance. See Appendix B (Emergency Vector Control Plan) for procedures in case of a natural disaster or contingency leading to a vector-borne disease outbreak.

12.8.3 PREVENTION AND CONTROL

12.8.3.1 Non-Chemical Control

A good integrated mosquito management program can minimize the risk of mosquito-borne disease outbreaks and help prevent disease transmission in the event an outbreak occurs. Management efforts are most effective when directed towards the immature stages of mosquito populations. Larval mosquito control should consist of environmental management, biological control, and chemical control.

Environmental management decreases or eliminates habitat availability for immature mosquitoes. These management practices may include reducing standing water through improved drainage systems, managing aquatic vegetation to reduce food and habitat for mosquito larvae, disposing of items such as used tires or other containers which collect water, cleaning rain gutters, etc.

12.8.3.2 Non-Chemical Control Methods

TYPE	SITES	SCHEDULE	RESPONSIBLE PARTY
Mechanical control: Pest proofing (exclusion from buildings)	Screen doors, window screens, door sweeps, etc.	As required	Facilities Maintenance
Physical control: Water management (reduction of breeding habitat through alteration of the environment and education of base personnel)	Ditches, storm drains, artificial containers, tidal flats, etc.	As needed	Environmental Department, Facilities Maintenance, Housing Office
Biological Control: Augment and conserve natural enemies (i.e. predatory fish* and copepods)	All areas of permanent standing water.	Augment predator populations as needed	Facilities Maintenance, Environmental Department

*The common guppy, *Lebistes reticulates*, and the mosquitofish, *Gambusia affinis*, are the most widely used biological control agents of mosquitoes in Hawaii. These fish may be released in ponds, canals, and flooded fields with approval from MCBH natural resources.

12.8.3.3 Chemical Control

The application of larvicides, chemicals that kill mosquito larvae or pupae, is usually the most effect use of chemical control. There are numerous products available that are relatively specific for mosquitoes and minimize risk to non-target organisms. Adulticide sprays or fogs may be required in certain circumstances to reduce the population of adult mosquitoes in a short period of time, but they are not recommended as long term solutions for mosquito management. The use of chemical larvicides and adulticides for mosquito management should based on surveillance data and the distribution and biology of the target mosquito species. See section 12.8.3.5 for the list of authorized chemicals intended for mosquito management at MCBH.

2.8.3.4 Chemical Control Methods

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	Adult Mosquitoes: Ultra Low Volume (ULV) application using an EPA registered pesticide (e.g., ULD BP 300) shall be the primary response to mosquito problems. ULV applications shall not be performed when wind is in excess of 9 mph or during the middle of the day. ULV applications must also be conducted when targeted adult mosquitoes are actively flying. Larval Mosquitoes: Larval mosquito management shall be performed at common breeding sites near transient water such as storm drains, lowland stagnant pools, building roof tops, stored tires, and rain gutters using approved larvicides.
SITES:	Pesticides shall be applied as required based on survey information only.
SENSITIVE AREAS:	Wetlands, WMA, areas with small children, areas with domestic animals, and paint finishes

12.8.3.5 Authorized Pesticides

NOTE: Additional approved materials may be found in the pesticide inventories provided in Appendix G and Appendix I.

COMMON NAME	TRADE NAME	TARGET STAGE	EPA REG #
Methoprene	Altosid	larvae	2724-375
Pyrethrin	ULD BP 300	adult	499-450

12.8.4 MOSQUITO MANAGEMENT RESPONSIBILITIES

Branch Medical Clinic (Preventive Medicine):

- install, operate, and maintain adult light traps
- collect adult mosquitoes
- identify adult mosquitoes to species
- perform adult landing count surveys (last resort)
- determine when and in which zones ULV pesticide applications are required
- spot check using larval dips
- perform periodic *Aedes* sp. breeding surveys (as required)

Facilities Pest Control Staff:

- perform ULV pesticide applications
- calibrate and test droplet size of ULV equipment every 50 hours of usage
- perform larval mosquito surveys
- perform larval mosquito pesticide applications

Environmental Department:

- recommend and approve land modifications to eliminate breeding sources

12.8.5 MOSQUITO VECTORED DISEASES

12.8.5.1 Background

Worldwide there are approximately 3,450 species and subspecies of mosquitoes belonging to 38 genera. Some of the most important vector species, or species that transmit disease, belong to the genera *Anopheles*, *Culex*, and *Aedes*. *Anopheles* species are well known for transmitting malaria, however they are also vectors of filarial worms (*Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*) and some arboviruses. Some mosquito species in the genus *Culex* transmit many different arboviruses in addition to *Wuchereria bancrofti*. The genus *Aedes* contains important vectors of yellow fever, dengue, encephalitis viruses, and many other arboviruses.

Prior to 1826, there were no mosquitoes in Hawaii. Today there are 7 recognized species of mosquitoes established in the state, but only 5 of these 7 species are considered noxious and bite humans. Of these five species, one is from the genus *Culex* (*C. quinquefasciatus*), one is from the genus *Wyeomyia* (*W. mitchellii*), and three are from the genus *Aedes* (*A. aegypti*, *A. albopictus*, *and A. vexans*).

12.8.5.2 Mosquito Vectored Diseases in Hawaii

Endemic transmissions of mosquito vectored human diseases in Hawaii are extremely rare, therefore outbreaks typically occur when a person or animal is infected outside the state, comes into the state, and introduces the disease into the local mosquito population. Mosquito vectored disease organisms rely on a specific species or group of species for transmission, consequently, for a disease to be spread, a suitable mosquito species must be present in substantial numbers. Only mosquitoes in the genus *Anopheles*, for example, transmit the organisms that cause human malaria. Malaria is generally not considered as a potential outbreak threat among humans in Hawaii since there are no species of *Anopheles* currently established in the state. Dengue fever, on the other hand, is transmitted by mosquitoes in the genus *Aedes*, and there is a history of dengue outbreaks that have occurred in the state. The most recent dengue outbreak was in 2001. It is thought that a group of infected residents returned to Hawaii from French Polynesia and introduced the virus into the mosquito population on Maui. The

disease eventually spread to the islands of Oahu and Kauai infecting over 100 people.

12.8.5.3 Potential Threats

Appendix B, Emergency Vector Control Plan (MCBH Kaneohe Bay), outlines the procedures and responsible parties in the event of a mosquito or arthropod-borne virus (arbovirus) outbreak.

- Dengue Fever. Commonly known as "breakbone fever", this viral disease is transmitted in a mosquito-human-mosquito cycle by *A. aegypti* and *A. albopictus.* Periodic outbreaks have occurred in Hawaii.

- Encephalitis. The word encephalitis means inflammation of the brain. There can be many causes for encephalitis, but one in particular involves mosquito-transmitted viruses. The most common in the U.S. is St. Louis Encephalitis (SLE), but other types also occur there such as Western Equine Encephalitis (WEE), and Eastern Equine Encephalitis (EEE). Japanese Encephalitis (JE) is the most common mosquito-borne encephalitis in Asia.
  C. quinquefasciatus is one of the primary vectors of SLE, but does not transmit WEE, EEE, or JE. *A. vexans* can transmit EEE. Birds serve as the reservoirs for the virus and are essential to the transmission cycle. Humans and most mammals are considered "dead-end hosts", meaning that once infected they cannot pass the disease back into the mosquito population. For an outbreak to occur, an infected bird or an infected mosquito must enter the state. No outbreaks of a mosquito-borne encephalitis virus have occurred in Hawaii.

- West Nile Virus. Historically, West Nile Virus (WNV) was limited to Africa, Southern Europe, and Asia; however, in 1999 the disease arrived in the U.S., with the first documented case in New York. By the end of 1993 it had been identified in 46 states and the District of Columbia. There have been no documented cases of WNV in Hawaii, however due to its rapid dissemination throughout the U.S., there is a heightened awareness of the possibility that it may enter the state. All three species of *Aedes* in Hawaii and *C. quinquefasciatus* are potential vectors for WNV. Like the encephalitis viruses, humans are dead end hosts for WNV, and birds are the primary reservoir; therefore, this virus also can only enter the state by way of an infected bird or mosquito. The virus has been shown to affect 162 species of birds, and dead birds are good indicators of WNV activity. Mortality in a wide variety of bird species has been an effective tracking mechanism of WNV activity as it has spread across the U.S. from coast to coast. Of particular concern in Hawaii are the islands' rare bird species that could be very susceptible to the disease.

12.9 VEGETATION AND NOXIOUS WEED CONTROL

TARGET PESTS:	Undesirable vegetation; noxious weeds, aquatic weeds, grasses, broadleaf weeds, and poisonous weeds

12.9.1 SURVEILLANCE

TECHNIQUES:
- Visual inspections
- Customer complaints

RESPONSIBLE PARTY:
- Facilities pest control staff

ACTION THRESHOLD:
- Action thresholds vary according to species of weed and site

12.9.2 NON-CHEMICAL CONTROL METHODS

METHOD	SITES	SCHEDULE	RESPONSIBLE PARTY
Cultural control: Landscape management: (seeding with desirable low growing grasses)	Semi-improved sites: canal banks, fence lines, other rights-of-way	As needed	Facilities Maintenance
Cultural control: mulching	Ornamental planting beds	Remulch annually	Facilities Maintenance
Mechanical control: Mechanical removal (hand pulling, weed whacking, etc…) *Fountain Grass:* Removal of fountain grass requires cutting off the flowering seed head and freezing it for 72 hours.	Ornamental planting beds *Fountain Grass:* Runways and road shoulders at MCTAB and wetland behind 3dMarines motor pool	As required *Fountain Grass:* Immediately upon observation	Facilities Maintenance *Fountain Grass: Facilities pest control shop and Environmental Dept*
Biological Control: Specific to Ivy gourd (*Coccinius grandis*) - Ivy gourd leafmining weevil (*Acythopeus* cocciniae) or Ivy gourd vine borer (*Melittia oedipus*), a sesiid moth.	Multiple locations around MCBH Kaneohe Bay	When HDOA or USDA-APHIS rearing facilities make it available.	Hawaii Dept of Agriculture. US Dept of Agriculture Animal and Plant Health Inspection Service Environmental Dept – Nat Res

12.9.3 CHEMICAL CONTROL

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	Pesticide use shall be based on surveys. Method of dispersal shall be as appropriate for the pest species and site involved.
SITES:	Based on survey information
SENSITIVE AREAS:	WMA , wetlands, areas with small children, areas with valuable ornamental or native plants

12.9.4 AUTHORIZED PESTICIDES

NOTE: Additional approved materials may be found in the pesticide inventories provided in Appendix G and Appendix I.

USE	COMMON NAME	TRADE NAME	EPA #
All vegetation, residual, non-cropland use	Bromacil+Diuron	Krovar 1DF	352-505
Broad leaf weeds and woody plants	Triclopyr	Garlon 3A	62719-37
All vegetation, non- residual terrestrial including WMA	Glyphosate	Roundup Pro	524-475
All vegetation near or in water, contact, no residual, canal banks and WMA with discretion	Glyphosate	Aqua Master	62719-324

12.9.5 REMARKS AND COMMENTS

Treatment of the soil adjacent to the perimeter fence shall be a priority. Soil residual and non-residual herbicides shall be used as needed to provide total vegetation control along fence lines. For the majority of the fence lines, a soil residual herbicide can be used. For fence line areas in or adjacent to wetlands, streams, and tidal flats, a herbicide registered for aquatic sites shall be used.

Turf weeds at MCBH Kaneohe Bay are primarily a concern at Klipper Golf Course where certified pesticide applicators maintenance staff schedule periodic applications for their control.

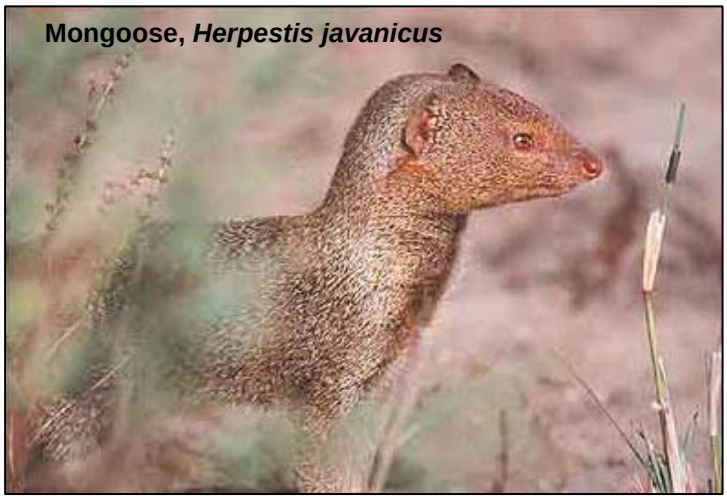
Vegetation growing along interior fence lines, around road signs, poles and other obstructions may be controlled with herbicides to facilitate mechanical control (weedwacking) efforts by labor personnel.

Control of vegetation on paved and graveled parking areas, transformer vaults, storage areas, and sidewalks is required to prevent damage to paved areas, maintain aesthetic values, and reduce fire hazards. The reduction of fire hazard is particularly important in the areas adjacent to and on the fuel breaks and bisecting unimproved roads on the Weapons range that protect the red footed booby population.

Residual herbicides will provide season long control of vegetation on paved and graveled areas. Care must be taken to prevent damage to valuable ornamental plants. For chemical control operations near any water site, only herbicides labeled for aquatic use may be used.

12.10 VERTEBRATE PEST CONTROL

TARGET PESTS:	Mongoose, feral cats, feral dogs, birds



12.10.1 SURVEILLANCE

TECHNIQUES:

- Sightings by base personnel;
- Customer complaints

RESPONSIBLE PARTY:

- MCBH Military Police
- Environmental Department (Natural Resources);
- Facilities pest control staff

ACTION THRESHOLD:

- Any confirmed damages or nuisance activity of these target vertebrate pests

NOTE: Military police have general purview over feral animals and mongoose on the installation; Natural Resources personnel have purview over all wildlife in the WMAs and the BASH program in the airfield; base pest control is responsible for controlling non-migratory, pest birds in all other areas.

12.10.2 NON-CHEMICAL CONTROL METHODS

METHOD	SITES	SCHEDULE	RESPONSIBLE PARTY
Cultural control: Improve sanitation (Limit accessibility to food and water.)	All office, institutional, industrial, recreational and housing areas.	Continous	Facilities Maintenance, Facilities pest control staff, and base residents
Mechanical control: Pest proofing (install screens and other pest exclusion devices such as bird barriers)	All administrative, institutional, industrial, and housing structures	Basewide policy or SOP As required	Facilities Maintenance, Facilities Pest Control staff; commercial pest control contractors
Mechanical control: Trapping (use of bird and animal traps)	All outdoor sites - around workplaces, recreational and housing areas; WMAs, airfield;	As needed	Military Police; MCBH Natural Resources personnel; Facilities Pest Control staff
Mechanical Control: Hand removal (Physical removal of animals or nesting areas)	Where birds nest such as trees, in and around buildings	As needed	Facilities Pest control personnel; MCBH Natural Resources personnel
Mechanical Control: Euthanasia (As permitted by USFWS and/or DLNR	Outdoor selected sites (WMAs, airfield)	As needed	Natural Resources personnel

METHOD	SITES	SCHEDULE	RESPONSIBLE PARTY
Physical Control: Sound and visual deterrents (Noisemakers and other deterrent devices such as firecrackers, recorded sounds, reflectors, and scarecrows)	Selective outdoor areas, airfield	As needed	Military police; Natural Resources personnel; Federal Conservation Law Enforcement Officer

12.10.3 CHEMICAL CONTROL

TYPES OF PESTICIDES USED AND METHODS OF APPLICATION:	Chemicals will be used only for bird management. Only repellents will be used.
SITES:	On and around buildings where people work or reside; not for use in WMAs or airfield
SENSITIVE AREAS:	N/A

12.10.4 AUTHORIZED PESTICIDES

COMMON NAME	TRADE NAME	EPA REG. #
Polybutene	Bird Repellent “4 The Birds II”	1621-17-56

12.10.5 REMARKS AND COMMENTS:

The management of vertebrate pests and wildlife at MCBH Kaneohe Bay is more than a pest control function and requires the involvement of several in-house agencies to ensure the safe and sound control of these animals. The provost marshal or military police have base-wide responsibilities over stray and wild animals but recognize the responsibilities of other agencies in managing wildlife in specific areas of the base. The Environmental Department’s natural resources staff has inherited the task of managing mongoose, feral cats, and migratory protected birds in the WMAs. The natural resources staff also provides technical oversight and expertise to the bird air-strike hazard (BASH) program at the airfield in order to minimize bird collisions with aircraft during landing and take-off. The staff, furthermore, assumes the responsibility of controlling wild pigs in Marine Corps Training Area Bellows (MCTAB). Various

techniques, including erecting physical barriers, trapping, and using noise makers are used in the control effort. As a last resort measure, natural resources personnel and USDA Wildlife Services employees involved with these projects are permitted by the U.S. Fish and Wildlife Service and Hawaii Department of Land and Natural Resources to carry and use rifles to shoot pestiferous and predatory animals and wildlife.

Introduced, non-migratory birds such as pigeons, sparrows and mynahs can become a nuisance if given the opportunity to nest in and around occupied buildings. Birds carry mites and other ectoparasites on their bodies and in their nests that will migrate and attack building occupants after the birds abandon their nest. The droppings left behind provide media for the growth of harmful spores that can cause respiratory related illnesses such as histoplasmosis and psittacosis in humans. Facilities maintenance and pest control personnel perform non-recurring services to control birds in the urban areas of base using traps, repellents and making building repairs. Licensed contractors specializing in bird control should install bird barriers such as bird netting and other physical barriers.

Alien or invasive plant and animal species will be fully addressed in an Integrated Natural Resources Management Plan (INRMP) and an Invasive Species Management Study (ISMS), in compliance with the Sikes Act Improvement Act (SAIA) and Executive Order 13112 on Invasive Control which are being developed by contract. The plans will cover invasive species control issues as well as how the various components of pest management may be integrated with other natural resource-related plan components at MCBH.

13. SIGNIFICANT INVASIVE SPECIES

In December 2002, the Environmental Dept contracted the preparation of a comprehensive invasive species study, Marine Corps Base Hawaii Invasive Species Management Study (MCBH ISMS), which assessed the available information on various invasive species invading MCBH-Kaneohe Bay, Marine Corps Training Area Bellows (MCTAB), MCBH Camp Smith and the Puuloa Training Facility. The study addressed critical information gaps and needs, and proposed a mix of recommended management actions to address the invasive species threatening MCBH. While the study provides general information on various invasive plants, aquatic, animal and invertebrate species, this plan is highlighting the most significant species of concern to MCBH. More extensive information can be obtained from the 2002 Study.

13.1 COCONUT HEART ROT

13.1.1 Background

This disease, known as “coconut heart rot”, is caused by the fungus *Phytophthora katsurae*. The pathogen was first identified in the 1970 by the University of Hawai‘i (UH) on Kaua‘i. The disease started on the windward side of the Islands with the loss of a few trees. There was no initial cause for alarm because it seemed to spread slowly and was attributed to the wetness of the location. However in the last few years, coconut palms have died in great numbers on the windward side despite the occurrence of unusual droughts.

The disease has become an epidemic in Kaua‘i, O‘ahu, Maui and the Big Island, and has shown the ability to survive on the leeward sides of the Islands, where daily irrigation combined with strong midday heat helps the fungus thrive.

Although it is not known how this fungus arrived in Hawai‘i, most scientists believe that it is spread by strong windblown rains, through insects, birds, and rats, or by pruning and planting infected trees. The infection is carried by a given agent (rain, insects, etc.) to the top of a nearby healthy tree where the fungus then moves down into the heart of the palm, producing a rot that slowly destroys the growing shoot and kills the tree.

Because coconut trees are very slow growing (about one foot per year), it is estimated that a highly prized 20 foot tree is about 20 years old. At $50 per foot of trunk, plus transportation, equipment (e.g., backhoe, crane), and labor charges, the cost to remove and replace a dead tree with another of similar stature could be as much as $3,000 or more. In some situations, accessibility may be a problem and replacing it may be impractical. Furthermore, trees of this size are in short supply or may be unavailable from many nurseries.

13.1.2 Symptoms

The first visible symptom of coconut heart rot is the death of the young center leaf, which turns brown and falls over. As the rot advances, other remaining fronds slowly droop and die. Eventually, the top of the tree falls off, leaving what looks like an abandoned pole. Another symptom is the appearance of a stem end rot on young developing nuts, which causes them to fall prematurely. Once external symptoms are displayed, the heart of the palm is already rotten and the tree can no longer be saved. If the infected tree is not immediately removed and properly disposed, the fungus can easily spread to neighboring palms.

13.1.3 Recommended Precautions

The following precautions are recommended to reduce risk from coconut heart rot:

- Never prune healthy trees if you suspect your tools (pruners, knives, etc.), equipment (chain saws, ladders or lifts, truck beds, etc.), or any other materials (hands, gloves, shoes, clothing, etc.) may have been contaminated with the fungus.
- Thoroughly wash, clean, or disinfect these items with a 20% solution of Clorox, or 70% Isopropyl rubbing alcohol to avoid spreading the disease.
- Once a dead tree has been cut down, it should be immediately buried, burned (fire permit may be required), or taken to the landfill.
- When hauling a diseased tree, it must be properly wrapped or covered to prevent any infected tissues or insects from spreading along the roadway, thereby causing new outbreaks in other locations.

13.2 COQUI FROG

13.2.1 Background

The coqui frog, *Eleutherodactylus coqui* Thomas (Anura: Leptodactylidae), was accidentally introduced into Hawai'i from Puerto Rico in about 1988. Since that time, coqui frog populations have increased dramatically. They are now present on the Big Island, Maui, Oahu, and Kauai. In its native environment the frog reaches a density of only about 40 frogs per 20 x 20 m area; however, on the Big Island, in the absence of any effective natural predators or competitors, densities can be as high as 200 frogs in the same

The coqui frog, *Eleutherodactylus Coqui* (Honolulu Star Bulletin)

sized area.

Coqui frogs are nocturnal, coming out at night to feed primarily on insects and spiders, but eating also snails and other small frogs. They also produce loud calls and mate at this time. They do not have a tadpole stage and therefore do not require a body of water to reproduce. The female lays eggs on damp moss or leaf litter, or inside a rolled or folded leaf, and the eggs are brooded by the male, who keeps them moist until they hatch. Researchers have estimated that in Hawaii one female frog may lay up to 1,400 eggs per year.

The frogs are probably spread through the transport of infested vegetation. During the day they favor moist protected areas, often hiding in the leaf axils of common ornamentals like dracaena, ginger and elephant ear.

Coqui frogs are not poisonous, but their loud can be a major nuisance to the public. Perhaps more importantly, coqui frogs pose a threat to Hawai'i's island ecosystem. Unlike the greenhouse frog, a similar non-native frog from the Caribbean, coqui frogs are tolerant of cooler temperatures and have the potential to move up into mid-elevation native forests (they have been found in areas up to 4,000 ft above sea level). In these areas it is likely that they will prey upon native insects and spiders. They may also compete with endemic birds and other native fauna that rely on insects for food. A large population of Coqui frogs may also facilitate the establishment of other invasive species, such as the brown tree snake, by providing a food source.

13.2.2 Identification

- Adults can grow up to 2 inches long.
- Color ranges from brown to gray-brown with variable patterns including a light mid-dorsal stripe, dorsal chevrons, dark suprascapular W's, or unicolor.
- Call consists of a two note, high pitched "Ko-Kee'".

Coqui frog (Colorado State University)

13.2.3 Recommended Precautions

- Accept plant material from nurseries and facilities certified to be free of invasive frogs (*Eleutherodactylus* tree frogs) (2004 MCBH ISMS 12.1.2).
- Educate personnel to recognize coqui frog calls.
- Report all coqui frog sightings or calls.

- Act quickly to eliminate new infestations.

13.2.4 Information

More detailed information on the coqui frog is provided by Hawaii Ecosystems At Risk (HEAR) at http://www.hear.org and by the University of Hawaii at http://www.ctahr.hawaii.edu/coqui/index.asp.

13.3 BROWN TREE SNAKE

13.3.1 Background

Brown treesnake head (US Geological Survey)

The brown treesnake, *Boiga irregularis*, was accidentally introduced on Guam sometime before 1950, probably hidden in ship cargo from the New Guinea area. By the late 1960's they had dispersed throughout the island. In the absence of natural population controls and with vulnerable prey on Guam, the snakes have now become an exceptionally common pest, causing major ecological and economic. It has been estimated that up to 13,000 snakes per square mile occur in some forested areas of Guam.

The brown treesnake reproduces by depositing up to 12 leathery-shelled eggs, perhaps as often as twice a year. The eggs are abandoned by the female in caves, hollow trees, or in other places where they hatch if adequately protected from drying and overheating. The young snakes are about 18 inches in length when they hatch about 90 days later, but they may reach lengths of 3 feet in about one year. Snakes are about 4 to 5 feet long and about 3 years old when they first reproduce.

The snake is an able climber and is most at home in trees and shrubs, where it forages at night to find lizards, birds, and mammals using its keen sense of smell and sensitive night vision. It frequently invades homes, commercial buildings, and other urban habitats in search of food and hiding spots. The brown treesnake uses a combination of constriction and mild venom injected from its rear fangs to subdue prey. They are typically aggressive when threatened and may inflict a painful bite, but bites are not known to be fatal to humans.

Brown treesnake in tree (Scott Vogt)

Any site that provides protection from bright light and high temperatures is a potential daytime retreat for brown treesnakes. For this reason, they are commonly transported

either as stowaways in aircraft or cargo, or in the wheel wells on aircraft. Between 1981 and 1998, nine brown tree snakes have been found or observed at airfields on O‘ahu. Brown tree snakes have not been found on MCBH properties.

This species poses perhaps the greatest biodiversity and economic threat to Hawai‘i, more than any other alien species, based on the impact it has had on Guam. It has virtually wiped out the native forest birds of Guam, and scientists fear that introduction and establishment of the snake in Hawaii would lead to similar results. The snakes also cause economic damage by causing power outages and damaging electrical lines (since 1978, more than 1200 power outages have been caused by snakes in Guam). Power interruptions cause a multitude of problems ranging from food spoilage to computer failures. These problems have caused enormous productivity and economic losses.

13.3.2 Identification

- Slender snakes with brownish or greenish coloring and cross-band markings.
- Large head in relation to the body.
- Distinctive vertical pupil.
- Adults can reach lengths of 8 feet or more and weigh up to 5 pounds.

13.3.3 Recommended Precautions (2004 MCBH ISMS 4.5.2.1.2)

- Ensure appropriate personnel keep up to date on brown tree snake issues in Hawaii and Guam as well as effective control methods.
- Increase inspections of flights from Guam to 100% by supplementing APHIS inspections with onbase inspectors.
- Place snake barrier fences and baited snake traps around hangars, and cargo storage areas.
- Place high-risk cargo in snake enclosure areas until it can be adequately disassembled, visually inspected, or fumigated.
- Record any brown tree snake interceptions in MCBH Environmental Database for future reference.

13.3.4 Information

More detailed information on the brown treesnake is provided in the following

references and websites: 2004 MCBH ISMS section 4.5.2 and appendix I; Hawaii Ecosystems At Risk (HEAR) http://www.hear.org; http://www.invasivespeciesinfo.gov; and the United States Geological Survey (USGS) http://www.mesc.usgs.gov/resources/education/bts/bts_home.asp.

13.4 IVY GOURD

13.4.1 Background

Ivy gourd, *Coccinia grandis*, first appeared in the Hawaiian Islands in 1969. In less than 20 years it became a major invasive weed in the islands, and it continues to spread throughout the state today. It is widespread on Oahu and the Big Island and has established small populations on Maui and Kauai.

Ivy gourd can reproduce sexually, producing fruits or "gourds" with many small flattened seeds, and it can spread vegetatively via pieces of roots, vines, or cuttings. Seeds are spread by many animals such as birds, rats, and pigs that eat the fruit. The plant or vine quickly grows over trees, vegetation, fences, or anything else in its path, forming a dense blanket. It remains green throughout the year, but will die back during dry conditions.

Ivy gourd is considered a noxious weed by the State of Hawaii. Its thick blankets suffocate and kill native trees and plants and other beneficial vegetation. It also covers fences, utility lines, and cultivated fields, and serves as a reservoir for fruit fly pests and other important field crop pests. Because it can grow back from cut pieces, a combination of mechanical and chemical control is required to manage ivy gourd. If the entire root of the vine cannot be removed, a systemic insecticide such as Roundup or Garlon must be applied to cut stems and stumps.

Ivy gourd, *Coccinia grandis* (hear.org)

Ivy gourd is established in certain areas of MCBH Kaneohe Bay, MCBH Camp Smith Headquarters, and the Manana Housing area.

13.4.2 Identification

- Climbing vine
- Heart shaped or pentagon shaped leaves up to 5 inches wide and long
- White, 2 inch star-shaped flowers

- Gourd shaped fruits1-2 inch long and red when mature

13.4.3 Recommended Precautions (2004 MCBH ISMS)

- Utilize the ISMS ivy gourd fact sheet to educate appropriate personnel about the plant's natural history and its control methodology.
- When feasible, use sterilized organic material and certified weed-free landscaping materials.
- Educate appropriate personnel and contractors about need for regular and frequent follow-up inspection of landscaping projects for weed invasions.
- Continue efforts to manage to existing infestations of ivy gourd
- Remove/treat new patches of ivy gourd where they occur

13.4.4 Information

More detailed information on ivy gourd is provided in the 2004 MCBH ISMS and by Hawaii Ecosystems At Risk (HEAR) at http://www.hear.org/ivygourd.

13.5 FOUNTAINGRASS

15.5.1 Background

Fountain grass, *Pennisetum setaceum*, has been introduced throughout the world because of its popularity as an ornamental plant and its readily dispersible seeds. It was first established on the leeward side of the Big Island of Hawaii in the early part of the 20th century, and is now present on all the major islands.

Fountain grass, *Pennisetum setaceum* (hear.org)

Fountain grass tends to grow in dry areas, but it has displayed the ability to adapt to Hawaii's broad range of habitats. It can live for many years, growing quickly and forming large stands that crowd out other plants. If the above ground portion of the plant is destroyed, fountain grass will resprout from the roots. Reproduction can occur regardless of seed fertilization, and seeds can remain viable in the soil for at least 7 years. The seeds are primarily

wind-dispersed, but may also be moved large distances by water, vehicles, livestock, birds, and humans. Fountain grass is adapted to fire, which means that fire stimulates its seeds to germinate and grow.

Fountain grass is classified as noxious weed by the State of Hawaii, and is considered to be one of the most disruptive invasive plants in the state. It is a poor pasture grass and a serious weed in many dry habitats. It greatly increases fuel loads, which increases the intensity and spread of a fire. It is thought to promote the spread of fire more than any other grass in the Hawaiian Islands. In Hawaii, most native plants are not adapted to frequent fires. The increased frequency of fires in areas infested with fountain grass causes the native (and even other non-native) plants to die out and be replaced by more fountain grass.

Fountain grass can be controlled with herbicide and/or manual removal. Small clumps may be managed by uprooting plants and removing the plumes from the area (put them in plastic bags so as to prevent seeds from falling off and dispose of bags in manner that seeds will not remain viable). Removal by hand may need to be repeated several times per year. Extensive infestations of fountain grass are probably best controlled with a combination of manual removal and use of herbicides with systemic activity.

Fountain grass is not well established on Oahu, and there is an ongoing effort to eradicate it from the island. The only MCBH Property currently known to have fountain grass is Marine Corps Training Area – Bellows (MCTAB). The incipient population here has been controlled through periodic sweeps by an interagency team comprised of MCBH, National Guard, and Air Force environmental staff and Oahu Invasive Species Committee staff, to identify and remove when discovered (by mechanical and/or chemical means). Extra vigilance is also taken to review any ground disturbance plans at MCTAB to ensure controls are built into the plan to discourage the spread of fountain grass.

13.5.2 Identification

- Coarse grass in a dense clump usually from 1 to 5 ft tall.
- Produces feathery pink or purple plumes that contain the flowers and seeds.

13.5.3 Recommended Precautions

- Utilize the ISMS fountain grass fact sheet to educate appropriate personnel about the plant's natural history and its control methodology.
- When feasible, use sterilized organic material and certified weed-free landscaping materials.
- Educate appropriate personnel and contractors about need for regular and frequent follow-up inspection of landscaping projects for weed invasions.

- Continue annual control of fountain grass throughout areas where it exists.
- Remove/treat new patches of fountain grass where they occur.

13.5.4 Information

More detailed information on ivy gourd is provided in the 2004 MCBH ISMS and by Hawaii Ecosystems At Risk (HEAR) at http://www.hear.org/species/pennisetum_setaceum.

13.6 RED IMPORTED FIRE ANT

13.6.1 Background

The red imported fire ant (RIFA), *Solenopsis invicta*, is an extremely destructive, highly invasive stinging ant that has so far proven to be impossible to eradicate once established. It was first introduced to the United States in the 1930s, and has since invaded over 300 million acres across the southern U.S. despite federal quarantine measures. This ant has not yet become established in Hawaii; however, it has recently spread to California. With the enormous quantity of cargo, and people, arriving in Hawaii from California, there is significant risk of this ant becoming the next major pest invasion in Hawaii.

Red imported fire ant workers (USDA APHIS)

RIFA colonies are composed primarily of reddish brown workers ranging in size from about 3 to 6 mm in length. They closely resemble some other common ant species in Hawaii, however, they may be easily distinguished by their nest mounds. Mounds are typically, but not always, dome shaped and never have a central opening. Mounds are often situated in open sunny areas, and depending on soil type, they can reach up to two feet in width and height. Colonies are extremely productive, growing rapidly and achieving large densities in a relatively short period of time. Workers are armed with a powerful sting, which they use both for defense and to subdue prey. Stings are painful, and usually a victim will incur multiple stings.

Red imported fire ant mounds (USDA APHIS)

Solenopsis invicta would likely do very well in Hawaii due to the mild climate and prevalence of disturbed habitats (including range and agriculture lands). If it were to become established here, it would probably have serious negative effects in all sectors, affecting public health, tourism, agriculture and livestock industries, and natural ecosystems. The ISMS states, "The red imported fire ant is perhaps the key species to prevent from establishing in Hawai'i, if at all possible."

13.6.2 Identification

- RIFA are reddish brown, usually with a shiny opaque black abdomen.
- Worker size varies widely, even within the same nest, ranging from 1/8 to 1/4 inch. Head size is always in proportion to body size - no large headed workers.
- Mounds have no visible opening. Mounds often appear dome or cone shaped; are often built in open sunny areas; are sometimes built against a wall, post or shrub; and, do not have areas around them that have be en denuded of vegetation.
- Unlike other ants, when a nest mound is disturbed, RIFA rapidly swarm out over their mound and climb up onto (and sting) anything nearby. This is unique to RIFA.
- Stings result in formation of a white pustule within 24 hours, which lasts for several days.

There is a similar looking fire ant species, *Solenopsis geminata,* that also inflicts a painful sting and is common in dry areas of Hawaii. It can be distinguished from RIFA by the following characteristics: 1) it may form small dirt piles, but it never builds mounds, 2) Some workers in the colony are large-headed, and 3) colonies are much less aggressive, inflicting usually only a few stings.

13.6.3 Recommended Precautions (2004 MCBH ISMS Chapter 9)

- Educate appropriate personnel in insect (RIFA) identification.
- Ensure SOPs are rigorously enforced to clean equipment before bringing on base from offisland.
- Ensure thorough inspections of all cargo and materials arriving from off-island.
- Treat insect-contaminated cargo, shipments, equipment, etc. with appropriate pesticides or control methods if ants are found.

- Conduct inspections (by a qualified entomologist) and update MCBH insect species list every 5 years to coordinate with INRMP updates.

13.6.4 Information

More detailed information on the RIFA is provided in Chapter 9 of the 2004 MCBH ISMS, by Hawaii Ecosystems At Risk (HEAR) at http://www.hear.org/AlienSpeciesInHawaii/ants/ and at http://www.hear.org/AlienSpeciesInHawaii/species/solenopsis_invicta/, and by the Hawaiian Ant Group (HAG) at http://hbs.bishopmuseum.org/ants/.

13.7 WEST NILE VIRUS

13.7.1 Background

West Nile Virus (WNV) has been historically limited to Africa, Southern Europe, and Asia. In 1999 the disease arrived in the U.S., with the first documented case in New York. By the end of 2003 it had been identified in 46 states and the District of Columbia. There have been no documented cases of WNV in Hawaii, however due to its rapid dissemination throughout the U.S., there is a heightened awareness of the possibility that it may enter the state. All three species of *Aedes* in Hawaii (*A. aegypti*, *A. albopictus*, *and A. vexans*) and *C. quinquefasciatus* are potential vectors for WNV.

Like other encephalitis viruses, humans are dead end hosts for WNV, and birds are the primary reservoir; therefore, this virus can only enter the state by way of an infected bird or mosquito. The virus has been shown to affect 162 species of birds, and dead birds are good indicators of WNV activity. Mortality in a wide variety of bird species has been an effective tracking mechanism of WNV activity as it has spread across the U.S. from coast to coast. Of particular concern in Hawaii are the islands' rare bird species that could be very susceptible to the disease.

Surveillance of mosquito populations is an important aspect of WNV prevention and early detection. Adult mosquito abundance is a key factor contributing to the risk of disease transmission. Monitoring the abundance of adult mosquito populations provides important information on the size of the vector population as it responds to changing climatic factors and mosquito control activities. The Preventive Medicine Department of the Installation Branch Medical Clinic has primary responsibility for adult mosquito surveillance at MCBH.

Aedes mosquito (CDC)

13.7.2 Identification

- Dead Bird Surveillance

  The most sensitive early detection system for WNV is the presence of dead or dying birds. The timely reporting of dead bird sightings and the submission of dead birds for WNV testing is critical because WNV-positive dead birds may provide the earliest indication of WNV activity in Hawaii.

- Adult Mosquito Surveillance

  Adult mosquito collections can be screened for the presence of WNV. This can be done with a variety of trapping techniques such as gravid and/or light traps.

13.7.3 Recommended Precautions

- Ensure military personnel are educated about WNV and dead bird reporting.

- Bag all conspicuous dying or dead birds that have succumbed within 24 hours and take them either to the Humane Society (2700 Waialae Ave., Honolulu, Hawaii 96826, Phone: 946-2187) or directly to the Halawa facility of the State Vector Control Branch (99-945 Halawa Valley Street, Aiea, HI 96701, Phone: 586-4700, Fax: 483-2545) for WNV testing. Specimens that cannot be taken in immediately should be frozen until transportation is available.

- Install mosquito traps (e.g. gravid traps, light traps, etc) around air terminal and other docking facilities and monitor frequently.

- Deliver samples of adult mosquitoes to the Halawa facility of the State Vector Control Branch on a regular basis for WNV screening.

- Conduct mosquito control programs, using chemical, mechanical, and biological control methods, as appropriate (see section 13.8 of this plan).

13.7.4 Information

More detailed information on the mosquitoes and WNV is provided in Chapter 9 of the 2004 MCBH ISMS**,** by Hawaii Ecosystems At Risk (HEAR) at http://www.hear.org/species/westnilevirus/, and by the Centers for Disease Control (CDC) at http://www.cdc.gov/ncidod/dvbid/westnile/index.htm.

APPENDIX 9-1

Annual Facility Inspection Checklist

<reserved for future use>

APPENDIX 10-1

Industrial and Commercial Site Inspection Sheet
<*reserved for future use*>

APPENDIX 10-2

Prioritized Area Plan for Industrial and Commercial Inspections
<*reserved for future use*>

APPENDIX 11-1

SIC Codes for Industrial Facilities Requiring Permit Coverage

Standard Industrial Classification (SIC) Codes for Industrial Facilities Requiring Permit Coverage

Hawaii Administrative Rules (HAR) Chapter 11-55 Appendix B authorizes storm water discharges associated with industrial activities from the following facilities:

1. *Facilities Subject to Storm Water Effluent Limitations Guidelines*: Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N (except facilities with toxic pollutant effluent standards that are exempted under category (i) to (ix) and (xi) of this definition). The categories of facilities specified in 40 CFR Subchapter N currently are: Cement Manufacturing (40 CFR 411), Feedlots (40 CFR 412), Fertilizer Manufacturing (40 CFR 418), Petroleum Refining (40 CFR 419), Phosphate Manufacturing (40 CFR 422), Steam Electric (40 CFR 423), Coal Mining (40 CFR 434), Mineral Mining and Processing (40 CFR 436), Ore Mining and Dressing (40 CFR 440), and Asphalt Emulation (40 CFR 443).

2. *Manufacturing Facilities*: Standard Industrial Classifications (SICs) 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3441, and 373.

3. *Oil and Gas/Mining Facilities:* SICs 10 through 14 including active or inactive mining operations and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with any overburden, raw material, intermediate products, finished products, by-products or waste products.

4. *Hazardous Waste Treatment, Storage, or Disposal Facilities:* Includes those operating under interim status or a permit under Subtitle C of the Resource Conservation and Recovery Act (RCRA).

5. *Landfills, Land Application Sites, and Open Dumps*: Sites that receive or have received industrial waste from any facilities described in this subsection, sites subject to regulation under Subtitle D of RCRA.

6. *Recycling Facilities:* SICs 5015 and 5093. These codes include metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as:

   SIC 5015 - Motor Vehicle Parts, Used

   SIC 5093 - Scrap and Waste Materials

7. *Steam Electric Power Generating Facilities*: Includes coal handling sites.

8. *Transportation Facilities:* SICs 40, 41, 42 (except 4221-25), 43, 44, 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, equipment cleaning operations, airport deicing operations, and lubrication) or other operations identified herein that are associated with industrial activity.

9. *Sewage or Wastewater Treatment Works:* Treatment works treating domestic sewage or any other sewage sludge; or wastewater treatment device or system used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of one million gallons per day or more, or required to have an approved pretreatment program under 40 CFR Part 403. Not included are farm lands, domestic gardens, or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with Section 405 of the CWA.

10. *Manufacturing Facilities Where Materials are Exposed to Storm Water:* SICs 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31, (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, and 42.25.

APPENDIX 11-2

STORM WATER POLLUTION CONTROL PLANS:

- List of Industrial Facilities
- Marine Corps Base Hawaii Industrial Facilities and Base Drainage Map
- Storm Water Pollution Control Plans
  February 2016

Table 11-2-1 displays the order in which the Storm Water Pollution Control Plans are organized in this appendix.

Table 11-2-1 Industrial Facilities at MCB Hawaii

No.	Building No.	General Category	Description
1	101	Maintenance	Maintenance Hangar
2	102	Maintenance	Maintenance Hangar
3	103	Maintenance	Maintenance Hangar
4	104	Maintenance	Maintenance Hangar
5	105	Maintenance	Maintenance Hangar
6	132		Recycle Center
7	129	Maintenance	Small Boat Repair Shop
8	351	Maintenance	Vehicle Maintenance Shop
9	373	Maintenance	Motor Vehicle Maintenance Shop
10	375	Maintenance	Aircraft Maintenance
11	1170, 1171	POL Storage	Aircraft Fuel Islands
12	1252, 1253	Storage	Fuel Division Supply Department
13	1304	Operations	Ordnance Operations
14	1388	Maintenance	Lab/Boat Shop
15	1619	Maintenance	Ground Support Equipment Shop
16	1631	Maintenance	Aircraft Wash & Rinse Facility
17	5069	Maintenance	Corrosion Control Facility
18	6025	Storage	Liquid Oxygen/Nitrogen Facility
19	6107	Maintenance	Aircraft Rinse Facility
20	6182	Storage	Fuel Delivery Branch and Refueler Truck Parking
21	6183	Maintenance	Engine Test Facility
22	6479	Storage	Aircraft Ready Fuel Storage
23	Sanitary Landfill	Sanitary Landfill	Sanitary Landfill
24	WWTP	Utility	Water Reclamation Facility
25	Parking Apron	Storage	Aircraft Parking Apron

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

MAINTENANCE HANGAR (BUILDING 101)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
FOD	foreign object debris
HazMin	Hazardous Materials Minimization
HMLA	Marine Light Attack Helicopter
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SAS	Satellite Accumulation Site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Maintenance Hangar, Building 101

Maintenance Hangar (Building 101), or Hangar 101, is located within MCB Hawaii, Kaneohe Bay on 1st Street near Kaneohe Bay. The facility encompasses roughly 14.5 acres and can be found in grid H18 of the MCB Hawaii Base Map, Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

The hangar is divided into two separate areas: the "Street Side" that is near 1st Street and the "Bay Side" that is near Taxiway B and Kaneohe Bay. The "Street Side" of the hangar is utilized by Marine Light Attack Helicopter (HMLA) Squadron 367. The Bay Side is usually empty and only used as needed by HMLA 367.

Tenants	Hazardous Materials Coordinators:
HMLA Squadron 367	Capt. Jacob Ashbolt SSgt Zimdahl (808-257-2543)

HMLA 367 performs major aircraft maintenance, including painting and wet sanding, inside the hangar. Minor work, including top off of fluids and replacement of small parts, is performed outside the hangar as needed. All significant materials are procured through the MCB Hawaii Hazardous Materials Minimization (HazMin) Center.

Several small buildings are located adjacent to the Street Side of Hangar 101. Located near the northwest corner of the hangar, Building 194 is of concrete construction and is used for significant hazardous material storage. It is kept locked at all times, and opened only with supervision. A portion of Building 194 is designated the Satellite Accumulation Site (SAS) for used hazardous wastes, including batteries. There is additional hazardous waste storage (fuel samples and spent batteries) within lockers against the outside of Building 194. Spill kits are available throughout the hangar and outside Building 194.

In general, hangar floors are cleaned at the beginning and end of each day. Drip pans are used to capture and contain spilled liquids inside the hangar only; monitoring for leaks is continuously conducted during work outside. Material spills onto the floor are contained and cleaned using spill absorbent materials from one of several designated spill kits. Foreign object debris (FOD) walks are conducted every morning; however, no street sweeping is conducted.

The area surrounding Hangar 101 has a moderate to flat slope. Storm water runoff on the east, west, and south sides of the hangar sheet flows southerly over the concrete surface toward Kaneohe Bay. Storm water runoff on the north side of the hangar flows northerly over the asphalt surface toward 1st Street, where it enters a catch basin that eventually discharges to Kaneohe Bay through Outfall 017. The concrete and asphalt pavements immediately surrounding the hangar are generally in good condition.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Hangar 101:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides through the hangar doors and in areas near the various material storage sheds.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are stored indoors on shelves, in hazardous materials storage lockers, or on spill pallets. Double-bagged oily rags and other wastes are collected at the SAS before being sent to the MCB Hawaii HazMin Center for disposal.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Hangar 101 include loading and unloading of materials, minor maintenance such as incidental fueling and other fluid changes as needed, and helicopter parking.

D. Significant Materials Inventory

The following significant materials are located at Hangar 101:

- Used Oil
- Polish
- Hydraulic Fluid
- Lubricating Oil
- Transmission Oil
- Jet Fuel
- Batteries
- Grease
- Hand Cleaner
- Paint Thinner
- Solvents
- Paint (new and used)
- Alodine (Corrosion Treatment)

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 101 if not properly managed:

- Jet Fuel
- Hydraulic Fluid
- Transmission Oil

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 101 employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 101 are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the SAS are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 101 have been identified as having a high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Hangar 101 are shown in Table 2-1.

Modifications to the existing BMPs at Hangar 101 are listed in Table 2-2.

New BMPs for implementation at Hangar 101 are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Containers of absorbent material and containment booms are readily available at the facility during fueling operations.
035	Park Vehicles on an Impervious Surface	Vehicle and helicopters are parked on impervious asphalt and concrete surfaces.
042	Use Drip Pans under Leaking Equipment	Drip pans are used under helicopters and equipment indoors as necessary to catch leaks.
044	Conduct Maintenance within a Building or Covered Area	Major aircraft repair and maintenance work is conducted inside the facility.
057	Store Liquids and Significant materials within a Building or Covered Area	The majority of significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill containment pallets or in hazardous material storage lockers.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
057	Store Liquids and Significant materials within a Building or Covered Area	Conduct as much minor maintenance as possible inside the hangar. Move two flammable lockers outside Building 194 indoors.	NS	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Weekly technical training topics also include disposal, spill cleanup, etc. In addition, spill drills are conducted monthly.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

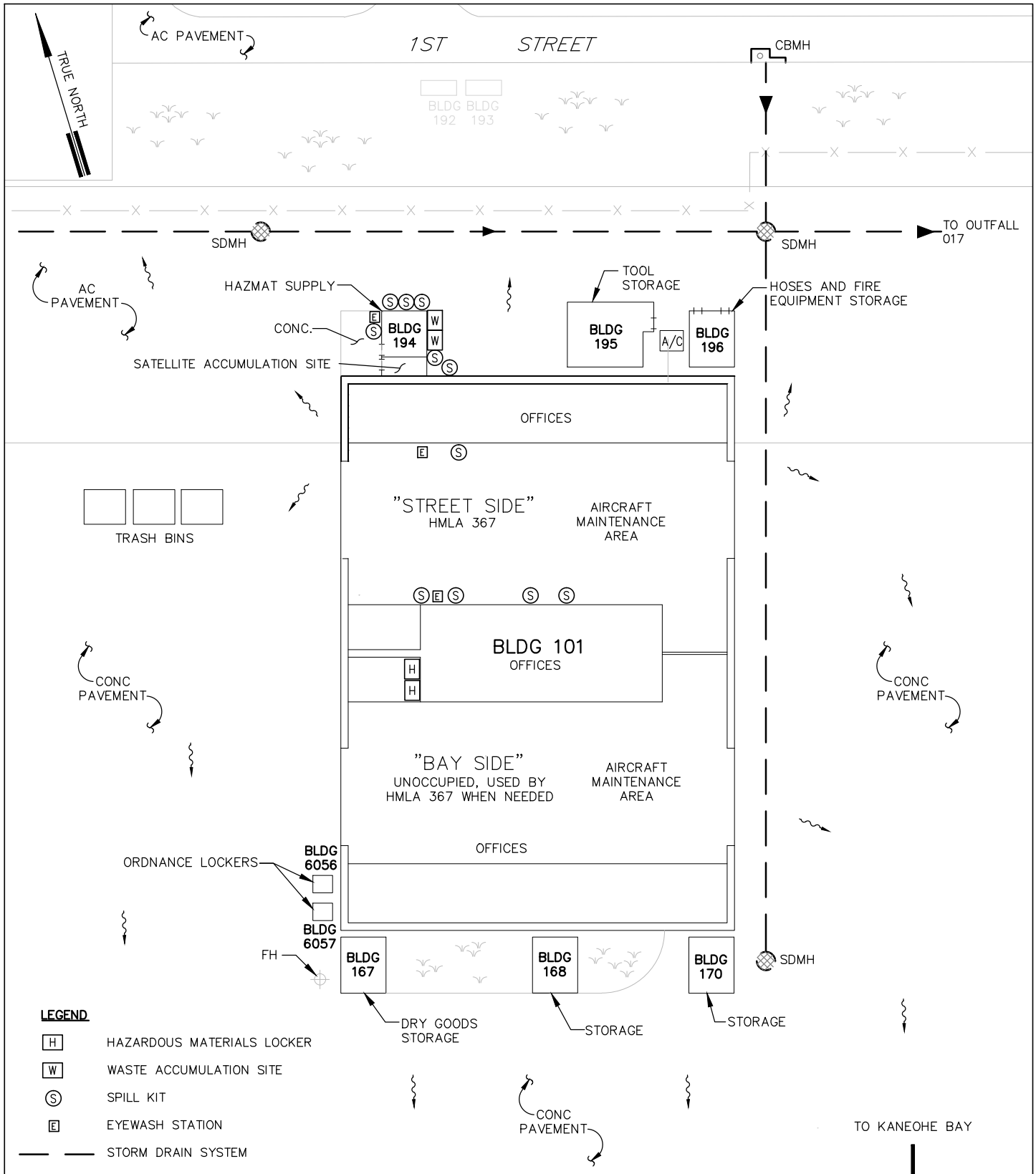
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 101.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- FLOW ARROW

MAINTENANCE HANGAR (BUILDING 101)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 14.5 ACRES, ASSOCIATED WITH BUILDING 101 DISCHARGES TO KANEOHE BAY AS SURFACE RUNOPFF AND VIA OUTFALL 017.
2. A REPRESENTATIVE SAMPLING POINT FOR ALL FIVE (5) MAINTENANCE HANGARS IS LOCATED AT GRATED INLET (105-2), NEAR MAINTENANCE HANGAR 105.
3. UNLESS NOTED OTHERWISE, FLOORS INSIDE HANGAR 101 ARE CONCRETE.
4. A CONC. CURB IS LOCATED ALONG THE KANEOHE BAY SIDE OF THE CONC. PAVEMENT. METAL GATES CAN BE INSERTED INTO CURB CUTS TO PREVENT POLLUTANTS FROM REACHING THE BAY IN THE EVENT OF A SPILL.

DATE:	PROJECT TITLE:
FEB 2016	STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
FIGURE TITLE: MAINTENANCE HANGAR (BUILDING 101)	FIGURE NO.: 2-1

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STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

MAINTENANCE HANGAR (BUILDING 102)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
EMU	Experimental Military Unit
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
HMH	Heavy Marine Helicopter
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SAS	Satellite Accumulation Site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Maintenance Hangar, Building 102

Maintenance Hangar (Building 102), or Hangar 102, is located within MCB Hawaii, Kaneohe Bay on 1st Street near Kaneohe Bay. The facility encompasses roughly 13.0 acres and can be found in grid H18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

The hangar is divided into two separate areas: the "Street Side" that is near 1st Street and the "Bay Side" that is near Taxiway B and Kaneohe Bay. The hangar is shared by Heavy Marine Helicopter (HMH) Squadrons 463 and the EMU (Experimental Military Unit) 3; the EMU 3 Unit is located on the Street Side and Squadron 463 is located on the Bay Side. The Street Side of Hangar 102 is occupied by non-permanent contracted units and changes occupancy, as needed.

The area surrounding Maintenance Hangar 102 has a moderate to flat slope. Storm water runoff on the east, west, and south sides of the hangar flows via sheet flow southerly toward Kaneohe Bay. Storm water runoff on the north side of the hangar flows northerly toward 1st Street where it enters a catch basin that eventually discharges to Kaneohe Bay through Outfall 017. The concrete and asphalt pavements immediately surrounding the hangar are generally in good condition.

2.1 Maintenance Hangar, Building 102 – Bay Side

Tenants	Hazardous Materials Coordinators:
HMH Squadron 463	Capt. Schatz Sgt. Skaggs (808-257-9967) SSgt. Rebenstorft

HMH 463 performs occasional major aircraft maintenance within the hangar. Minor work such as top off of fluids and replacement of small parts is performed outside of the hangar. However, any type of maintenance work can be performed outdoors, as needed, due to special constraints. All significant materials are procured through the MCB Hawaii Hazardous Materials Minimization (HazMin) Center.

Several small buildings are located adjacent to the Bay Side of Hangar 102. Located near the southwest corner of the hangar, Building 162 is of concrete construction and is used for significant hazardous material storage. It is kept locked at all times, and opened only with supervision. Materials are stored on shelves, spill containment pallets, or within sheet metal containment pans. A portion of Building 162 is designated the Satellite Accumulation Site (SAS) for used hazardous materials. Used batteries and cleaning supplies are stored within separate flammable lockers within the hangar. Spill kits are available throughout the hangar and outside Building 162, and are regularly inventoried. Fuel flammable lockers are stored outside of Building 162 without any covering.

In general, hangar floors are cleaned with mops and buckets. No cleaning by hosing out of the bays is performed. Drip pans are used to capture and contain spilled liquids. Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. The floors are cleaned with a Zamboni floor cleaning machine, as needed.

2.1.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Hangar 102 Bay Side:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides near the hangar doors and in areas near the material storage sheds.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are stored indoors on shelves, in hazardous materials storage lockers, or on spill pallets. Double-bagged oily rags and other wastes are collected at the SAS before being sent to the MCB Hawaii HazMin Center for disposal.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Hangar 102 Bay Side include loading and unloading of materials, maintenance, and helicopter parking.

D. Significant Materials Inventory

The following significant materials are located at Hangar 102 Bay Side:

- Used Oil
- Polish
- Hydraulic Fluid
- Lubricating Oil
- Transmission Oil
- Jet Fuel
- Batteries
- Grease
- Hand Cleaner
- Paint Thinner
- Solvents
- Paint (new and used)
- Alodine (Corrosion Treatment)

2.1.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 102 Bay Side if not properly managed:

- Used Oil
- Polish
- Hydraulic Fluid
- Lubricating Oil
- Transmission Oil
- Jet Fuel
- Grease
- Solvents
- Paint (new and used)
- Alodine (Corrosion Treatment)

Materials that have <u>*not*</u> been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a

significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.1.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 102 Bay Side employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 102 Bay Side are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the SAS are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 102 Bay Side have been identified as having a high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Hangar 102 Bay Side are shown in Table 2-1.

Modifications to the existing BMPs at Hangar 102 Bay Side are listed in Table 2-2.

New BMPs for implementation at Hangar 102 Bay Side are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Absorbent material and containment booms are readily available at the facility during fueling operations.
034	Park Vehicles or Equipment Indoors or under a Roof	All helicopters or equipment are stored inside the facility when not in use.
035	Park Vehicles on an Impervious Surface	Vehicle and helicopters are parked on impervious asphalt and concrete surfaces.
042	Use Drip Pans under Leaking Equipment	Drip pans are used under helicopters as necessary to catch leaks.
044	Conduct Maintenance within a Building or Covered Area	Major helicopter repair and maintenance work are conducted inside the facility.
057	Store Liquids and Significant Materials within a Building or Covered Area	The majority of significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

Notes:
(1) NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
044	Conduct Maintenance within a Building or Covered Area	Conduct as much minor maintenance as possible inside the hangar. Store mops and mop buckets outside Building 162 indoors.	NS	2016
057	Store Liquids and Significant materials within a Building or Covered Area	Move flammable lockers outside Building 162 indoors.	NS	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.1.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Training may also include SAS management. In addition, spill drills are conducted monthly, and as frequently as weekly during inspections.

2.1.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 102(Bay Side).

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

2.2 Maintenance Hangar, Building 102 – Street Side

Tenants	Hazardous Materials Coordinators:
Unit EMU 3	Whitney Washburn (808-257-3247)

Unit EMU 3 is a contracted entity that stores fixed wing marine unmanned aircraft within the hangar. No aircraft is flown on base; aircraft are only flown at Barbers Point and occasionally at Wheeler Army Airfield. No maintenance work is performed outside of the hangar. All significant materials are procured through the MCB HazMin Center.

A portion of Hangar 102 Street Site at the northeast corner is designated the SAS for used hazardous materials, including batteries. Spill kits are available throughout the hangar.

Major cleaning of the hangars concrete floors is not performed. Drip pans are used to capture and contain spilled liquids. Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. The floors are cleaned with a Zamboni floor cleaning machine, as needed.

2.2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Hangar 102 Street Side:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides near the hangar doors and in areas near the material storage sheds.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are stored indoors on shelves, in hazardous materials storage lockers, or on spill pallets. Double-bagged oily rags and other wastes are collected at the SAS before being sent to the MCB Hawaii HazMin Center for disposal.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. No outdoor maintenance activities are conducted at Hangar 102 Street Side.

D. Significant Materials Inventory

The following significant materials are located at Hangar 102 Street Side:

- Aviation Fuel
- Engine Oil
- Hydraulic Fluid
- Batteries

2.2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 102 Street Side, since no maintenance work is conducted outside.

2.2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 102 Street Side employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 102 Street Side are included in Tables 2-5 through 2-7.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay EQA program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-5 through 2-7 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the SPCC Plan and/or O&HS SCP will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 102 Street Side have been identified as having a high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Hangar 102 Street Side are shown in Table 2-5.

Modifications to the existing BMPs at Hangar 102 Street Side are listed in Table 2-6.

New BMPs for implementation at Hangar 102 Street Side are listed in Table 2-7.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-5 to 2-7 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-5 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Absorbent material and containment booms are readily available at the facility during fueling operations.
034	Park Vehicles or Equipment Indoors or Under a Roof	All aircraft or equipment is stored inside the facility when not in use.
035	Park Vehicles on an Impervious Surface	Vehicle and aircraft are parked on impervious asphalt and concrete surfaces.
042	Use Drip Pans Under Leaking Equipment	Drip pans are used under aircraft as necessary to catch leaks.
044	Conduct Maintenance Within a Building or Covered Area	Major aircraft repair and maintenance are conducted inside the facility. Conduct as much minor maintenance as possible inside the hangar.
057	Store Liquids and Significant materials Within a Building or Covered Area	All significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

TABLE 2-6 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[(1)]	Implementation Schedule
044	Conduct Maintenance Within a Building or Covered Area	Conduct as much minor maintenance as possible inside the hangar.	NS	2016

TABLE 2-7 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[(1)]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[(1)] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.2.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. In addition, spill drills are conducted quarterly.

2.2.5 Record of Past Spills or Leaks of Hazardous Pollutants

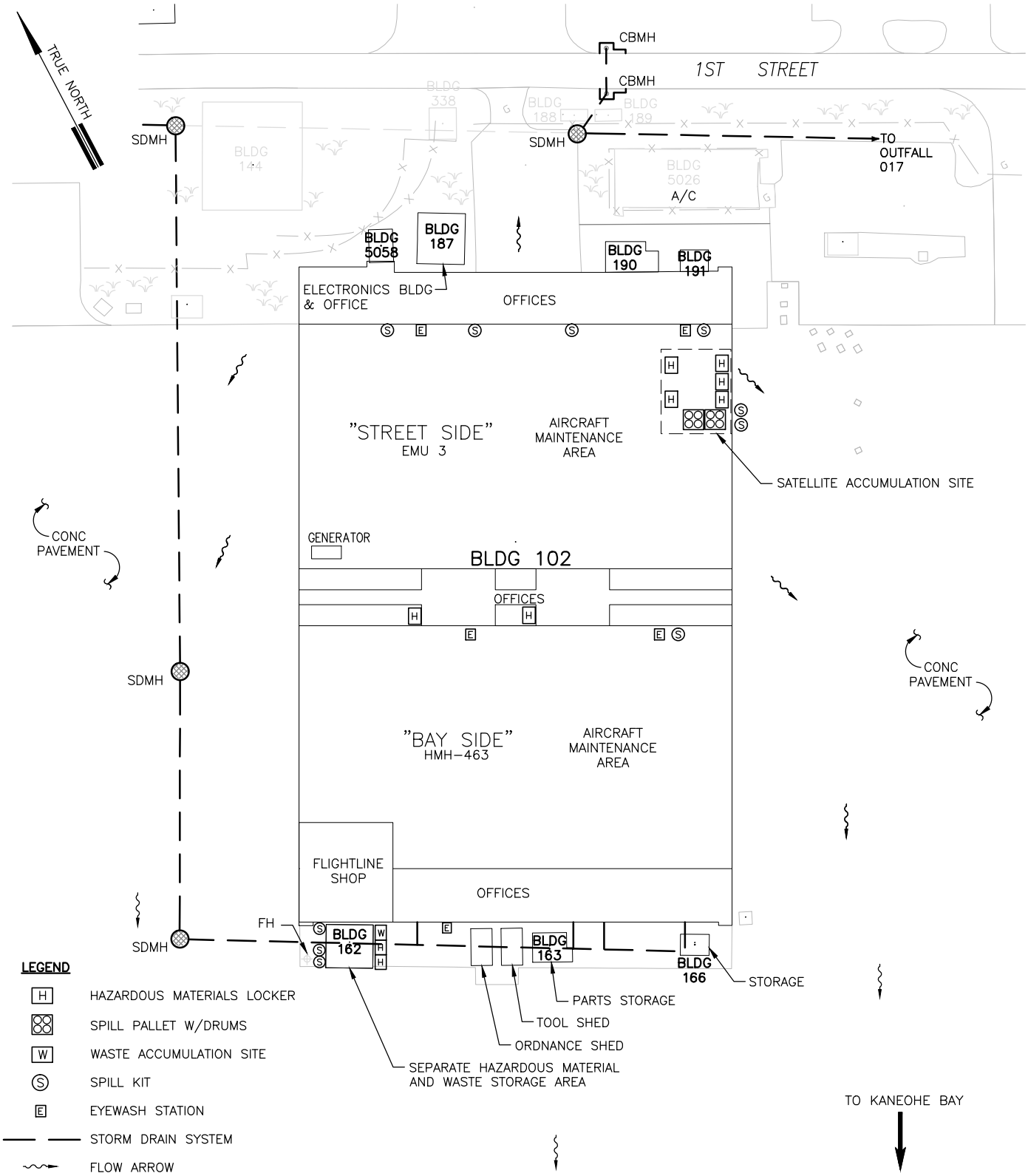
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-8. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 102(Street Side).

TABLE 2-8 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- FLOW ARROW

NOTES:

1. STORM WATER, FROM APPROXIMATELY 13.0 ACRES, ASSOCIATED WITH BUILDING 102 DISCHARGES TO KANEOHE BAY VIA SURFACE RUNOFF AND OUTFALL 017.
2. A REPRESENTATIVE SAMPLING POINT FOR ALL FIVE (5) MAINTENANCE HANGARS IS LOCATED AT GRATED INLET 105-2, NEAR MAINTENANCE HANGAR 105.
3. UNLESS NOTED OTHERWISE, FLOORS INSIDE HANGAR 102 ARE CONCRETE.
4. A CONC. CURB IS LOCATED ALONG THE KANEOHE BAY SIDE OF THE CONC. PAVEMENT. METAL GATES CAN BE INSERTED INTO CURB CUTS TO PREVENT POLLUTANTS FROM REACHING THE BAY IN THE EVENT OF A SPILL.

MAINTENANCE HANGAR (BUILDING 102)

NOT TO SCALE

DATE:	PROJECT TITLE:
FEB 2016	STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
FIGURE TITLE: MAINTENANCE HANGAR (BUILDING 102)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

MAINTENANCE HANGAR (BUILDING 103)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

ATAC	Airborne Tactical Advantage Company
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
FOD	Foreign Object Debris
HazMin	Hazardous Materials Minimization
HSM	Helicopter Maritime Strike
MALS	Marine Aviation Logistics Squadron
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
OWS	oil/water separator
POC	Point of Contact
SAS	Satellite Accumulation Site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Maintenance Hangar, Building 103

Maintenance Hangar (Building 103), or Hangar 103, is located within MCB Hawaii, Kaneohe Bay on 1st Street near Kaneohe Bay. The facility encompasses roughly 11.3 acres and can be found in grid H19 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

The hangar is divided into two separate areas: the "Street Side" adjacent to 1st Street, and the "Bay-Side" near Taxiway B and Kaneohe Bay. The Hangar is shared by Helicopter Maritime Strike (HSM) Squadron 37 and Airborne Tactical Advantage Company (ATAC), which was contracted by Marine Aviation Logistics Squadron (MALS) 24; HSM 37 is located on the Street Side and MALS 24 is located on the Bay Side.

Wastes are stored at a Satellite Accumulation Site (SAS) within a prefabricated metal hazardous materials storage shed located outside the eastern side of the hangar. The shed has integral secondary containment and no numerical designation.

The area surrounding Hangar 103 has a moderate to flat slope. Storm water runoff on the east, west, and south sides of the hangar sheet flow on the concrete pavement southerly to a curb adjacent to Kaneohe Bay, with curb cuts that allow runoff to discharge into the Bay. Storm water runoff on the north side of the hangar flows northerly toward 1st Street where it enters catch basins that discharge to Kaneohe Bay through Outfall 017. The concrete and asphalt pavements immediately surrounding the hangar are generally in good condition.

Trench drains are installed along the east and west sides within Maintenance Hangar 103. Liquids from the interior floors of the hangar are captured by the trench drains, conveyed to sumps on either side, and then pumped to an aboveground oil/water separator (OWS) within concrete containment, located near the northwest corner of the hangar. Effluent from the OWS is discharged by gravity to the MCB Hawaii sanitary sewer system. The OWS structure is a double-walled tank with interstitial leak detection.

2.1 Maintenance Hangar, Building 103 – Street Side

Tenants	Hazardous Materials Coordinators:
HSM Squadron 37	AM2 Ater (808-257-0107)

The Street Side of Hangar 103 is occupied by HSM Squadron 37. HSM 37 day and night crews perform major helicopter maintenance, including degreasing activities, within the hangar. Minor work such as fluids top off and replacement of small parts is performed outside of the hangar. All significant materials are procured through the MCB Hawaii Hazardous Materials Minimization (HazMin) Center. Significant materials are segregated and stored in hazardous materials lockers in the tool room located at the north side of Hangar 103 Street Side. Additional hazardous materials, including batteries, are kept in hazardous materials storage lockers within the hangar.

Drip pans are used to capture and contain liquids under the helicopters within the hangar; however, due to safety reasons of becoming Foreign Object Debris (FOD) cannot be used outside of the hangar. Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. There are two spill kits within the Street Side (one is rolling, and can also be used outside), with a spare located in the SAS.

Daily clean ups and sweeps are conducted. Sections of the floor are cleaned weekly using a walk-behind floor scrubbing machine. In general, only water is used for cleaning; however, cleaning products such as "Simple Green" or "Orange Muscle" are used only when needed. Wash water from floor cleaning is discharged into the hangar trench drains. During rain events, the hangar doors are closed.

2.1.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Hangar 103 Street Side:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides through the hangar doors and in areas near the materials storage sheds and SAS.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are stored indoors on shelves, in hazardous materials storage lockers, or on wooden or spill pallets. Double-bagged oily rags, paint debris, and other wastes are collected at the SAS before being sent to the MCB Hawaii HazMin Center for disposal, about every other day.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Hangar 103 Street Side include loading and unloading of materials, maintenance as needed, and helicopter parking.

D. Significant Materials Inventory

Daily inventories of significant materials are taken to ensure that records are kept up-to-date. The following significant materials are located at Hangar 103 Street Side:

- Jet Fuel
- Used Oil
- Hydraulic Fluid
- Lubricating Oil
- Transmission Oil
- Acid/Corrosives
- Engine Cleaner
- Preventative Coats
- Polish
- Solvents
- Adhesive
- Sealant
- Paint (new and used)
- Paint Thinner
- Greases
- Hand Cleaner
- Alcohol
- Alconox (for fuel samples)
- Cutting Oil
- Batteries

2.1.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 103 Street Side if not properly managed:

- Jet Fuel
- Hydraulic Fluid
- Transmission Oil

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.1.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 103 Street Side employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 103 Street Side are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the SAS are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assessment (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS

SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 103 Street Side have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Hangar 103 Street Side are shown in Table 2-1.

Modifications to the existing BMPs at Hangar 103 Street Side are listed in Table 2-2.

New BMPs for implementation at Hangar 103 Street Side are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Drums of absorbent material and containment booms are readily available at the facility during fueling operations. Openings in the curb adjacent to Kaneohe Bay can be readily blocked with metal gates to prevent contaminants from entering the Bay.
035	Park Vehicles on an Impervious Surface	Helicopters and vehicles are parked on impervious concrete surfaces.
040	Discharge Wash Water to Sanitary Sewer	Wash water from mop buckets, the walk-behind floor scrubbing machine, and alconox is discharged into the trench drains, which are connected to the OWS.
042	Use Drip Pans under Leaking Equipment	Drip pans are used under helicopters inside the hangar to catch leaks.
044	Conduct Maintenance Within a Building or Covered Area	Major repair and maintenance work is conducted inside the facility.
057	Store Liquids and Significant materials within a Building or Covered Area	All significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
044	Conduct Maintenance Within a Building or Covered Area	Conduct as much minor maintenance as possible inside the hangar.	NS	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.1.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Weekly meetings are held for all staff to address any current issues or observed trends.

2.1.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 103 (Street Side).

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

2.2 Maintenance Hangar, Building 103 – Bay Side

Tenants	Hazardous Materials Coordinators:
MALS	Lamar Hina (LSI) (808-257-5632)
	James Carver (808-257-5703/5637)
ATAC	John Paganelli (Primary Ops) (240-298-8217)
	Jose Ramirez (Primary Maintenance) (757-969-3889)

The Bay Side of Hangar 103 is occupied by MALS 24. Fueling of aircraft occurs outside of the hangar, but spill kits are made available for use during fueling. All other maintenance work is performed inside the hangar. All significant materials are procured through the MCB Hawaii HazMin Center. Significant materials are segregated and stored in separate hazardous materials lockers located at the south side of Hangar 103 Bay Side. The lockers are secured with padlocks at all times. An additional hazardous waste SAS is located at the southwestern corner of the hangar, and includes the storage of used oily rags.

Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. There is one spill kit within the Bay Side, with a spare located in the SAS outside.

Major cleaning of the hangar concrete floor is not performed. Daily sweeps are conducted and drip pans are used to capture and contain liquids. As required the concrete floors are cleaned using a walk-behind floor scrubbing machine.

2.2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Hangar 103 Bay Side:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides through the hangar doors and in areas near the materials storage sheds and SAS. Fueling is also conducted outside.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are stored indoors on shelves, in hazardous materials storage lockers, or on wooden or spill pallets. Oily rags are double-bagged, containerized, and collected at the SAS on the south side of the Bay Side before being sent to the MCB Hawaii HazMin Center for disposal.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Hangar 103 Bay Side include loading and unloading of materials, fueling as needed, and aircraft parking.

D. Significant Materials Inventory

The following significant materials are located at Hangar 103 Bay Side:

- Oil
- Grease
- Paint (new and used)
- Paint Thinner
- Oil
- Lube Oil (for tools, WD40)
- Batteries
- Brake Cleaners
- Solvent
- Sealants
- Acids
- Alodines (metal treatment)
- Alcohol

2.2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 103 Bay Side if not properly managed:

- Jet Fuel

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 103 Bay Side employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 103 Bay Side are included in Tables 2-5 through 2-7.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a weekly and monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay EQA program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-5 through 2-7 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the SPCC Plan and/or O&HS SCP will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 103 Bay Side have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications Hangar 103 Bay Side are shown in Table 2-5.

Modifications to the existing BMPs Hangar 103 Bay Side are listed in Table 2-6.

New BMPs for implementation at Hangar 103 Bay Side are listed in Table 2-7.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-5 to 2-7 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-5 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Drums of absorbent material and containment booms are readily available at the facility during fueling operations. Openings in the curb adjacent to Kaneohe Bay can be readily blocked with metal gates to prevent contaminants from entering the Bay.
035	Park Vehicles on an Impervious Surface	Aircraft and vehicles are parked on impervious concrete surfaces.
040	Discharge Wash Water to Sanitary Sewer	Wash water from mop buckets, the walk-behind floor scrubbing machine, and alconox is discharged into the trench drains, which are connected to the OWS.
042	Use Drip Pans Under leaking Equipment	Drip pans are used under aircraft inside the hangar to catch leaks.
044	Conduct Maintenance Within a Building or Covered Area	All aircraft repair and maintenance are conducted inside the facility.
057	Store Liquids and Significant Materials Within a Building or Covered Area	All significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

TABLE 2-6 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-7 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. SAS inspections are conducted weekly. Fueling training is conducted quarterly. In addition, monthly hazardous materials inspections are performed.

2.2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-8. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 103 (Bay Side).

TABLE 2-8 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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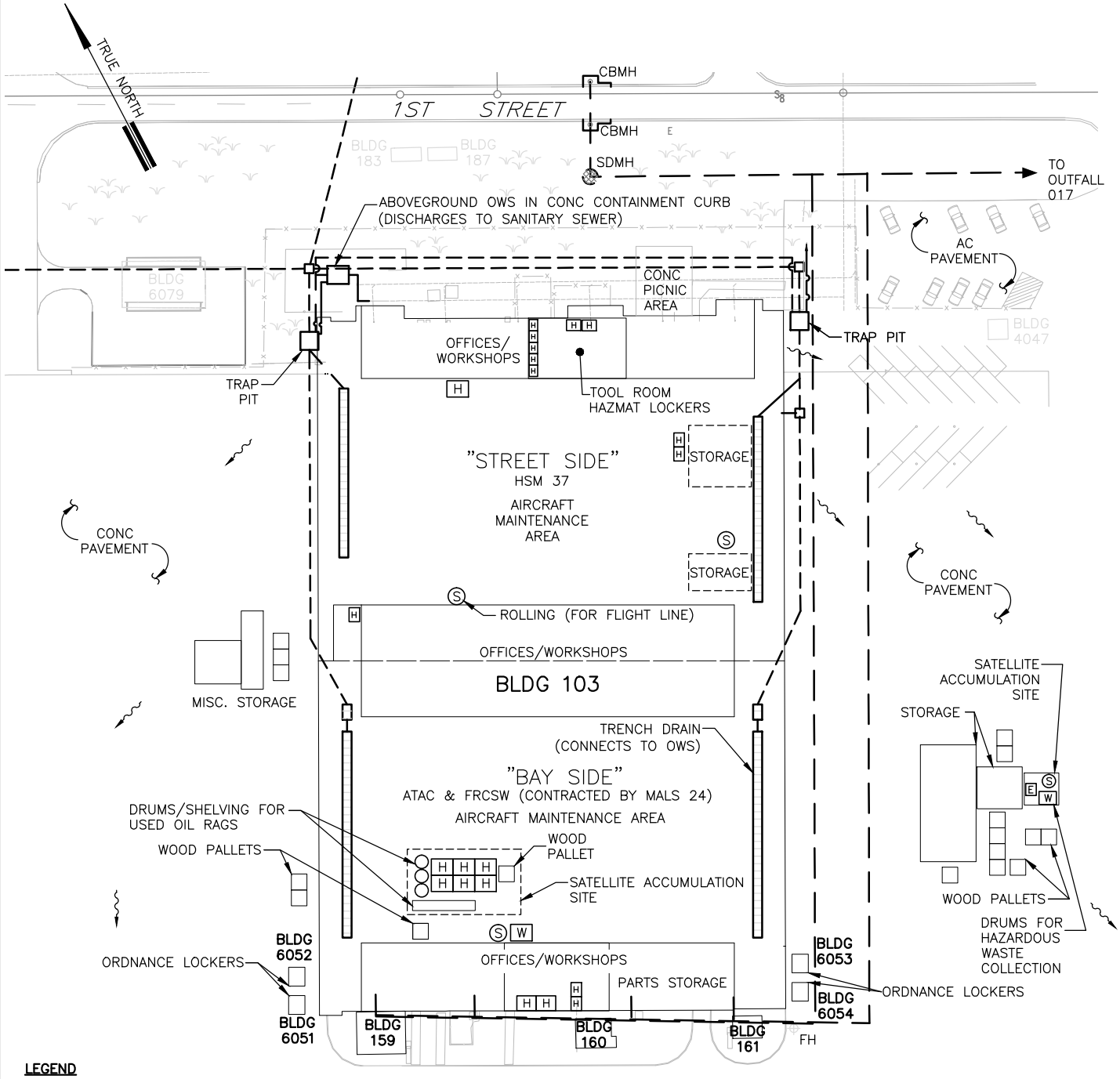

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- SANITARY SEWER SYSTEM
- FLOW ARROW

MAINTENANCE HANGAR (BUILDING 103)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 11.3 ACRES, ASSOCIATED WITH BUILDING 103 DISCHARGES TO KANEOHE BAY VIA SURFACE RUNOFF AND OUTFALL 017.
2. A REPRESENTATIVE SAMPLING POINT FOR ALL FIVE (5) MAINTENANCE HANGARS IS LOCATED AT GRATED INLET 105–2, NEAR MAINTENANCE HANGAR 105.
3. UNLESS NOTED OTHERWISE, FLOORS INSIDE HANGAR 103 ARE CONCRETE.
4. A CONC. CURB IS LOCATED ALONG THE KANEOHE BAY SIDE OF THE CONC. PAVEMENT. METAL GATES CAN BE INSERTED INTO CURB CUTS TO PREVENT POLLUTANTS FROM REACHING THE BAY IN THE EVENT OF A SPILL.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: MAINTENANCE HANGAR (BUILDING 103)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

MAINTENANCE HANGAR (BUILDING 104)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	satellite accumulation site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan
VP	Patrol Squadron

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Maintenance Hangar, Building 104

Maintenance Hangar (Building 104), or Hangar 104, is located within MCB Hawaii, Kaneohe Bay on 1st Street near Kaneohe Bay. The facility encompasses roughly 12.9 acres and can be found in grid J20 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

The hangar is divided into two separate areas: "Street Side" which is near 1st Street, and "Bay Side" which is near Taxiway B and Kaneohe Bay. Use of Hangar 104 Bay and Street sides is constantly rotating between the three Patrol Squadrons VP 4, 9, and 47, every 14-15 months. At the time of the site visit, VP Squadron 47 occupied the "Street Side", but preparing to deploy the following week; and VP Squadron 4 occupied the "Bay Side." VP Squadron 47 deploys to a new location annually. VP Squadron 4 deploys to varying locations semi-annually, but they will be permanently relocated in March 2016, when VP Squadron 9 returns. The squadrons perform maintenance activities for the P-3 Orion aircraft inside the hangar. Minor work such as fluids top off and replacement of small parts is performed outside of the hangar.

Hangar Side	Tenants	Hazardous Materials Coordinators:
Street Side	VP Squadrons 4, 9, and 47	Tool Room (808-257-2342)
Bay Side		Duty Office (808-257-2336)

The area surrounding Hangar 104 has a moderate to flat slope. Storm water runoff on the east, west and south sides of the hangar flow via sheet flow southerly toward Kaneohe Bay. Storm water runoff on the north side of the hangar flows northerly toward 1st Street where it enters a catch basin that discharges to Kaneohe Bay through Outfall 018. The concrete and asphalt pavements immediately surrounding the hangar are generally in good condition.

Trench drains are installed along the east and west sides within Hangar 104. Liquids from the interior floors of the hangar are captured by the trench drains, conveyed to sumps on either side, and then pumped to an above-grade oil/water separator (OWS) located near the northwest corner of the hangar. Effluent from the OWS is discharged by gravity to the MCB Hawaii sanitary sewer system. The OWS structure is a double-walled tank with interstitial leak detection.

Drip pans are used to capture and contain liquids. Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. A walk-behind floor scrubbing machine is available. In general, the standard practice is to wash floors only as needed and to use only water (no detergents). If necessary, biodegradable detergents such "Simple Green" are used to clean the floors. Wash water from floor cleaning is discharged into the hangar trench drains.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Hangar 104:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides by the hangar doors and in areas near the materials storage sheds.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are procured through the MCB Hawaii HazMin Center. Significant materials are segregated and stored in hazardous materials lockers, or on spill pallets, located centrally inside the hangar area. Used materials, including double-bagged oil rags, are stored at a centralized satellite accumulation site (SAS) within a prefabricated metal hazardous materials storage shed (SAS), located outside along the eastern side of the hangar, before being sent to the MCB Hawaii HazMin Center for disposal. Each squadron maintains a separate area within the SAS. The shed has integral secondary containment. The shed does not have a numerical designation.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Hangar 104 include loading and unloading of materials and P-3 Orion aircraft parking. Minor work such as fluids top off and replacement of small parts is also performed outside of the hangar.

D. Significant Materials Inventory

The following significant materials are located at Hangar 104:

- Used Oil
- Polish
- Hydrant Fluid
- Lubricating Oil
- Transmission Oil
- Jet Fuel (in aircraft)
- Alcohol
- Grease
- Hand Cleaner
- Paint Thinner
- Solvents
- Paint (new and used)
- Detergents
- Adhesives

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 104 if not properly managed:

- Hydrant Fluid
- Transmission Oil
- Jet Fuel (fuel samples)

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 104 employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 104 are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspections of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS

SCP) should be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 104 have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Hangar 104 are shown in Table 2-1.

Modifications to the existing BMPs at Hangar 104 are listed in Table 2-2.

New BMPs for implementation at Hangar 104 are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Drums of absorbent material and containment booms are readily available at the facility during fueling operations.
035	Park Vehicles on an Impervious Surface	Aircraft and vehicles are parked on impervious concrete and asphalt surfaces.
042	Use Drip Pans under Leaking Equipment	Drip pans are used under aircraft as necessary to catch hydraulic fluid leaks.
044	Conduct Maintenance within a Building or Covered Area	Major aircraft repair and maintenance work are conducted inside the facility.
057	Store Liquids and Significant Materials within a Building or Covered Area	All significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[(1)]	Implementation Schedule
044	Conduct Maintenance within a Building or Covered Area	Conduct as much minor maintenance as possible inside the hangar.	NS	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[(1)]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[(1)] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

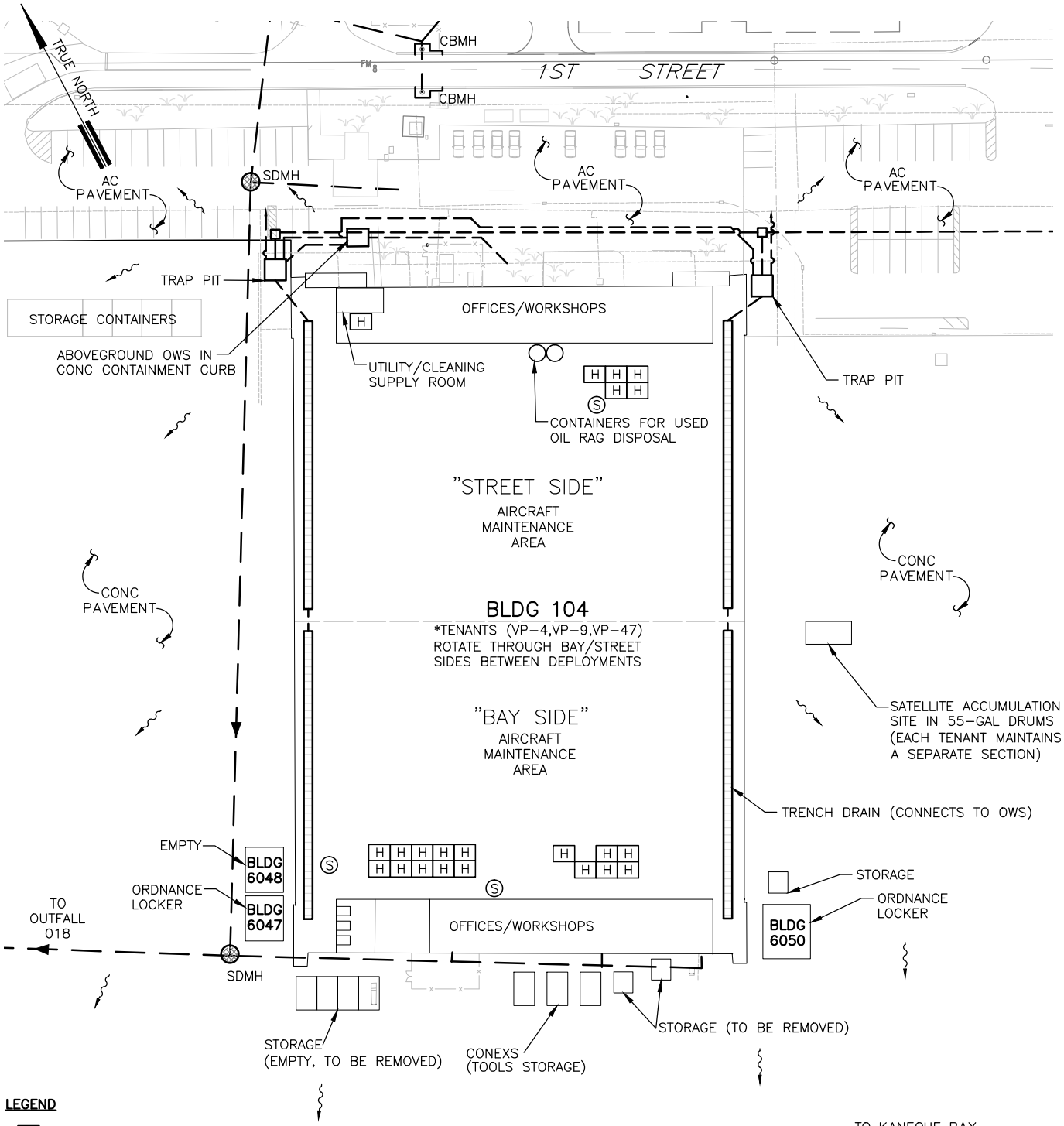
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 104.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- S — SPILL KIT
- STORM DRAIN SYSTEM
- SANITARY SEWER SYSTEM
- FLOW ARROW

MAINTENANCE HANGAR (BUILDING 104)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 12.9 ACRES, ASSOCIATED WITH BUILDING 104 DISCHARGES TO KANEOHE BAY VIA SURFACE RUNOFF AND OUTFALL 018.
2. A REPRESENTATIVE SAMPLING POINT FOR ALL FIVE (5) MAINTENANCE HANGARS IS LOCATED AT GRATED INLET 105-2, NEAR MAINTENANCE HANGAR 105.
3. FLOORS CLEANED USING WALK-BEHIND FLOOR CLEANING MACHINE
4. A CONC. CURB IS LOCATED ALONG THE KANEOHE BAY SIDE OF THE CONC. PAVEMENT. METAL GATES CAN BE INSERTED INTO CURB CUTS TO PREVENT POLLUTANTS FROM REACHING THE BAY IN THE EVENT OF A SPILL.

DATE:	PROJECT TITLE:
FEB 2016	STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
FIGURE TITLE: MAINTENANCE HANGAR (BUILDING 104)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

MAINTENANCE HANGAR (BUILDING 105)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	Satellite Accumulation Site
SDS	Safety Data Sheet
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan
VPU	Patrol Squadron, Special Projects Unit
VR	Reserve Unit

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Maintenance Hangar, Building 105

Maintenance Hangar (Building 105), or Hangar 105, is located within MCB Hawaii, Kaneohe Bay on 1st Street near Kaneohe Bay. The facility encompasses roughly 22.1 acres and can be found in grid J20 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

The hangar is divided into two separate areas: the "Street Side" that is near 1st Street and the "Bay Side" that is near Taxiway B and Kaneohe Bay. The hangar is shared by VPU-2 (Patrol Squadron, Special Projects Unit) and VR-51 (Reserve Unit); VPU-2 is located on the Street Side and VR-51 is located on the Bay Side.

The area surrounding Maintenance Hangar 105 has a moderate to flat slope. Storm water runoff on the northwest, west, and southeast sides of the hangar flows via sheet flow away from the building toward catch basins that eventually discharge into Kaneohe Bay through Outfall 019. Storm water runoff on the northeast side of the hangar enters catch basins that discharge into Kaneohe Bay through Outfall 019. The concrete and asphalt pavements immediately surrounding the hangar are generally in good condition.

Trench drains were installed within Maintenance Hangar 105, along the eastern and western lengths. Liquids from the interior floors of the hangar are captured by the trench drains, conveyed to sumps on either side, and then pumped to an above-grade oil/water separator (OWS) located near the northwest corner of the hangar. Effluent from the OWS is discharged by gravity to the MCB Hawaii sanitary sewer system. The OWS structure is a double-walled tank with interstitial leak detection.

2.1 Maintenance Hangar, Building 105 – Street Side

Tenants	Hazardous Materials Coordinators:
VPU-2	AE1 Myre (808-257-2114)

VPU-2 performs all aircraft maintenance within the hangar, with the exception of fueling with tank trucks, which is performed outdoors in two designated areas. Fueling is conducted under watch and spill kits are available nearby. All significant materials are procured through the MCB Hawaii Hazardous Materials Minimization (HazMin) Center. Significant materials are segregated and stored in hazardous materials lockers located centrally inside the hangar area.

Several small buildings are located adjacent to the Street Side of Hangar 105. Located near the north side of the hangar, Building 3082 is of concrete construction and is used for significant hazardous material storage. Absorbent booms are laid across the doorways floor. The building is kept locked at all times, and opened only with supervision. A portion of Building 3082 is designated the Satellite Accumulation Site (SAS) for used hazardous materials. Spill kits and spill pallets are available in the SAS, in the adjacent Building 3084 (office), and in the hangar.

Drip pans are used to capture and contain spilled liquids. Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. A walk-behind floor scrubbing

machine is available, and sweeping is also conducted. In general, VPU-2's standard practice is to wash floors only as needed and to use only water. However, as necessary a biodegradable detergent such as "Zep" is used. Wash water from floor cleaning is discharged into the hangar trench drains.

2.1.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Maintenance Hangar 105 Street Side:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides near the hangar doors and in areas near the material storage sheds.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are stored indoors in hazardous materials storage lockers or on spill pallets. Double-bagged oily rags are, drained used oil filters, and other wastes are collected at the SAS before being sent to the MCB Hawaii HazMin Center for disposal.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Hangar 105 Street Side include loading and unloading of materials, fueling, and P-3 Orion aircraft parking.

D. Significant Materials Inventory

The following significant materials are located at Hangar 105 Street Side:

- Used Oil
- Polish
- Hydraulic Fluid
- Lubricating Oil
- Transmission Oil
- Jet Fuel
- Sealants
- Grease
- Hand Cleaner
- Paint Thinner
- Solvents
- Paint (new and used)
- Diesel
- Absorbents

2.1.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 105 Street Side if not properly managed:

- Jet Fuel
- Hydraulic Fluid
- Transmission Oil

Materials that have <u>*not*</u> been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a

significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.1.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 105 Street Side employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 105 Street Side are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the SAS are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water Best Management Practices (BMPs) at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 105 Street Side have been identified as having a high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Hangar 105 Street Side are shown in Table 2-1.

Modifications to the existing BMPs at Hangar 105 Street Side are listed in Table 2-2.

New BMPs for implementation at Hangar 105 Street Side are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Containers of absorbent material and containment booms are readily available at the facility during fueling operations.
034	Park Vehicles or Equipment Indoors or Under a Roof	All aircraft or equipment is stored inside the facility when not in use.
035	Park Vehicles on an Impervious Surface	Vehicle and aircraft are parked on impervious asphalt and concrete surfaces.
042	Use Drip Pans Under Leaking Equipment	Drip pans are used under aircraft as necessary to catch leaks.
044	Conduct Maintenance Within a Building or Covered Area	All aircraft repair and maintenance are conducted inside the facility.
057	Store Liquids and Significant Materials Within a Building or Covered Area	All significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, biannual refreshers, and occasional spot checks and drills).
101	Store Containers Inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.1.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. There is also biannual training on contents and use of spill kits. In addition, spot check training and drills are conducted occasionally.

2.1.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 105 (Street Side).

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

2.2 Maintenance Hangar, Building 105 – Bay Side

Tenants	Hazardous Materials Coordinators:
VR-51	Ms. Shannon Gaddis (808-306-3267)

VR-51 is a Navy training squadron that primarily uses C-20 Gulfstream aircraft. A private contractor, Gulfstream, has been retained under contract to perform maintenance on the four C-20 Gulfstream aircraft at the hangar, and is responsible for all of its own activities, including environmental compliance. Gulfstream has the contract until 2019. VR-51 performs all major aircraft maintenance activities, with the exception of painting, inside the hangar. Very infrequently, minor work such as fluids top off and replacement of small parts is performed outside of the hangar. The fueling with tank trucks is performed outdoors in designated areas by MCB Hawaii. Fueling is conducted under watch and spill kits are available nearby.

All significant materials are procured by the private contractor directly from suppliers. Procedures for material procurement, storage, use, and waste disposal are governed by the private contractor's internal procedures. The procedures implemented at Hangar 105 generally comply with the MCB Hawaii Hazardous Materials Management Plan. Significant materials are segregated and stored in hazardous materials lockers located at work areas inside the hangar. A portion of Building 105 Bay Side at the northeast corner is designated the SAS for used hazardous materials. Spill containment pallets and drum holders with integral secondary containment are utilized.

Drip pans are used to capture and contain liquids. Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. Sweeping and mopping are conducted inside the hangar. A walk-behind floor scrubbing machine is also available. In general, standard practice is to wash floors only as needed and to use only water. Wash water from floor cleaning is discharged into the hangar trench drains.

Aircraft are washed periodically at the base wash racks, as needed. Biodegradable detergents that have been approved for use by the MCB Hawaii HazMin Center such as "Zep" are used for the occasional aircraft cleaning.

2.2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Maintenance Hangar 105 Bay Side:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded on the east and west sides near the hangar doors.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are stored indoors in hazardous materials storage lockers or on spill pallets. Double-bagged oily rags and other wastes are collected at the SAS before being sent to the MCB Hawaii HazMin Center for disposal.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Hangar 105 Bay Side include loading and unloading of materials and C-20 Gulfstream aircraft parking.

D. Significant Materials Inventory

The following significant materials are located at Hangar 105 Bay Side:

- Used Oil
- Polish
- Hydraulic Fluid
- Lubricating Oil
- Transmission Oil
- Jet Fuel (JP-8)
- Grease
- Hand Cleaner
- Paint Thinner
- Solvents
- Paint (new and used)

2.2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Hangar 105 Bay Side if not properly managed:

- Jet Fuel
- Hydraulic Fluid
- Transmission Oil

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Hangar 105 Bay Side employs good housekeeping practices throughout its operations. Good housekeeping practices for Hangar 105 Bay Side are included in Tables 2-5 through 2-7.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis.

Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay EQA program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-5 through 2-7 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the SPCC Plan and/or O&HS SCP will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Hangar 105 Bay Side have been identified as having a high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications for Hangar 105 Bay Side are shown in Table 2-4.

Modifications to the existing BMPs for Hangar 105 Bay Side are listed in Table 2-5.

New BMPs for implementation at Hangar 105 Bay Side are listed in Table 2-6.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-5 to 2-7 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-5 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Drums of absorbent material and containment booms are readily available at the facility during fueling operations.
034	Park Vehicles or Equipment Indoors or under a Roof	All aircraft or equipment is stored inside the facility when not in use.
035	Park Vehicles on an Impervious Surface	Vehicle and aircraft are parked on impervious asphalt and concrete surfaces.
042	Use Drip Pans Under leaking Equipment	Drip pans are used under aircraft as necessary to catch leaks.
044	Conduct Maintenance Within a Building or Covered Area	Major aircraft repair and maintenance are conducted inside the facility.
057	Store Liquids and Significant materials Within a Building or Covered Area	All significant material containers are stored indoors.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, biannual refreshers, and occasional spot checks and drills).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

TABLE 2-6 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
044	Conduct Maintenance Within a Building or Covered Area	Conduct as much minor maintenance as possible inside the hangar.	NS	2016

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-7 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.2.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. In addition, training on spills, hazardous materials, and safety data sheets (SDSs) is conducted monthly.

2.2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-8. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Hangar 105 (Bay Side).

TABLE 2-8 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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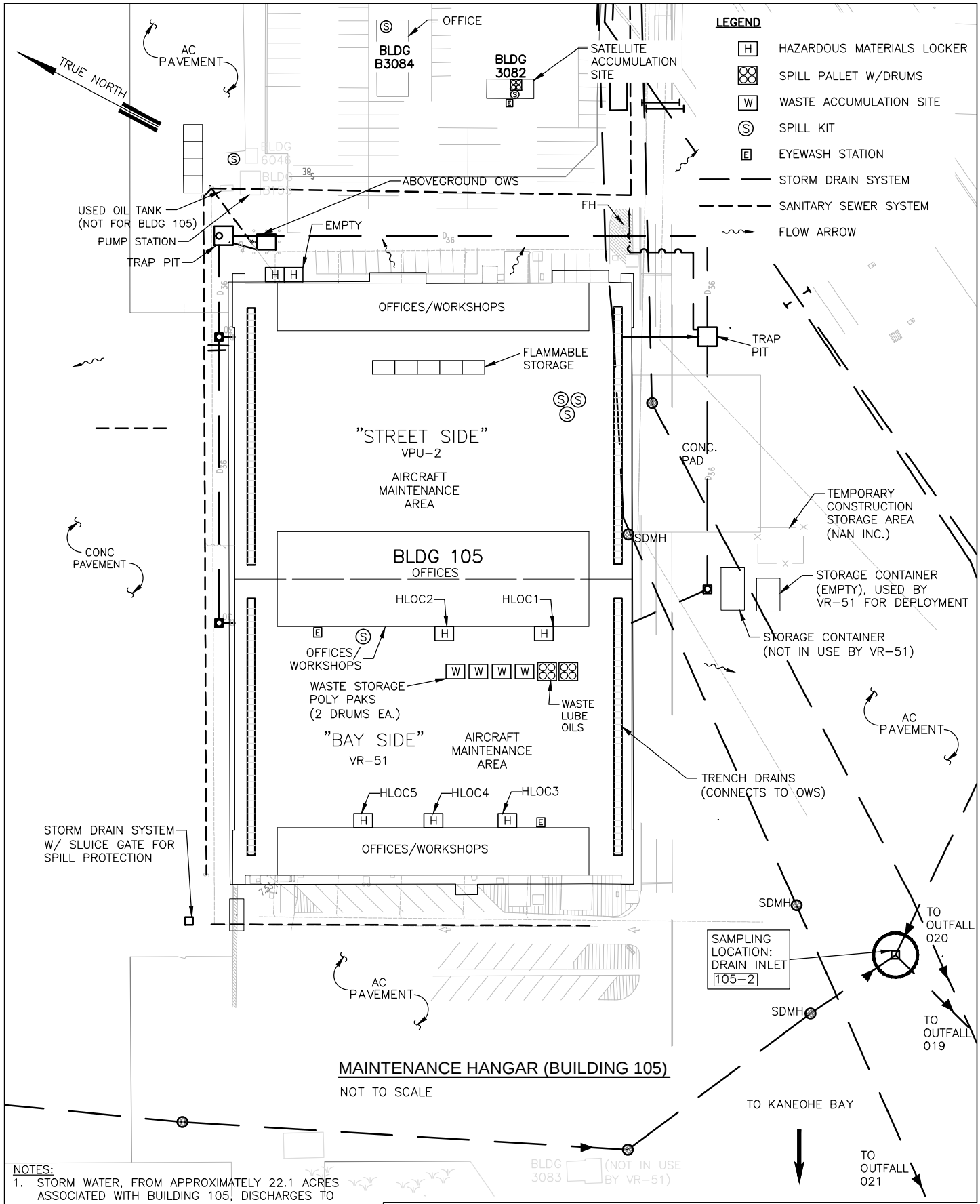

MAINTENANCE HANGAR (BUILDING 105)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 22.1 ACRES ASSOCIATED WITH BUILDING 105, DISCHARGES TO KANEOHE BAY VIA SURFACE RUNOFF AND OUTFALL 019.
2. A REPRESENTATIVE SAMPLING POINT FOR ALL FIVE (5) MAINTENANCE HANGARS IS LOCATED AT GRATED INLET 105-2.
3. UNLESS NOTED OTHERWISE, FLOORS INSIDE HANGAR 105 ARE CONCRETE.
4. A CONC. CURB IS LOCATED ALONG THE KANEOHE BAY SIDE OF THE CONC. PAVEMENT. METAL GATES CAN BE INSERTED INTO CURB CUTS TO PREVENT POLLUTANTS FROM REACHING THE BAY IN THE EVENT OF A SPILL.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: MAINTENANCE HANGAR (BUILDING 105)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

RECYCLE CENTER (BUILDING 132)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
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O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan
WWTP	Wastewater Treatment Plant

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Recycle Center, Building 132

The Recycle Center, Building 132, is located at the southern end of MCB Hawaii, Kaneohe Bay, to the south of the intersection of D Street and 1st Street. The facility encompasses approximately 2.0 acres and can be found in grid G17 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

The Recycle Center complex is asphalt-paved and bounded by a chain-linked, screened fence. Access to the Recycle Center complex is provided by gates at the north and east ends of the center. Recyclables are accepted at the facility on Wednesdays.

Hazardous Materials Coordinator:

Mr. Jim Sibert (808-257-4300)

The primary building within the Recycle Center complex is Building 132, which is a single-story building that houses office space to the north, a covered cardboard and paper sorting/shredding/baling area and an industrial shredder to the southeast, a concrete block shed to the south, a bundled paper storage area to the southwest, and a 4-bay uncovered structure situated over a concrete pad (Building 131) to the west. The concrete block shed to the south stores chemicals such as paints, propane, Simple Green, gasoline, WD-40, soaps, bleach, cleaning products, and air freshener spray cans. The 4-bay space is primarily used to store and sort various loose metals, including small munitions crushing machines.

Building 5073 is located to the northeast of Building 132 along the compound's eastern boundary. The building consists of corrugated metal structure over a concrete pad. The building houses a tool container, and cans for gasoline, oil, and hydraulic fluid. A concrete ramp northwest of the building leads up to the concrete pad, which is used to store domestic blue recycle bins. An oil/water separator (OWS) and waste oil tank are also located along the eastern boundary; however, the waste oil tank is currently not in use. The OWS pumps wastewater to the base Wastewater Treatment Plant (WWTP).

The Recycle Center complex also contains various recycled materials storage areas around the perimeter of the facility. Items along the northern boundary include several domestic blue and green recycle bins (for distribution and use at various base events) and two facility garbage bins. Items along the western boundary include sorting bins, roll-off bins and one additional facility trash bin. Items along the southwestern boundary include stacks of wooden pallets, and metal and glass recyclables. Items along the southern boundary include bundles of cardboard recyclables and stacks of wooden pallets. A plastics sorting and storage area is located to the south. There is a concrete pad with a containment curbing, and miscellaneous wiring and metals to the southeast. Items along the eastern fence include miscellaneous items such as scaffolding, large appliances, piping, chairs, ladders, etc.

The interior of Building 132 is swept as needed, and the facility is swept with a street sweeper once or twice a year. No rinsing of recyclables is performed on-site. The drop-off sorting area is rinsed with water once a week after drop-off to remove sticky substances from the ground surface. It is recommended that recycles be dropped off within a secondary containment bladder or impervious sheet, to prevent the need for rinsing of sticky substances from the ground. However, any further rinsing is to be conducted within a bermed containment area, where rinse water can percolate.

Storm water along the northern and western sides of the facility flows via sheet flow offsite. Storm water along the northwestern end of the site is directed off site by curbing to a catch basin along D Street. Storm water near the four covered bays (Building 131) is directed southeasterly to a shallow asphalt swale and ponds onsite, or is carried offsite to the southwest. Storm water on the southern and eastern sides of the facility flows via sheet flow offsite to the southeast. The storm water collection system near the Recycle Center discharges into Kaneohe Bay via Outfall 017.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Recycle Center, Building 132:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded at various locations at the facility, particularly the sorting area and material storage room at the southern corner of Building 132.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. The Recycle Center does not store significant amounts of hazardous waste materials or batteries onsite. Consumer cleaners are stored in the concrete shed, and minor amounts of gasoline and oil are stored in Building 5073. The facility has parking and storage areas for personal vehicles. There is no inoperable vehicle storage at the facility.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at Recycle Center, Building 132 include the handling, sorting, and storage of materials to be recycled, including metals, paper, cardboard, wood, glass, and plastics. Equipment maintenance is performed, as needed, but only on rare occasions.

D. Significant Materials Inventory

The following significant materials are located at Recycle Center, Building 132:

- Gasoline
- Cleaners
- Oil
- Hydraulic fluid
- Paint
- Metals (scrap)
- Grease

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Recycle Center, Building 132 if not properly managed:

- Gasoline
- Sediment

- Metals (scrap)

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Recycle Center, Building 132 employs good housekeeping practices throughout its operations. Good housekeeping practices for Recycle Center, Building 132 are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems on a regular basis. The preventive maintenance program involves inspections of equipment and storage systems that are exposed to storm water.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

The area between the fence line and curbing along the northwestern end of the compound was observed to be areas of dirt that showed signs of erosion. It is recommended that this area be finished with gravel to prevent erosion (Figure 2-1).

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Recycle Center are shown in Table 2-1.

Modifications to the existing BMPs at the Recycle Center are listed in Table 2-2.

New BMPs for implementation at the Recycle Center are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
002	Restrict Access to Area and Equipment	The facility is completely surrounded by chain-linked fencing.
005	Perform regular pavement sweeping	The facility is periodically swept to control excess sediment and debris.
014	Recycle	The facility is used to recycle materials from the Base. Materials to be recycled are generally stored together at the facility.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category (1)	Implementation Schedule
014	Recycle	Store cardboard recyclables under cover.	NS	2016

Notes:
(1) NS = Non-structural; S = Structural
Refer to Appendix 11-2 for BMP descriptions and additional information.

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
011	Construct Berm or Dike Around Critical Areas	Construct a bermed area or enclosure downstream of the drop-off area to allow containment and evaporation of rinse water.	S	2017
012	Pave Bermed Areas	Place gravel on the dirt area along the northwestern end of the facility to prevent erosion.	S	2016
044	Conduct Maintenance Within a Building or Covered Area	Store mops and mop buckets inside.	NS	2016
050	Properly Store Containers	Store all hazardous material containers in flammable lockers, on spill pallets, under cover, ideally in one centralized location.	NS	2016
100	Conduct Personnel Training Regarding the SWPPP	Regularly train personnel in topics regarding the SWPPP.	NS	2016
118	Spill Prevention and Control	Obtain and store a spill kit at the facility.	NS	2016

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Recycle Center.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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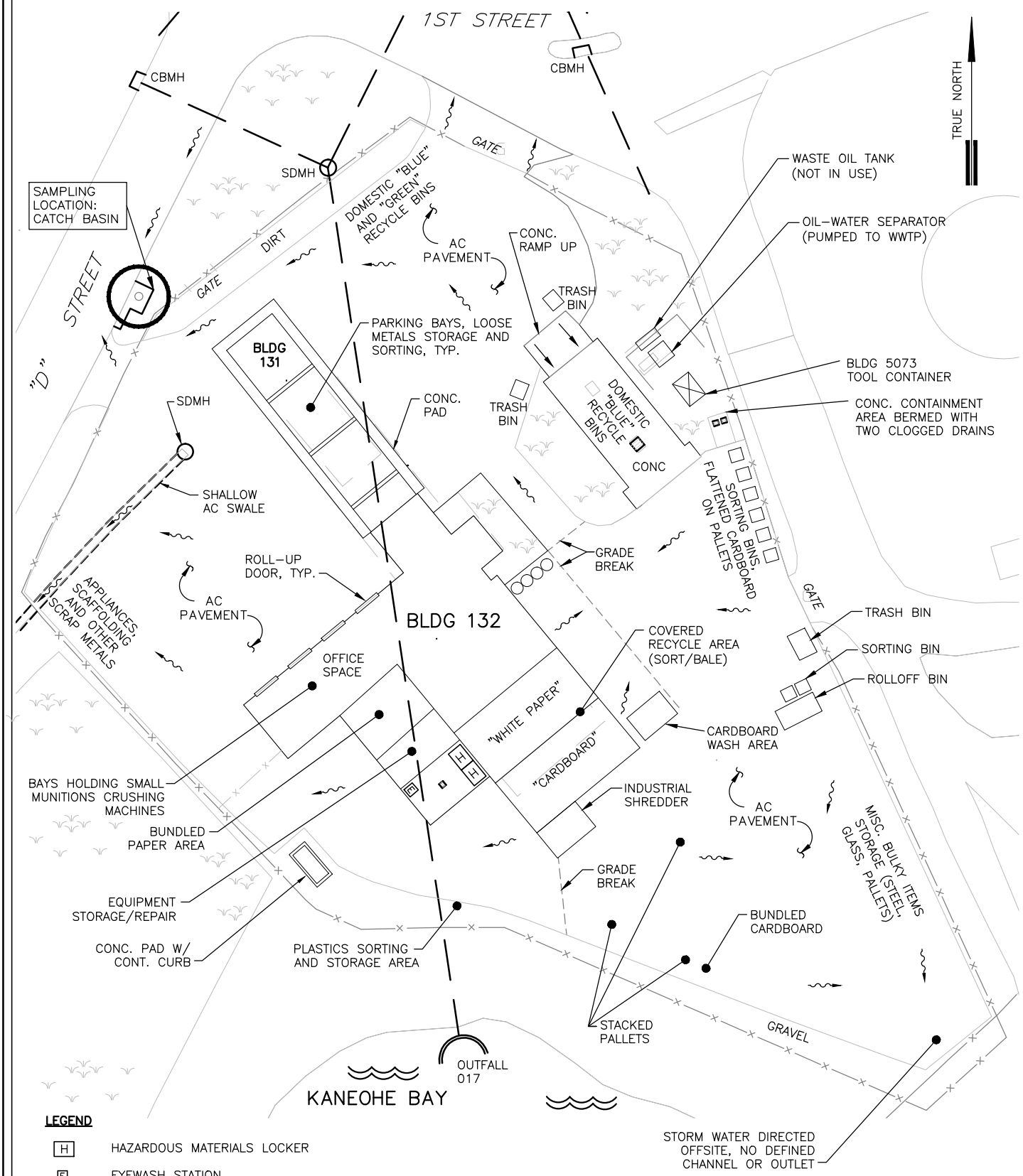

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- FLOW ARROW

RECYCLING CENTER (BUILDING 132)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 2.0 ACRES ASSOCIATED WITH BUILDING 132, DISCHARGES TO KANEOHE BAY VIA SURFACE RUNOFF AND OUTFALL 017.
2. NO BATTERIES ARE STORED ONSITE.

DATE:	PROJECT TITLE:
FEB 2016	STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
FIGURE TITLE: RECYCLING CENTER (BUILDING 132)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

SMALL BOAT REPAIR SHOP (BUILDING 129)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CMU	concrete masonry unit
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
HEPA	high-efficiency particulate air
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	satellite accumulation site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Small Boat Repair Shop, Building 129

The Small Boat Repair Shop, Building 129, has been demolished since the previous Storm Water Pollution Control Plan and is currently identified as Building 1698. The facility is located within MCB Hawaii, near the southern tip of "D" Street. It encompasses an area of approximately 3.4 acres and can be found in grid G17 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Neil Morgan (808-254-7666)

Building 1698 is a single-story corrugated metal structure with repair and storage areas. The materials are stored in hazardous material lockers in a room inside the building or in a larger self-contained storage locker (primarily gasoline) behind and outside the building, but under cover. There are also used oil drums on spill containment pallets inside the western side of the building.

Repair activities at Building 1698 include sanding, fiberglass/resin application/repair, and spray/brush painting of boats. These activities are done using high-efficiency particulate air (HEPA) vacuum-shrouded sanding tools. Repair activities are either conducted indoors or outdoors on a concrete slab south of the building (for larger boats). Occasional work on motors is also performed in the bay, if needed. During a facility inspection, an outdoor wash basin behind the building allows wash water to discharge directly into Kaneohe Bay. The wash basin was recommended for immediate discontinuation of use, until it is removed or connected to the existing sanitary sewer system.

Building 1698 is surrounded by concrete pavement. Storm water runoff north and east of the building sheet flows easterly over the concrete pavement and discharges directly into Kaneohe Bay. Runoff south of the building sheet flows across the concrete paved outdoor repair area and percolates into the adjacent grass/dirt picnic area. Grass has not taken root, so there are very large patches of damp dirt. Runoff on the southwest side of the building flows to two drain inlets in the gravel parking area that discharge to Kaneohe Bay via Outfall 017A. Runoff on the west side of building flows past "D" Street toward the gravel parking area, and appears to pond there.

Building 6800 is a single-story concrete masonry unit (CMU) building that has a retail/rental store/showroom in front and warehouse storage of rental equipment in back. An outdoor shower next to the restrooms allows rinse water to discharge to the concrete surface, flowing into the Kaneohe Bay. Rinse water is an allowable discharge as long as it meets the criteria specified in Chapter 3. This requires that the use of detergents and cleaners be prohibited. If this cannot be controlled by the facility, then the outdoor shower is to be discontinued from use until it can be connected to the sanitary sewer system. The warehouse is dry swept daily and wet mopped about twice every week, while the showroom is mopped about once every week.

A Convault, double-walled, gasoline fuel aboveground storage tank (AST), Building 1192, is located north of Building 6800. A boat ramp is situated between the tank and building. The fuel tank is a pedestal-

mounted, double-walled tank within a concrete bermed area for vehicles to drive into and park while fueling. Galvanized steel pipe conveys fuel from the tank to a fuel dispensing pump located near the edge of the adjacent pier. The pump can be utilized 24 hours a day, 7 days a week.

The asphalt paved Boat Storage Parking Area is located further north of the fueling area, surrounded by chain-linked fencing. Across "D" Street from the boat storage is a gravel area located to the east of Building 120 and designated for "Boat Washdown Area".

At the southernmost portion of the facility, across "D" Street from the grass/dirt picnic area, there is a chain-linked fenced compound that appears to not be in use. A deteriorating shed (Building 1192), situated next to a small boat ramp, houses small amounts of hazardous materials within concrete curbing. Adjacent to and outside of the shed to the north is a pedestal-mounted, 500-gallon steel gasoline AST within concrete containment structure. The rest of the compound is used to store derelict boating equipment and various scrap metal. It is recommended that these materials be discarded if possible, or stored in bins off of the ground to prevent contact with storm water. Another "Boat Washdown Area" sign is posted north of the boat ramp, but the water spigot has been removed.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Small Boat Repair Shop:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded near the entrance to (west side of) the Building 1698 and at the gasoline AST and fuel pump dispenser by the larger boat ramp.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water runoff. Significant materials are stored in hazardous material lockers in a room inside the building or in a larger self-contained storage locker (primarily gasoline) behind and outside the building, but under cover. There are also used oil drums on spill containment pallets inside the western side of the building. Filled drums of used oil and other wastes are turned into the base HazMin Facility.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities include loading and unloading of materials; maintenance work, including sanding, fiberglass/resin application/repair, and spray/brush painting of boats; gasoline dispensing; boat storage; rinsing within the outdoor shower, and boat washing/rinsing.

D. Significant Materials Inventory

The following is a list of significant materials found at the Small Boat Repair Shop:

- Paints
- Paint Thinner
- Wood Stain
- Resin
- Acetone
- Soap/detergent
- Batteries
- Solvents
- Sanding Wastes
- Fiberglass
- Used Oil
- Gasoline
- Metals

dd

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 1698 if not properly managed:

- Paints
- Paint Thinner
- Wood Stain
- Resin
- Acetone
- Soap/detergent
- Metals
- Solvents
- Sanding Wastes
- Fiberglass
- Used Oil
- Gasoline
- Sediment

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Small Boat Repair Shop employs good housekeeping practices throughout its operations. Good housekeeping practices for the Small Boat Repair Shop are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to

determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

The open picnic area south of Building 1698 consists of large areas of dirt that could erode and discharge to Outfall 017A, which is right next to the picnic area. The area was previously hydromulched, but salt water from overspray at the dock area has prevented grass from taking root in large portions of the area. The area should be hydromulched with salt-tolerant grass or finished with geotextile, matting, or gravel to control erosion and prevent sediment runoff.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Small Boat Repair Shop are shown in Table 2-1.

Modifications to the existing BMPs at the Small Boat Repair Shop are listed in Table 2-2.

New BMPs for implementation at the Small Boat Repair Shop are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
003	Perform Regular Cleaning	Regular sweeping and mopping is conducted at Building 6800.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Spill kits of absorbent material and containment booms are readily available at the maintenance facility.
039	Wash Equipment and Vehicles in Designated Area	Boats are rinsed at the designated "Boat Washdown Area" at Building 120. Ensure no detergents or cleaners are utilized during rinsing.
057	Store Liquids and Significant Materials within a Building or Covered Area	All significant material containers are stored in flammable lockers or on spill pallets indoors.
067	Protect Tanks from Being Damaged by Vehicles	Bollards are erected in front of the gasoline AST to protect it from being damaged by vehicles.
070	Enclose Outdoor Sanding and Painting Operations and Use Tarps to Contain and Collect Solid Wastes	Maintain and use vacuum-shrouded hand tools, portable containment berms, and tent enclosures. Contain repair and related wastes by conducting all sanding and painting activities within the containment berm and tent enclosure and by utilizing the vacuum-shrouded sanding tools.

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
006	Control Spills	Install a spill kit next to the gasoline fuel dispenser/pump by the boat ramp. Valve draining the concrete containment around the gasoline AST should be closed during fueling. Consider restricting days and/or hours of use.	NS	2016
006	Control Spills	Rinse only with fresh water at the showers outside Building 6800 and the wash basin outside Building 1698. Prohibit the use of detergents and cleaners.	NS	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
032	Dispose of Obsolete Equipment, Inoperable Vehicles, and Surplus Materials	Dispose of hazardous waste materials, unused, derelict boating equipment, and various scrap metal in the Building 1192 compound. Any metals that cannot be discarded, will be stored in a bin off of the ground to prevent contact with storm water.	NS	2016
040	Discharge Wash Water to a Sanitary Sewer	Connect the outdoor wash basin, behind Building 1698, and outdoor showers to the sanitary sewer system.	S	2016
122/123/124	Hydromulching/Geotextile/Matting	Hydromulch bare soil in the picnic area with salt-tolerant grass or finish with geotextile, matting, or gravel to control erosion/prevent sediment runoff.	S	2016

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Monthly meetings are held to discuss on-going operations.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Small Boat Repair Shop.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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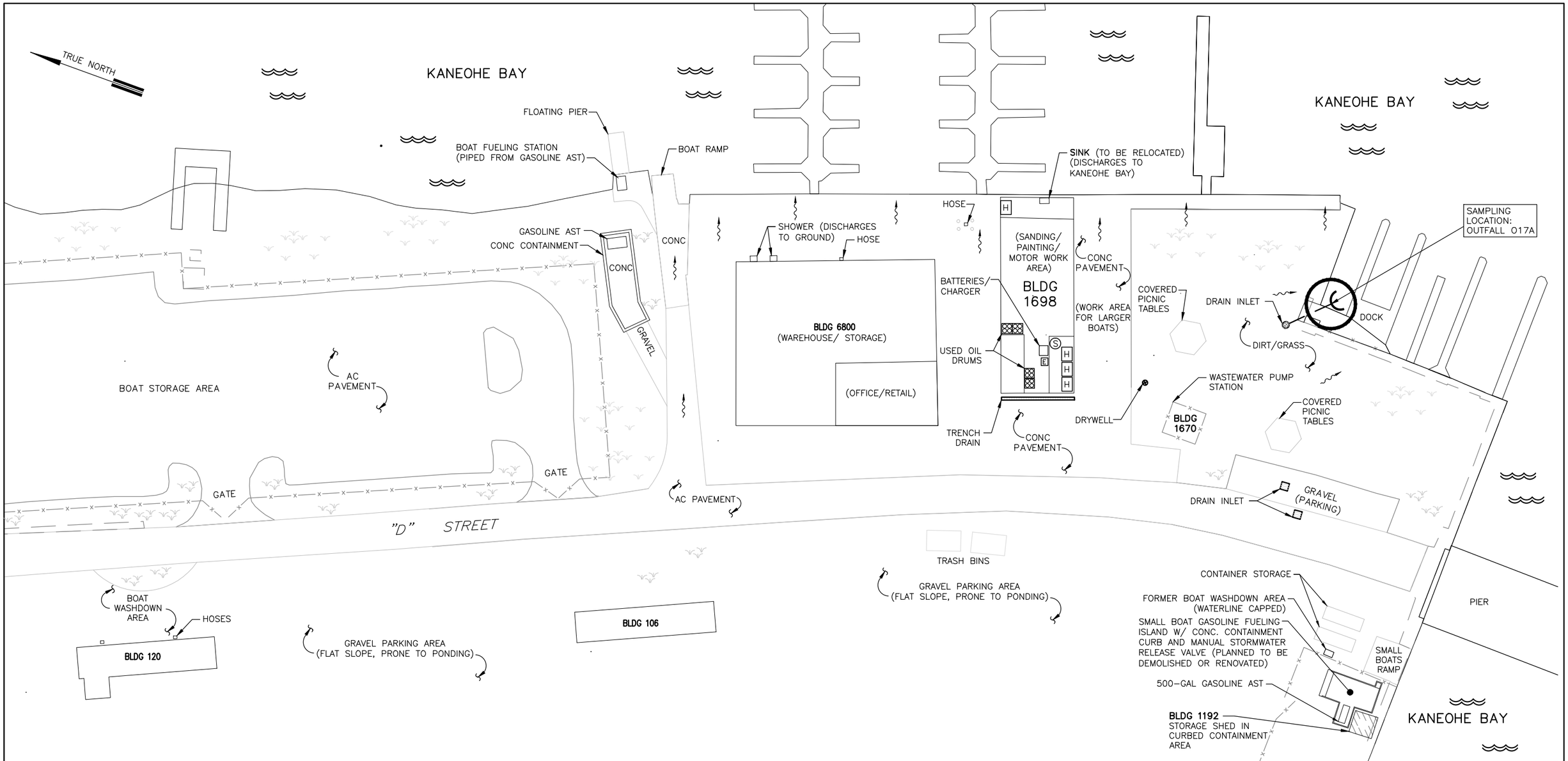

SMALL BOAT REPAIR SHOP (BUILDING 129)

NOT TO SCALE

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- FLOW ARROW

NOTE:

STORM WATER, FROM APPROXIMATELY 3.4 ACRES, ASSOCIATED WITH BUILDING 1698 (FORMERLY BUILDING 129), DISCHARGES TO KANEOHE BAY VIA SURFACE RUNOFF AND OUTFALL 017A.

element environmental llc
environmental · engineering · water resources

PROJECT TITLE:
STORM WATER POLLUTION CONTROL PLAN
MCB HAWAII, KANEOHE BAY, OAHU, HAWAII

FIGURE TITLE:
SMALL BOAT REPAIR SHOP (BUILDING 129)

DATE: FEBRUARY 2016

FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

VEHICLE MAINTENANCE SHOP (BUILDING 351)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MoGas	motor gasoline
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	satellite accumulation site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan
UST	underground storage tank

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan will become MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, will be knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of every five years. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. Additionally, ENV shall document and report the SWPCP changes to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

2 Vehicle Maintenance Shop, Building 351

The Vehicle Maintenance Shop, Building 351, is located within MCB Hawaii, Kaneohe Bay at the northeast corner of the intersection of "C" Street and 2nd Street. The facility encompasses approximately 7.9 acres and can be found in grid J17 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown in Figure 2-1.

Hazardous Materials Coordinator:

Mr. Kahana Kauahi (808-257-2304)

The central area of the vehicle maintenance complex is comprised of four buildings that are attached to form a single "U"-shaped structure: Buildings 351, 399, 377, and 322. The structure is single-story and of metal construction with concrete flooring, and encloses an asphalt paved area for facility vehicle parking. The remainder of the vehicle maintenance complex consists of grass/gravel parking areas for buses, trucks, fuel trucks, trailers, and facility vehicles at the southwest side of the facility; a gravel area at the northeast side of the facility that is used for storage of scrapped and salvaged vehicles, dumpsters, trucks, empty drums, generators, etc.; and an asphalt parking area near the center of the facility.

Building 351 is used to conduct maintenance on buses, sweepers, and light to medium duty trucks, and has a hydraulic lift. Supply and equipment records for the entire complex are centrally stored in the main office in the building.

Building 399, which is attached to the southeast end of Building 351, has a forklift repair section at its northwest end, a spray painting booth (currently not in use) in the midsection, and a section for vehicle repair and battery shop (currently not in use), including a hydraulic lift, at the southeast end. The southeast section is primarily used for repair of facility trucks. Wash sinks, one of which discharges to the ground, are located outside along the northwest wall. It is recommended that tenants discontinue use of this sink immediately, and that the sink be removed or connected to the sanitary sewer system or OWS.

Building 1545, located at the northernmost corner of the facility, is a metal building used as a covered parking bay.

Building 377, which is attached to the northwest end of Building 399, houses the tire, sheet metal, welding, and machine shops (which is no longer in use). An oil filter press and used oil drum are located in the tire shop; and a parts washer is located in the machine shop. Oxygen and acetylene cylinders associate with the welding shop are stored in metal sheds behind Building 377.

Building 322, which is attached to the southeast end of Building 377, consists of a below-grade grease rack facility. A used oil underground storage tank (UST) is located outside the northwest side of the building. A trench drain runs the full length of the southeast entrance and drains to a below-grade oil/water separator (OWS), which is located to the southwest of the building and drains to the sanitary sewer system. A steam cleaning area is located southwest of the grease rack and has a concrete surface that slopes toward the trench drain connected to a second OWS with a used oil aboveground storage tank (AST). Building 4051, located at the southern portion of the facility, houses an outdoor vehicle

wash rack. Wash water from the auto wash facility drains to a third OWS, the effluent of which then drains by gravity to Kaneohe Bay via Outfall 017. It is recommended that use of this OWS discontinue immediately, until it is removed or connected to the sanitary sewer system. To prevent any chance of overflow reaching the storm drain system, the connection of the OWS to the storm drain system is to be permanently sealed.

Building 300 is located southeast of the steam cleaning area. The building is constructed of concrete masonry units with a pitched metal roof. The facility was previously used as a motor gasoline (MoGas) filling station but is no longer in use. The USTs associated with the former filling station have also been removed.

Building 385, located southeast of Building 300, houses the Auto Parts Warehouse. The building has a parts department, office, and lunchroom.

A hydrogen fueling station is located at the southernmost corner of the facility, in the grass/gravel parking area.

Hazardous materials are stored within hazardous supply lockers inside Building 399. Additional hazardous materials lockers are located inside Building 377 for storage of paints and thinners. Waste materials are stored in the satellite accumulation site (SAS) near Building 322 in appropriate spill containment pallets and over-pack containers. The flammable lockers do not have inventory logs and some lockers were not properly locked during the site inspection. It is recommended that these lockers remain locked at all times when not in use.

In general, the storm water for the majority of the facility percolates into the porous ground or evaporates. A drain inlet (351-1) and two trench drains (351-2 and -3) at the western corner of the facility direct storm water runoff to Outfall 021. A headwall in the same area directs storm water runoff to Outfall 017. Runoff at the eastern portion of the facility sheet flows into two drain inlets along “C” Street, which also discharge to Outfall 017.

Sweeping with a push broom is performed daily; mopping is performed occasionally. A street sweeper is scheduled as needed. The trench drain near the oil change area is occasionally cleaned, but there is no regular schedule for this. Some mud and vegetation were observed in this trench drain during the site inspection.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Vehicle Maintenance Shop:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded near the entrances to the various buildings / tanks on asphalt paved surfaces.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water runoff. Salvaged vehicles and equipment are drained of all fluids prior

to storage outside on asphalt pavement. Smaller containers of significant materials are stored in flammable materials storage lockers at the northwest end of Building 399 and in Building 377. All containers of significant materials at Building 351 are double-contained or stored in over-pack containers.

Filled drums of crushed oil filters, batteries, waste fuel, and waste oil are turned into the base Hazardous Materials Minimization (HazMin) Facility. Absorbent blankets from the OWS are regularly removed, dried, bagged, and taken to the SAS for disposal by HazMin. Any tires turned into the Recycling Center are brought to the Vehicle Maintenance Shop (who is awaiting a new contract for tire disposal). Regular maintenance of the parts washer and used oil UST, AST, and grease rack is recommended to ensure that there are no incidents of overflow.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Vehicle Maintenance Shop include loading and unloading materials, vehicle washing at Building 4051, steam cleaning, and salvage/storage scrap yard. No maintenance work is performed outdoors.

D. Significant Materials Inventory

The following is a list of significant materials found at the Vehicle Maintenance Shop:

- Gasoline
- Diesel
- Lube Oil
- Grease
- Paints
- Hydraulic Oil
- Transmission Oil
- Power Steering Fluid
- Brake Fluid
- Exhaust Fluid
- Battery Acid
- Solvents
- Adhesive
- Sealant
- Waste Wash Water
- Oily Sludge
- Used Fuel
- Used Oil (AST and UST)
- Metals (scrap)

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 351 if not properly managed:

- Gasoline
- Diesel
- Metals (scrap)
- Used Oil
- Waste Wash Water

Materials that have <u>*not*</u> been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a

significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Vehicle Maintenance Shop employs good housekeeping practices throughout its operations. Good housekeeping practices for the Vehicle Maintenance Shop are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

The soil/gravel area near drain inlet 351-1 at the Vehicle Maintenance Shop has been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 351 are shown in Table 2-1.

Modifications to the existing BMPs at Building 351 are listed in Table 2-2.

New BMPs for implementation at Building 351 are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
002	Restrict Access to Area and Equipment	Area is completely enclosed by chain-linked fencing.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutant from being transported to receiving water. Drums of absorbent material and containment booms are readily available at the facility.
032	Dispose of Obsolete Equipment, Inoperable Vehicles, and Surplus Materials	Obsolete equipment and surplus materials stored outside in the salvage yard are disposed as expeditiously as possible to reduce the potential for generating pollutants.
033	Check Vehicles and Equipment for Leaks	Vehicles and equipment are checked for leaks on a regular basis.
037	Drain All Fluids from Stored or Salvaged Vehicles and Equipment	Fluids from vehicles and equipment are drained, prior to storage in the salvage yard.
038	Completely Drain Oil Filters before Disposal	Oil filters are drained, crushed, and stored in a drum prior to disposal off-site.
039	Wash Equipment and Vehicles In Designated Areas	Steam cleaning and vehicle washing facilities are provided at the compound.
040	Discharge Wash Water to a Sanitary Sewer	OWSs discharge to the sanitary sewer system. The radiator test tank drain line is also connected to the sanitary sewer system.
085	Construct OWS	Wash water from the vehicle wash and steam cleaning areas and areas in Building 322 all flow to OWSs.

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
040	Discharge Wash Water to a Sanitary Sewer	Discharge auto wash facility OWS and utility sink outside Building 399 to the sanitary sewer system.	S	2017

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
007	Place Trash Receptacles at Appropriate Locations	Move the scrap metal storage bin away from the trench drain.	NS	2016
010	Confirm that No Industrial Sinks are Connected to the Storm Drain System	Investigate whether the sink inside Building 355 drains to the storm drain system or sanitary sewer system. The sink drains outside to a hole beside the roof drain.	NS	2016
022	Permanently Seal Drains Within Critical Areas that Discharge to Storm Drain	The third OWS is to be immediately disconnected from the storm drain system and the connection sealed.	S	2016
026	Routinely Clean Catch Basins	Clean catch basins regularly to prevent clogging and accumulation of pollutants (debris accumulates in the grated inlet behind Building 399).	NS	2016
050	Properly Store Containers	Maintain inventory logs for all flammable lockers. Properly lock all flammable lockers when not in use.	NS	2016
146	Sodding	Plant sod in eroded area near the OWS and used oil AST at the eastern corner of the facility.	NS	2016

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

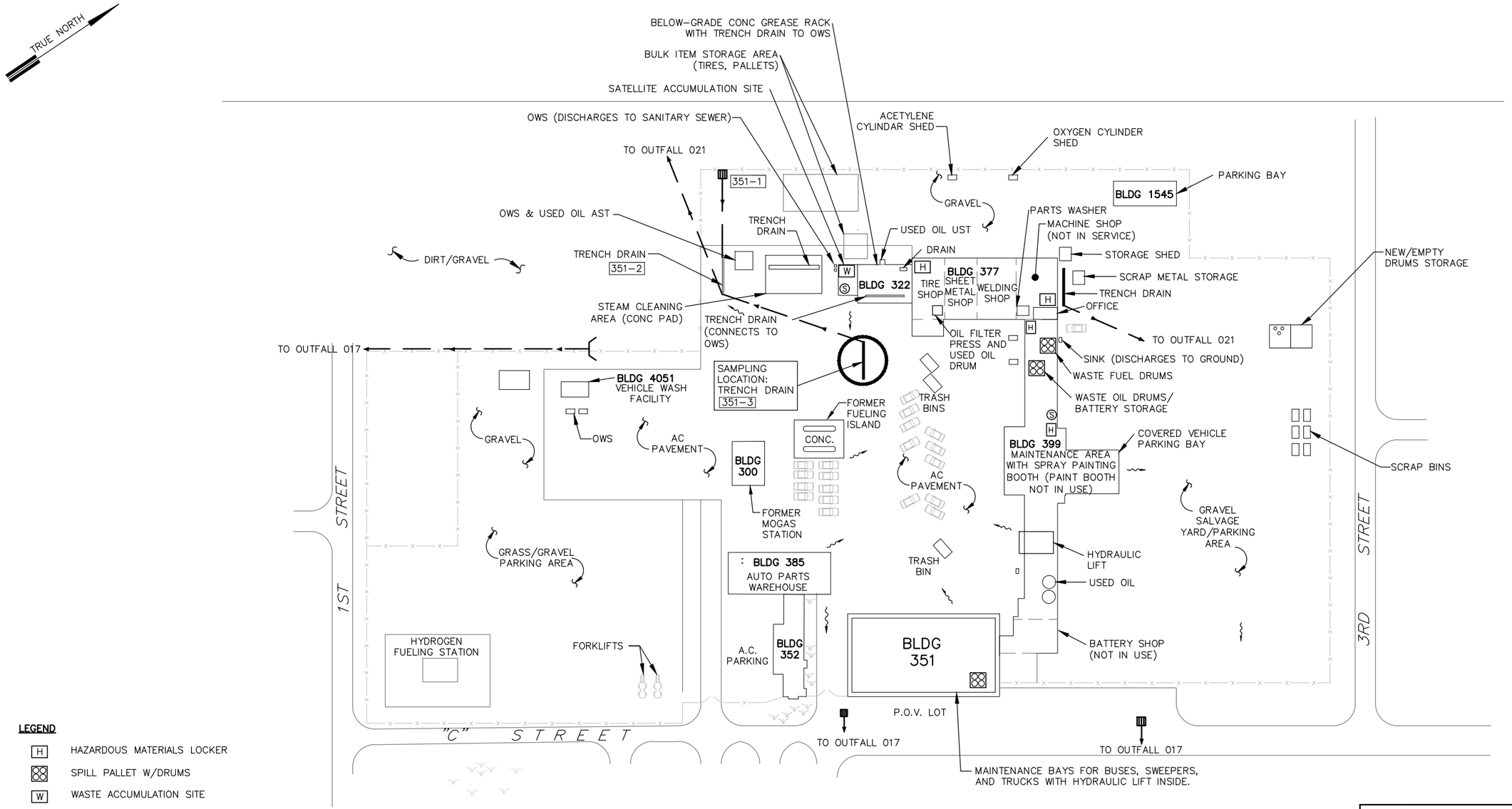
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Vehicle Maintenance Shop.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- STORM DRAIN SYSTEM
- FLOW ARROW

NOTES:

1. STORM WATER, FROM APPROXIMATELY 7.9 ACRES ASSOCIATED WITH BUILDING 351, DISCHARGES TO KANEOHE BAY VIA OUTFALLS 017 AND 021.
2. FLUIDS DRAINED FROM VEHICLES KEPT AT BAYS UNTIL FULL, THEN TRANSFERRED TO SAS ONSITE.
3. ABSORBENT PADS AND DRIP PANS TO BE PLACED UNDER ENTERING VEHICLES.
4. ALL INTERIOR FLOORS ARE CONCRETE UNLESS OTHERWISE NOTED.

VEHICLE MAINTENANCE SHOP (BUILDING 351)

NOT TO SCALE

element environmental llc
environmental · engineering · water resources

PROJECT TITLE:
STORM WATER POLLUTION CONTROL PLAN
MCB HAWAII, KANEOHE BAY, OAHU, HAWAII

FIGURE TITLE:
VEHICLE MAINTENANCE SHOP (BUILDING 351)

DATE: FEBRUARY 2016

FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

MOTOR VEHICLE MAINTENANCE – 3rd RADIO BATTALION (BUILDING 373)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
HMMWV	High Mobility Multipurpose Wheeled Vehicle (aka Humvee)
kW	kilowatt
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
POV	privately-owned vehicle
SAS	satellite accumulation site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Motor Vehicle Maintenance, Building 373

The Motor Vehicle Maintenance (3rd Radio Battalion), Building 373, is located within MCB Hawaii, Kaneohe Bay at the northeast corner of the intersection of “B” Street and 3rd Street. The facility encompasses approximately 8.5 acres and can be found in grid K18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Building 373 is a single-story “T”-shaped structure with a concrete slab floor and metal walls and roof. The facility is completely enclosed within chain-linked fencing with three access gates along 3rd Street. The portion of the building that parallels "B" Street is used as a furniture and bedding warehouse. The remaining portion of the building is used for vehicle maintenance, with offices and a tool room in between.

Hazardous Materials Coordinators:

LCpl. Dingman (808-257-2355)

Daniel Gonzales (808-257-0746)

The maintenance area has eight service bays with roll-up doors at each bay on the north and south sides of that portion of the building. The maintenance area is used to conduct minor service of military vehicles (including HMMWVs [High Mobility Multipurpose Wheeled Vehicles (aka humvees)]) and small portable and trailer-mounted 5 kilowatt (kW) and 7kW field generators. The humvees are fully fueled and ready to be deployed. Maintenance of outboard boat motors is no longer conducted at Building 373.

Significant amounts of hazardous materials are centrally stored in hazardous materials lockers or on spill pallets in the maintenance area inside Building 373, which is divided into the vehicle maintenance area and small generator maintenance area. A battery charging station, a rolling fueling cage, and an oil filter crusher/waste drain in the area. Bladders/drip pans are used inside and outside the building, and spills are absorbed as needed. Spill kits are available for each truck brought into the field. Waste materials, including used oil filters, drain waste, and oily rags, are collected at a satellite accumulation site (SAS) within the maintenance area of the building, and also within a large storage container outside and to the north of the maintenance area. Dry sweeping of hangar floors is conducted weekly; mopping is conducted as needed. Exterior dry sweeping is conducted annually.

The facility has asphalt-paved parking and storage areas for personal vehicles, humvees, portable and trailer-mounted field generators, trucks, amphibious carriers, and water carriers.

A wash rack is located at the northeast corner of the facility. A portable pressure washer is used for washing activities throughout the facility. Wash water is collected and conveyed to an oil/water separator (OWS), which discharges to the sanitary sewer system.

The area between Building 373 and "B" Street is covered with grass and asphalt driveways. The remainder of the compound is covered with gravel, except for an area southeast of Building 373, which is paved with asphalt. Storm water runoff from the northwest, west, and southwest sides of Building 373 percolates into the grass area with excess runoff flowing into drain inlets at the north or west sides of the building, or a catch basin along “B” Street (373-1) at the southeast corner of the building. Runoff

from the north side of the facility sheet flows over an asphalt-paved parking area and runoff from the east side of the facility percolates into the ground, with excess runoff entering drain inlets (one identified as 373-4). Runoff from the south side of the facility flows over the asphalt privately-owned vehicle (POV) parking area into a drain inlet located south of the building. All drain inlets around Building 373 are discharged to Kaneohe Bay via Outfall 021. The catch basin and two drain inlets at the south/southwest of the building were clogged at the time of the site visit.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Motor Vehicle Maintenance, Building 373:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading activities may collect in the soil or on paved surfaces and be carried away by storm water runoff. Materials are loaded and unloaded near the outdoor storage areas by the Building 373 vehicle maintenance entrance bay doors.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water runoff. All significant materials are procured through the MCB Hawaii Hazardous Materials Minimization (HazMin) Center. Significant materials are segregated and stored in hazardous materials lockers, or on spill pallets, located centrally inside the maintenance area inside the building. The satellite accumulation site (SAS) located in the same area, and outside along the fence on the north side of the maintenance area, are used to store hazardous waste before being sent to the MCB Hawaii HazMin Center for disposal.

The facility has asphalt-paved parking and storage areas for personal vehicles, humvees, portable and trailer-mounted field generators, trucks, amphibious carriers, and water carriers.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Motor Vehicle Maintenance include the loading and unloading of significant materials, pressure washing, and parking.

D. Significant Materials Inventory

The following is a list of significant materials found at the Vehicle Maintenance Shop:

- Diesel Fuel
- Mixed Fuels
- Antifreeze
- Lube Oil
- Grease
- Transmission Fluid
- Brake Fluid
- Mineral Spirits
- Used Oil
- Used Grease
- Used Paint
- Solvents
- Vehicle Batteries
- Battery Acid

2.2 Potential Storm Water Pollutants

The following list pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 373 if not managed properly:

- Oil & Grease (humvee parking)

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Motor Vehicle Maintenance employs good housekeeping practices throughout its operations. Good housekeeping practices for the Motor Vehicle Maintenance are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the SAS are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS

SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

Some areas at the Motor Vehicle Maintenance facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures, specifically there are large areas of bare soil and sediment around the drain inlets at the eastern side of the facility. Hydromulch or plant sod in the area to control erosion and prevent sediment runoff into the nearby drain inlets.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 373 are shown in Table 2-1.

Modifications to the existing BMPs at Building 373 are listed in Table 2-2.

New BMPs for implementation at Building 373 are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
002	Restrict access to Area and Equipment	The facility is completely surrounded by chain link fencing
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutant from being transported to receiving water. Drums of absorbent material and containment booms are readily available.
008	Train Employees to Properly Dispose of Waste	All staff members receive training on waste handling and disposal.
026	Routinely Clean Catch Basins	Debris accumulates in the grated inlet south of Building 373. Clean catch basins regularly to prevent clogging and accumulation of pollutants.
035	Park Vehicles on an Impervious Surface	Parking stalls are provided on impervious asphalt surfaces.
042	Use Drip Pans Under leaking Equipment	Drip pans are used under vehicles as necessary to catch hydraulic fluid leaks.
044	Conduct Maintenance Within a Building or Covered Area	All motor vehicle repair and maintenance are conducted inside the facility.
054	Do Not Allow Open Flames Near Flammable Material	Warning signs prohibiting smoking or open flames are posted.
057	Store Liquids and Significant materials Within a Building or Covered Area	All significant material containers are stored indoors or within a covered area.
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
122/146	Hydromulching/Sodding	Hydromulch or plant sod to control erosion and prevent sediment runoff into the nearby drain inlets, located at the eastern side of the facility.	NS	2016

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for Motor Vehicle Maintenance (3rd Radio Battalion) facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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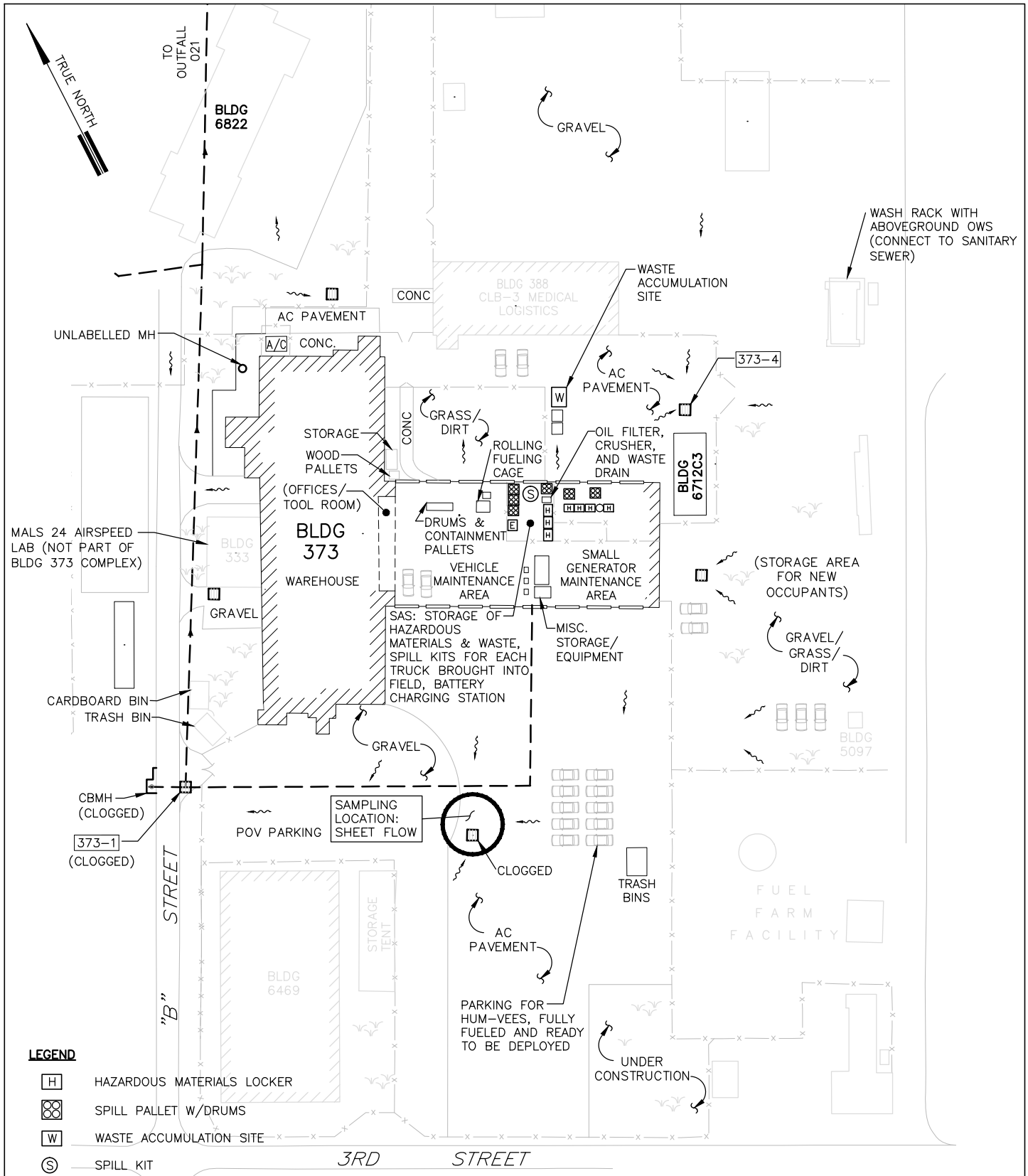

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- STORM DRAIN INLET
- FLOW ARROW

MOTOR VEHICLE MAINTENANCE SHOP (BUILDING 373)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 8.5 ACRES ASSOCIATED WITH BUILDING 373, DISCHARGES TO KANEOHE BAY VIA OUTFALL 021.
2. ALL OUTSIDE READY HUM-VEES HAVE DRIP PANS BENEATH VEHICLES.

	DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
	FIGURE TITLE: MOTOR VEHICLE MAINTENANCE SHOP (BUILDING 373)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

AIRCRAFT MAINTENANCE (BUILDING 375)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Aircraft Maintenance, Building 375

The Aircraft Maintenance, Building 375, is located within MCB Hawaii, Kaneohe Bay at the southeast corner of the intersection of "B" Street and 3rd Street. The facility encompasses approximately 5.9 acres and can be found in grid J18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Building 375 is a hangar used for aircraft maintenance. The facility is completely enclosed within chain-linked fencing with access gates along "B" Street. Large roll-up steel doors on the south side of the building are the primary means of aircraft entrance into the hangar. Office spaces and repair shop areas are located along the interior perimeter of the building. The offices and shop areas are shared by the 400 and 500 Divisions. The 400 Division generally occupies the western portion of the hangar and performs aircraft engine repair. All work is conducted inside the building. Drip pans are placed under all equipment. The 500 Division generally occupies the eastern portion of the hangar and includes airframes, hydraulics, machine, and tire shops. All work is conducted within the shops inside the building.

<u>Hazardous Materials Coordinator:</u>

Augustine Valencia (808-257-0906)

Building 5055, which is located south of Building 375, is the central hazardous material supply storage location and the satellite accumulation site (SAS) for Building 375. A smaller SAS specifically for the 500 Division is located to the southeast of Building 375, and stores used hydraulic/oil.

The area south of Building 375 is used to stage approximately 193 portable trailer van units, which can function as office and/or storage spaces.

An oil/water separator (OWS) is located near the southeast corner of Building 375. Also located near the east side of the building are Building 330, which is a restroom, and Building 1228, which is an inactive spray paint booth. No significant materials are stored outdoors.

Building 375 is surrounded by asphalt pavement and grass. The southwest side of the building that faces the hangar roll-up doors is paved with asphalt. Storm water runoff flows via sheet flow to the southwest and percolates into the grass areas. The northwest side of the building primarily consists of grass areas where storm water percolates into the grass. Excessive runoff flows onto "B" Street, enters the storm sewer system, and discharges into Kaneohe Bay through Outfall 021. Runoff from the northeast percolates into the grass areas, with excess runoff flowing via sheet flow onto 3rd Street, entering the storm sewer system, and discharging into Kaneohe Bay through Outfall 021. Runoff from the southeast percolates into grass and dirt/gravel areas, where excess runoff flows via sheet flow to a swale located southeast of Building 375.

Drip pans/cans are used to capture and contain liquids. Material spills onto the floor are contained and cleaned using spill absorbent materials from designated spill kits. A walk-behind floor scrubbing machine is available.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Aircraft Maintenance, Building 375:

A. *Material Loading and Unloading Areas*

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded inside the hangar of Building 375 and in front of the smaller buildings and sheds, including the two SASs.

B. *On-Site Material Storage and Disposal Practices*

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are procured through and returned for disposal to the MCB Hawaii Materials Minimization (HazMin) Center. Hazardous materials used at Building 375 are stored in lockers in the building, or on spill pallets in the nearby hazardous materials storage sheds (SASs). Used materials, oily rags, and oil sludge from the OWS are transported by facility personnel to the SAS for disposal. Used hydraulic fluid and used oil are transported by 500 Division personnel to their SAS for disposal.

C. *Outdoor Activities*

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. The majority of the activities associated with the facility is done inside the buildings. Outdoor activities at the facility include loading and unloading of significant materials, operation of the OWS, and staging of the storage vans/portable offices.

D. *Significant Materials Inventory*

The following significant materials are located at Building 375:

- Stripping Solution
- Used Oil
- Hydraulic/Lube Oil
- Paint Thinners
- Jet fuel
- Diesel
- Solvents
- Paints
- Adhesives
- Cadmium Plating
- GasolineR

2.2 Potential Storm Water Pollutants

The following list of pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 375 if not properly managed:

- Used Oil
- Hydraulic/Lube Oil
- Paint Thinners
- Solvents
- Paints

Materials that have <u>*not*</u> been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water

quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, Building 375 employs good housekeeping practices throughout its operations. Good housekeeping practices for Building 375 are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the SASs are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1.1 and are shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 to 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of Building 375 have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 375 are shown in Table 2-1.

Modifications to the existing BMPs at Building 375 are listed in Table 2-2.

New BMPs for implementation at Building 375 are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
002	Restrict Access to Areas and Equipment	The buildings are surrounded by chain-linked fencing.
006	Control Spills	Any spill of significant materials is controlled immediately to prevent pollutants from being transported to the receiving water. Drums of absorbent material and containment booms are readily available at the facility.
008	Train Employees to Properly Dispose of Waste	All staff members receive training on waste handling and disposal.
035	Park Vehicles on an Impervious Surface	Parking stalls are provided on impervious asphalt surfaces.
042	Use Drip Pans Under Leaking Equipment	Drip pans are used under equipment as necessary to catch leaks.
044	Conduct Maintenance Within a Building or Covered Area	All aircraft repair and maintenance are conducted inside the facility.
057	Store Liquids and Significant Materials Within a Building or Covered Area	All significant material containers are stored indoors.
097	Regularly Inspect and Maintain Storm Water Conveyance System	Storm water conveyance systems are inspected and maintained on a regular basis.
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.
085	Construct OWS	An OWS is utilized at the southeast corner of Building 375.

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
044	Conduct Maintenance Within a Building or Covered Area	Store mops and mop buckets inside.	NS	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Aircraft Maintenance Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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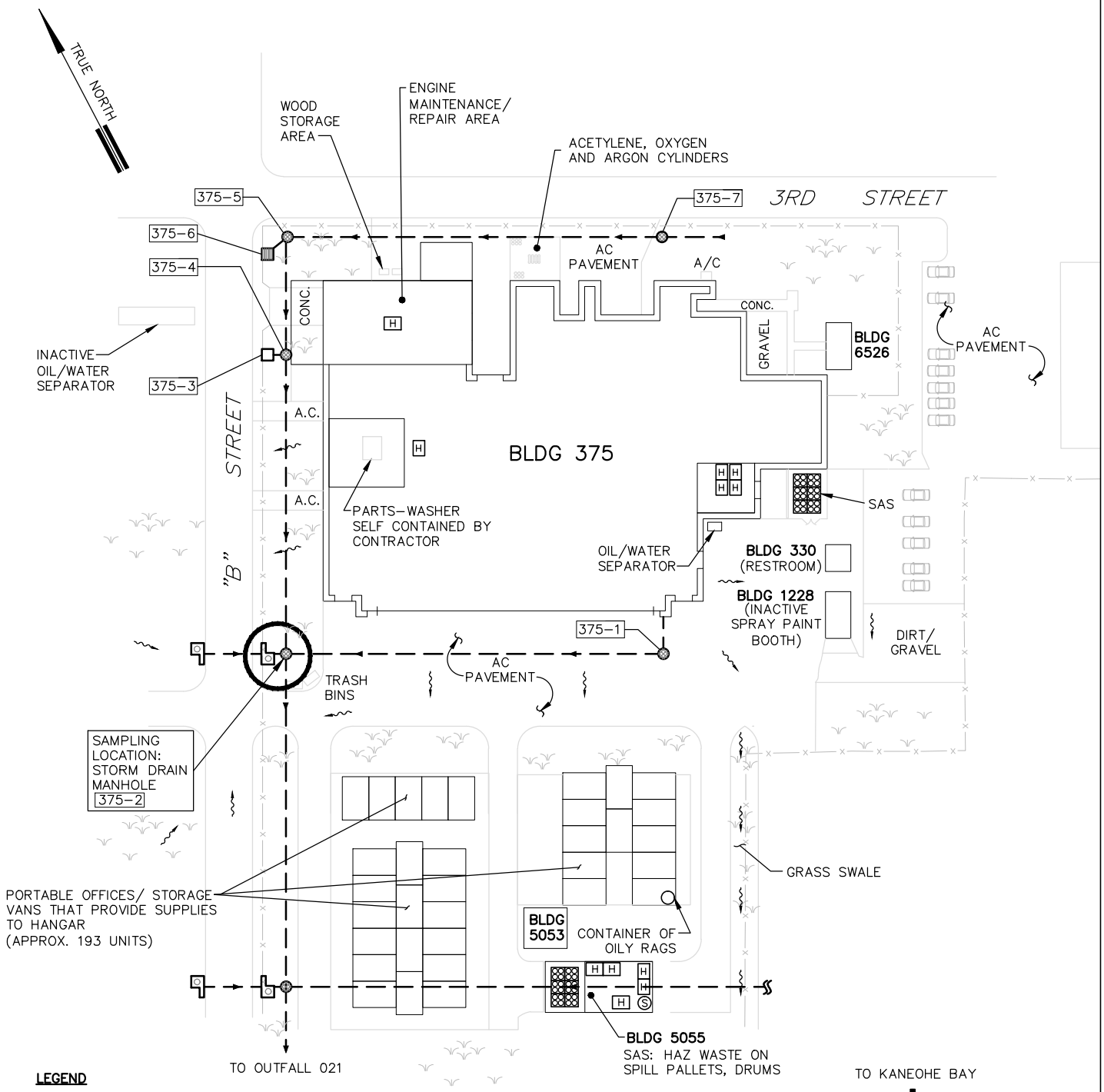

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- S — SPILL KIT
- STORM DRAIN SYSTEM
- STORM DRAIN INLET
- STORM DRAIN MANHOLE
- CATCH BASIN
- FLOW ARROW

AIRCRAFT MAINTENANCE (BUILDING 375)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 5.9 ACRES ASSOCIATED WITH BUILDING 375, DISCHARGES TO KANEOHE BAY OUTFALL 021.
2. FLOORS CLEANED USING WALK-BEHIND FLOOR CLEANING MACHINE
3. UNLESS OTHERWISE NOTED, FLOOR IN BLDG 375 IS CONCRETE.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: AIRCRAFT MAINTENANCE (BUILDING 375)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

AIRCRAFT FUEL ISLANDS (FACILITIES 1170 AND 1171)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Aircraft Fuel Islands, Facilities 1170 and 1171

The Aircraft Fuel Islands, Facilities 1170 and 1171, are located within MCB Hawaii, Kaneohe Bay to the northeast of Hangar 105 and east of the Runway. The facility encompasses approximately 3.3 acres and can be found in grid K19 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Ed Campbell (808-257-3187)

The Aircraft Fuel Islands are two identical outdoor fuel pumping facilities that are used for "hot fueling" of fixed and rotary-wing aircraft while aircraft are running in order to enable quick turn-around time between missions. The fuel islands receive fuel from the Aircraft Ready Fuel Storage (Tank 6479), and are operated by the MCB Hawaii Fuel Division (located in Building 370). Aircraft fly 24 hours a day, 7 days a week; however, jets can fly only until 10 pm.

The Aircraft Fuel Islands were reconstructed to accommodate the Navy P-3 Orion aircraft. Each island contains two fueling lanes (identified as Pits "A" through "D"), each of which has a concrete pavement fueling area with 6-inch containment curbs. The aircraft parks next to a station, the fuel hose that sits on metal supports are wheeled to the aircraft, and fueling is conducted. When aircraft are actively fueling, a spill kit and fire extinguisher are available nearby. When fueling is complete, the pressure in the line enables return of fuel within the hose.

Storm water runoff from the Aircraft Fuel Islands flows northerly via sheet flow toward a trench drain that extends across the full width of the two fueling lanes at each island. Both trench drains terminate at a concrete sump, where collected storm water is pumped onto the adjacent grass areas via sump pumps. The sump pumps are automatically controlled by level float switches. If fuel is visually detected within the concrete sump, it is pumped into 600-gallon tanks, and filtered to remove fuel) or absorbed will absorbent pads.

Fuel filters, piping, and other equipment are located on a concrete pad located in the open area between the two facilities. Storm water that accumulates in these areas drains to the trench drain sump associated with Fueling Island Facility 1170. In the unlikely event that the concrete sumps overflow, there are storm drain inlets between runways, near the Pit "A" and Pit "C" signage. These inlets discharge storm water to Kaneohe Bay via Outfall 024. There is an additional storm drain grate inlet located near the southwest corner of fuel island 1170. It connects to Outfall 021, which also discharges to Kaneohe Bay, however a heavy steel plate has been placed over it to prevent runoff from entering the storm drain system.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Aircraft Fuel Islands, Facility 1170 & 1171:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Active fueling is conducted at the Aircraft Fuel Islands. With the exception of fuel stored in relaxation chamber tanks, all fuel is stored at adjacent facilities.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. A small amount of fuel is stored at the central equipment area in the relaxation chamber tanks.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Aircraft Fuel Islands include the fueling of fixed wing aircraft, helicopters, and fuel trucks; and maintenance of motors, pumps, filters, relaxation chambers, valves, and meters at each fuel island, as needed.

D. Significant Materials Inventory

The following is a list of the significant material found at the Aircraft Fuel Islands:

- Jet Fuel

2.2 Potential Storm Water Pollutants

The following pollutant has been identified as having a reasonable potential to be present in storm water discharges from the Aircraft Fuel Islands.

- Jet Fuel

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Aircraft Fuel Islands employs good housekeeping practices throughout its operations. Good housekeeping practices for the Aircraft Fuel Islands are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to

determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas at the Aircraft Fuel Islands have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Aircraft Fuel Islands are shown in Table 2-1.

Modifications to the existing BMPs at the Aircraft Fuel Islands are listed in Table 2-2.

New BMPs for implementation at the Aircraft Fuel Islands are listed in Table 2-3

Appendix 11-3 has been included for reference because BMPs other than those identified in the SWPCP may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
002	Restrict Access to Area and Equipment	The facilities are located on the flight line, which is restricted to unauthorized personnel.
006	Control Spills	Spill kits are available nearby during active fueling.
009	Permanently Seal Drain Inlets that Discharge to Storm Drain System	Grated inlets terminate in sumps with manually controlled discharge pumps to prevent fuel from entering the storm water system.
011	Construct Berm or Dike around Critical Areas	Curbing exists around each fueling station, and along the edges of each facility.
024	Insert Filter in Catch Basin	Four drain inlets are equipped with filter fabric.
059	Monitor Major Fueling Operations	All fueling operations are closely monitored.
097	Regularly Inspect and Maintain Storm Water Conveyance System	Inspect and maintain storm water conveyance systems on a regular basis.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
006	Control Spills	Replenish spill kit supplies regularly, as needed.		

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

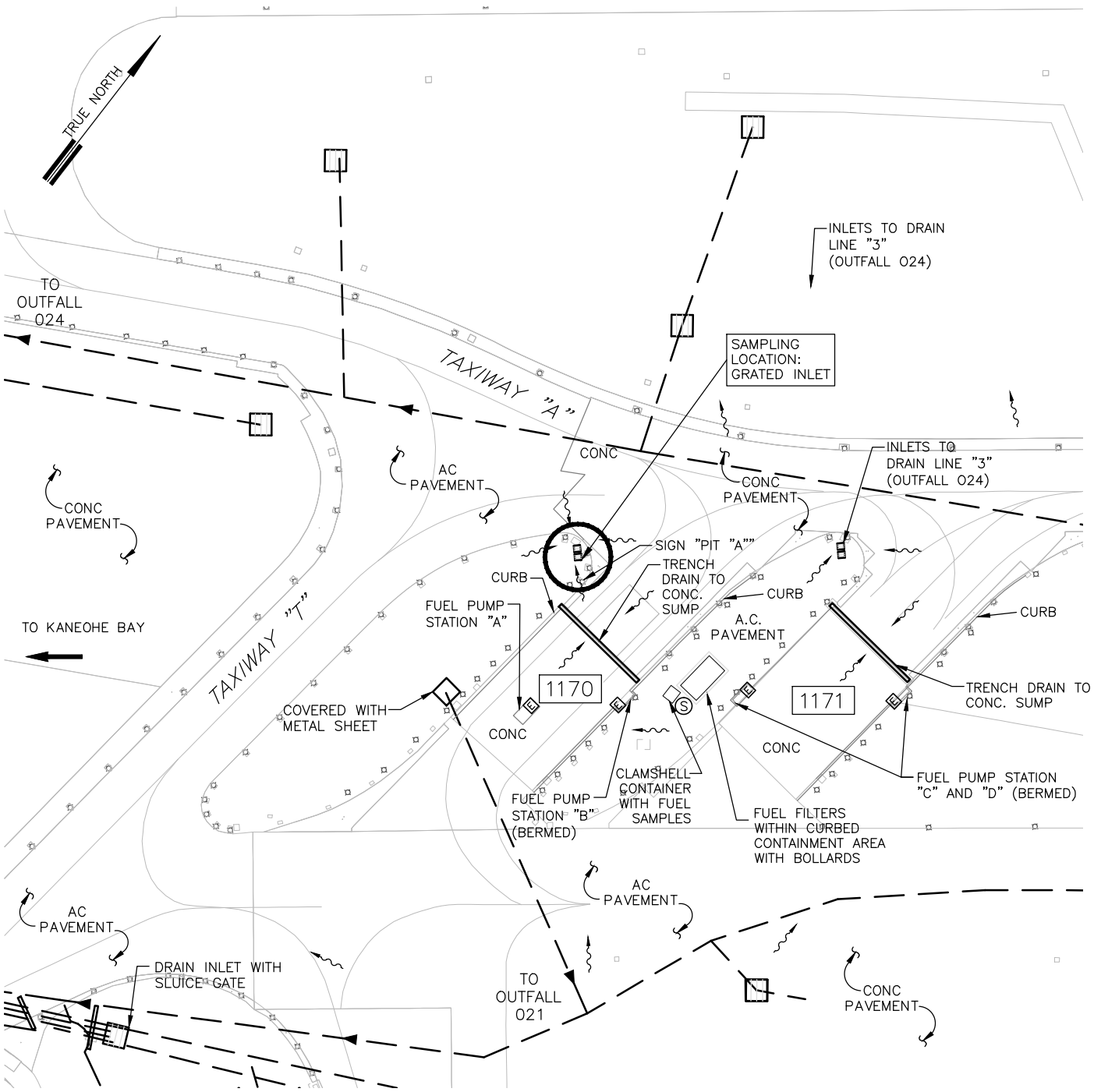
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Aircraft Fuel Islands.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



AIRCRAFT FUEL ISLANDS (FACILITIES 1170 & 1171)

NOT TO SCALE

LEGEND

- E — EYEWASH STATION
- S — SPILL KIT
- STORM DRAIN SYSTEM
- STORM DRAIN INLET
- FLOW ARROW

NOTE:

STORM WATER, FROM APPROXIMATELY 3.3 ACRES ASSOCIATED WITH FACILITIES 1170 & 1171, DISCHARGES TO KANEOHE BAY VIA OUTFALL 024 AND SHEET FLOWS TO SURROUNDING GRASS.

	DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
	FIGURE TITLE: AIRCRAFT FUEL ISLANDS (FACILITIES 1170 & 1171)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

FUEL DIVISION SUPPLY DEPARTMENT (BUILDINGS 1252 AND 1253)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MoGas	Motor Gasoline
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Fuel Division Supply Department, Buildings 1252 and 1253

The Fuel Division Supply Department is located within MCB Hawaii, Kaneohe Bay at the southwest corner of the intersection of "C" Street and 6th Street. The entire facility (with the exception of the government fueling area) is enclosed by chain-linked fencing with access gates, opened only during normal working hours. The Fuel Division Supply Department can be found in grid K17 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Ed Campbell (808-257-3187)

The Fuel Division Supply Department consists of two 30,000-barrel aboveground storage tanks (ASTs), distribution piping, and pumping facilities that serve as a fuel storage and a distribution station. The facility dispenses approximately 40,000 gallons of fuel per day. The two ASTs are located on impervious liners within containment berms, and are interconnected through a system of piping and valves. (Tank 1252 was not in use at the time of the site visit, due to issues with the concrete berm surrounding the tank and some structural issues within the tank itself.)

The ASTs receive fuel from tanker trucks through unloading pump stations located next to the ASTs. Fuel is distributed through a series of pumps to pump stations, to Tank 6479 and Building 1563, located within the fuel farm. An underground receiving pipe and supporting infrastructure has been installed for fuel delivery from Tank 6479, to the Aircraft Fuel Islands (Facilities 1170 and 1171). The underground system is inspected for leaks once every six months. Before Tank 1253 is completely emptied, the fuel contaminated water remaining at the bottom is pumped into a holding tank beside Building 1563. The fuel is separated for reuse onsite, using a Bowser truck, and the remaining water is collected in a separate tank and disposed of as hazardous waste.

Storm water accumulates within the lined containment berms of Tanks 1252 and 1253 and is allowed to evaporate. Each bermed area contains a sump and pump to remove accumulated storm water, as necessary. The storm water is visually inspected for signs of fuel or oil, and if detected the storm water is pumped into a holding tank beside Building 1563, after which the fuel is separated for reuse, and the remaining water is disposed of as hazardous waste. If no fuel or oil is detected, the storm water is discharged onto the adjacent gravel road and grass areas.

Building 1563 has four pump stations that pump jet fuel to tanker trucks. New tanker truck loading racks and pump stations, Buildings 1254, 347 and 6504, have been constructed to the south of Tank 1253. Building 347 pumps jet fuel to the 30,000-barrel ASTs, while Building 6504 pumps jet fuel to the 30,000-barrel ASTs as well as diesel and gasoline to the five 5,000-gallon ASTs located to the east of Tank 1253. The tanker truck delivery area for Buildings 1563, 1254, 347, and 6504 consists of a concrete pad with roll-over curbing. Storm water is directed to concrete sumps, one for Building 1563/Tank 6496 and one for Buildings 1254/347/6504, and pumped onto the surrounding grass area, where storm water accumulates. If fuel or oil is observed during manual inspection of the sump, absorbent pads are used

prior to discharging the remaining storm water to grass areas. Manual valves are located at the sumps and remain normally open to allow storm water to discharge onto adjacent grass areas.

Facility 6506 is located east of Tank 1253 and consists of five 5,000-gallon ASTs: two motor gasoline (MoGas), one biodiesel, one diesel, and one jet fuel (JP-8). The ASTs are constructed with double-walled steel equipped with leak detection, and are mounted on individual concrete pads with concrete curbing. Storm water is allowed to drain onto adjacent grass areas through manually-operated valves. The valves appear to normally remain open, although there are warnings painted on the curbing to keep the valves closed.

To the east of the ASTs (outside the fenced compound, at the corner of 6th Street and "C" Street) is a concrete-paved fueling area supplied by the five ASTs with roll-over curbing. There are three fueling islands with four pumps and six dispensers, which are used to fuel government vehicles. The first island has one dispenser (#1) for JP-8, the second island has one dispenser (#2) for B-20 (fuel comprised of 20% biodiesel and 80% petroleum diesel), and the third island has two pumps – one with dispensers for MoGas and diesel respectively, and one with two dispensers for E-85 (fuel comprised of 85% denatured ethanol and 15% gasoline). The E-85 pump is supplied by a 1,000-gallon AST, located to the east of the fueling area, stored on a concrete pad within chain-linked fencing. Storm water is allowed to drain onto adjacent grass areas through a manually-operated valve. The valve appears to normally remain open.

Runoff outside of the bermed areas or curbed/containment areas generally flows toward and percolates into the grass areas nearby. Storm water runoff to the north of the facility that does not percolate into the ground flows northerly toward catch basins along 6th Street and discharges to Kaneohe Bay through Outfall 021. Runoff to the southwest of the facility that does not percolate into the ground flows southerly/southwesterly toward catch basins at the end of 5th Street and discharges through Outfall 16B to Kaneohe Bay.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Fuel Division Supply Department:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Fuel is loaded and unloaded into tanks and tanker trucks through various pump and aboveground piping systems. Fuel is supplied to the dispensers through various above and belowground pump and piping systems.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant material associated with Fuel Division Supply Department is stored in ASTs (stationary and portable). Smaller quantities of hazardous materials

are stored on spill containment pallets, in drums over spill containment pallets, or within poly overpacks, near Building 1563. Fuel is recovered and reused on site as much as possible.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Fuel Division Supply Department include the storage, pumping, and dispensing of fuels.

D. Significant Materials Inventory

The following is a list of significant materials found at the Fuel Division Supply Department:

- Jet Fuel
- Diesel Fuel
- Biodiesel Fuel
- Gasoline
- Ethanol Fuel
- Engine Oil

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Fuel Division Supply Department if not properly managed:

- Jet Fuel
- Diesel Fuel
- Biodiesel Fuel
- Gasoline
- Ethanol Fuel
- Engine Oil

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Fuel Division Supply Department employs good housekeeping practices throughout its operations. Good housekeeping practices for the Fuel Division Supply Department are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas at the Fuel Division Supply Department have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Fuel Division Supply Department are shown in Table 2-1.

Modifications to the existing BMPs at the Fuel Division Supply Department are listed in Table 2-2.

New BMPs for implementation at the Fuel Division Supply Department are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
002	Restrict Access to Areas and Equipment	The Fuel Division Supply Department is surrounded by chain-linked fencing.
011	Construct Berms or Dikes around Critical Areas	Fuel storage Tanks 1252 and 1253 are enclosed within lined berms.
013	Provide Valve for Outlet Pipe in Containment Area	Bermed areas have a manual valve that is opened to release accumulated storm water only after water is found to be free of oily sheen.
051	Use Overpack Containers or Containment Pallets to Store 55-Gallon Drums or Containers Outside of Storage Area	Overpack containers and containment pallets are used to store drums and containers outside of storage area (and within Bldg 1563 containment area).
064	Restrict Access to Tanks	The E-85 tank is surrounded by chain-linked fencing.
066	Keep Tanks, Piping, and Valves in Good Condition	ASTs, valves, and piping are inspected for leaks and/or signs of structural deficiencies.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
013	Provide Valve for Outlet Pipe in Containment Area	Normally keep all drain valves from curbed/bermed containment at Facility 6506 and other areas closed.	NS	2016

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
067/068	Protect Tanks/Fill Pipe from Being Damaged by Vehicles	Install bollards where the exposed aboveground piping at Building 1563 is accessible to vehicles to protect the piping. Also protect the hazardous materials storage area located at the building.	S	2017

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training for potential pollutant spills, as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Additional quarterly training is provided for MCB Hawaii's Environmental Standard Operating Procedures.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Fuel Division Supply Department.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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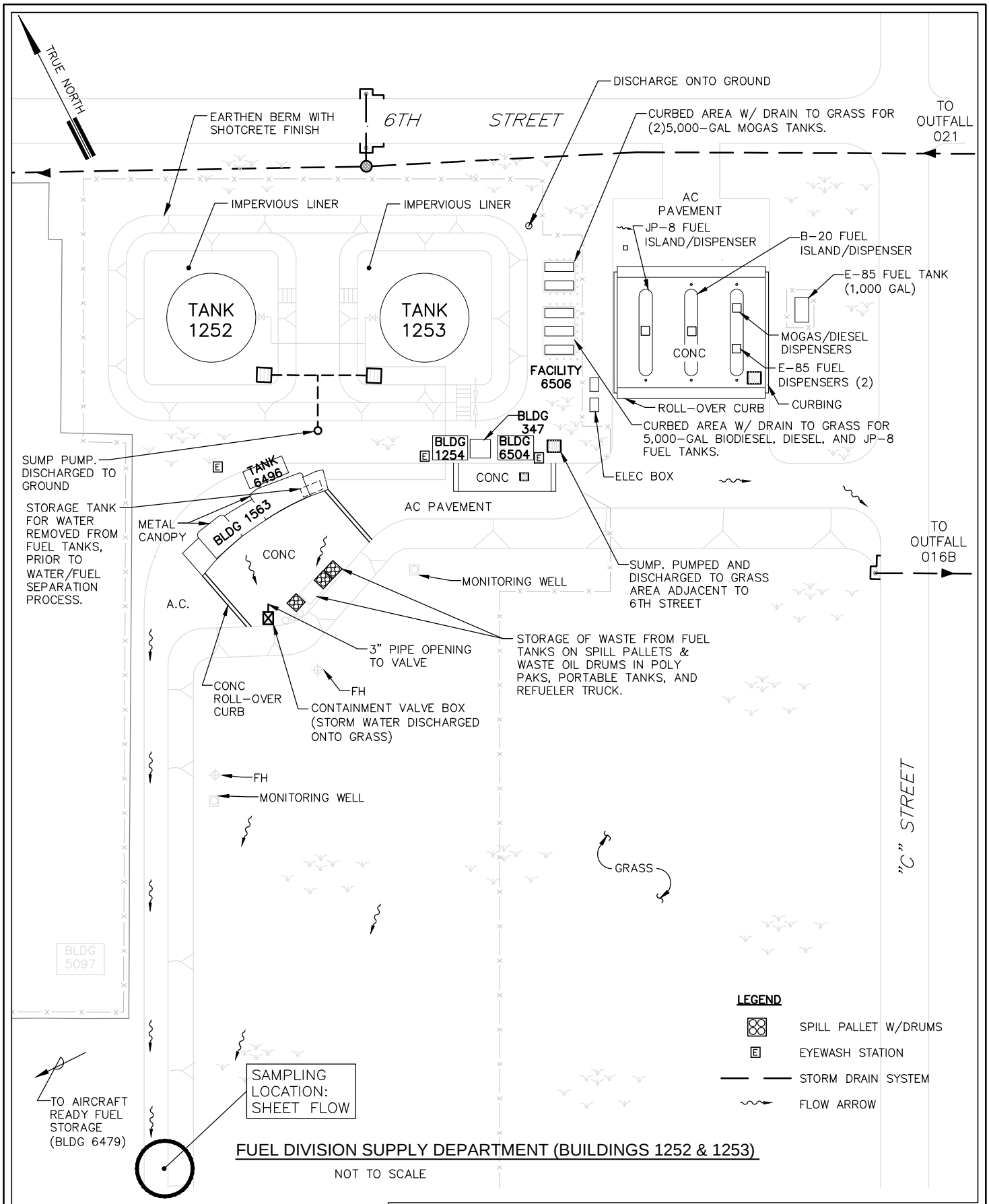

FUEL DIVISION SUPPLY DEPARTMENT (BUILDINGS 1252 & 1253)

NOT TO SCALE

NOTE:

STORM WATER, FROM APPROXIMATELY 9.5 ACRES ASSOCIATED WITH BUILDINGS 1252 & 1253, IS DISCHARGED TO KANEOHE BAY VIA OUTFALLS 016B, 018 AND 021.

DATE:	PROJECT TITLE:
FEB 2016	STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
FIGURE TITLE: FUEL DIVISION SUPPLY DEPARTMENT (BUILDINGS 1252 & 1253)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

ORDNANCE OPERATIONS (BUILDING 1304)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	satellite accumulation site
SDMH	storm drain manhole
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Ordnance Operations, Building 1304

The Ordnance Operations, Buildings 1304, is located within MCB Hawaii, Kaneohe Bay on the western side of Palikilo Road. The facility encompasses an area of approximately 3.9 acres and can be found in grid N19 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

GM2 Santini (808-257-0086)

Ordnance Operations stores and performs maintenance on aircraft armament support equipment. Building 1304 consists of an “”L”-shaped office building with a large covered storage area at its center (with a concrete floor). All equipment at the Ordnance Operations facility is stored inside of the structure or under the covered area. Drip pans are used under the equipment. The storage area has four floor drains.

Hazardous materials are stored in flammable lockers and on spill pallets (alongside a spill kit) in a covered structure at the northwest corner of the facility. A satellite accumulation site (SAS) is located to the east, under the covered storage area.

Building 5061 is located northwest of Building 1304 and consists of a concrete wash pad and oil/water separator (OWS). All wash water is directed to the OWS, which discharges to the sanitary sewer system. The wash pad and OWS are currently not in use.

The areas surrounding Building 1304 consist of asphalt paved, concrete paved, or gravel driveways, and grass on both the north and south ends. Storm water runoff on the east side of the building sheet flows easterly toward a grass swale. The swale directs runoff to the north where it is discharged into a vegetated area. Runoff on the north side of the building sheet flows northerly and then northwesterly to the nearby vegetated area. Runoff generated on the west side of the building sheet flows in a westerly direction to the vegetated area located along the western border of the site. Runoff generated on the south side of the building sheet flows in a southerly direction then in a westerly direction to a catch basin located beyond the driveway outside the southwest corner of the site which discharges storm water to Kaneohe Bay via Outfall 030.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Ordnance Operations, Buildings 1304:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Materials are loaded and unloaded at the covered storage areas.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials associated with the Ordnance Operations are stored in flammable lockers or on spill pallets in a covered structure, at the northwest corner of the facility. Used oil and paint debris are stored in the SAS within the large covered storage area.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Ordnance Operations include loading and unloading of materials at the covered storage areas. All repair and maintenance work is done under the covered area.

D. Significant Materials Inventory

The following significant materials are located at the Ordnance Operations facility:

- Spray Paints
- Brake Fluid
- Corrosion Prevention Compound
- Solvents
- Gasoline
- Metals
- Lube Oil
- Grease
- Cleaning Compound
- Isopropyl Alcohol
- Diesel

2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Ordnance Operations facility.

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Ordnance Operations Facility employs good housekeeping practices throughout its operations. Good housekeeping practices for the Ordnance Operations facility are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection

of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Ordnance Operations facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 1304 are shown in Table 2-1.

Modifications to the existing BMPs at Building 1304 are listed in Table 2-2.

New BMPs for implementation at Building 1304 are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers of significant materials, when onsite, are labeled.
016	Limit Significant Materials Inventory	Significant materials are checked in and returned off-site daily. There is no storage of significant materials inventory on-site.
044	Conduct Maintenance Within a Building or Covered Area	Maintenance of equipment is conducted at designated covered areas.
057	Store Liquids and Significant Materials Within a Building or Covered Area	All significant material containers are stored indoors.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. SPCC training is performed quarterly.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Ordnance Operations facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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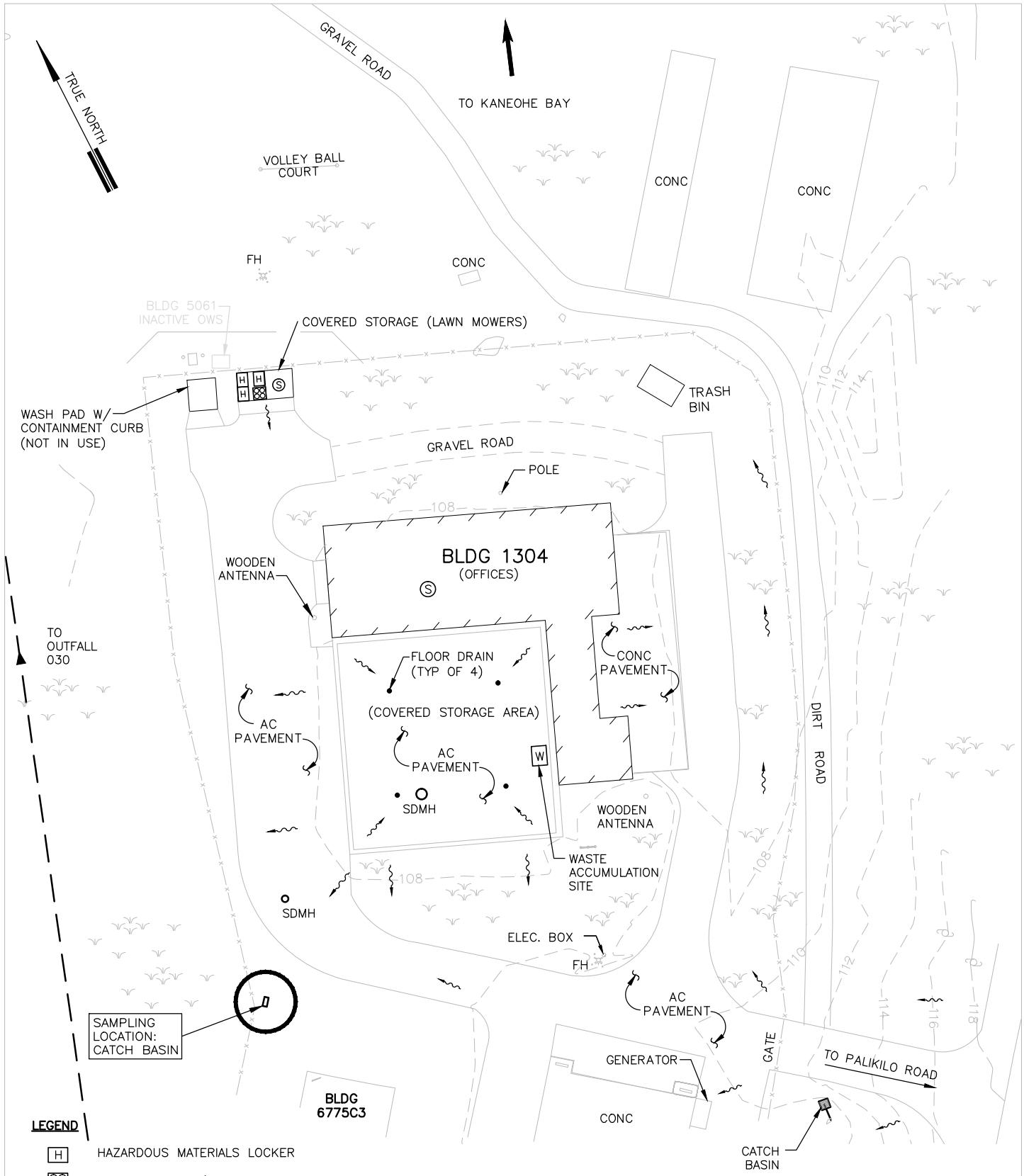

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- STORM DRAIN SYSTEM
- FLOW ARROW

NOTE:

STORM WATER, FROM APPROXIMATELY 3.9 ACRES ASSOCIATED WITH BUILDING 1304, DISCHARGES TO KANEOHE BAY VIA OUTFALL 030.

ORDNANCE OPERATIONS (BUILDING 1304)

NOT TO SCALE

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: ORDNANCE OPERATIONS (BUILDING 1304)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

LAB/BOAT SHOP (BUILDING 1388)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
PPE	personal protective equipment
SAS	satellite accumulation site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Lab/Boat Shop, Building 1388

The Lab/Boat Shop, Building 1388 (has since been demolished and replaced by Building 6802), is located within MCB Hawaii, Kaneohe Bay at the south end of the building complex located at the southwest corner of the intersection of Sumner Street and Perimeter Road. The facility encompasses approximately 3.2 acres and can be found in grid L22 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

P.O. Stackpole (808-257-2941)

The Lab/Boat compound, which is enclosed in chain-linked fencing, consists of three main buildings (Buildings 6801, 6802 and 1623) and ancillary structures, including Buildings 1620 and Tank 1203. In the previous MS4 Permit, the facility was partnered with a Marine Mammal Research Project for the University of Hawaii (UH). Currently the facility is more directed to Waterfront Operations, responsible for security and spill response at MCB Hawaii. Building 1385 is not part of the Waterfront Operations Facility. The Lab/Boat Shop, Building 1388 will be referred to herein as the Boat Shop, Building 6802.

Building 6801 serves as the Waterfront Operations Administration Building. The Boat Shop is contained in Building 6802, located at the northeast corner of the compound. Boat parking, repair, welding, painting, woodworking, and maintenance activities take place inside the building. Two parts washers, hazardous materials lockers, and a spill kit are also stored here. Used rags are stored in cans and used oil is stored in 55-gallon drums on spill containment pallets inside the building. Drip pans are used under leaking equipment.

Boats and trailers are parked outside on the concrete pavement to the south of the building. Adjacent to Building 6802 to the east are two satellite accumulation sites (SASs). One is inactive, and is to be removed, the other actively stores hazardous waste materials. Across the compound to the south is Building 1623, which serves as storage for Waterfront Operations. Equipment and dry materials, such as piping, racks, wood, and empty bilgewater drums, are stored here. A trench drain extends between the two buildings, collecting storm water runoff from the concrete paved boat/trailer parking for discharge through a dirt ditch with corrugated HDPE discharge pipe (Outfall 027). The MILCON project to construct a new ramp, pave the front parking lot (north of Building 6802), and modify the outfall pipe is ongoing, and will likely be completed within a few months.

To the southwest of the compound is Building 1620 and boat ramp. The southern end of Building 1620 is used to store personal protective equipment (PPE) such as hard hats and gloves. Between the building and boat ramp is a concrete-paved boat rinse facility and 1,000-gallon gasoline aboveground storage tank (AST) equipped with a dispensing pump (Tank 1203). Boats are rinsed only with fresh water (no detergents). The AST is used to fuel small boats. The concrete access driveway to the boat rinse facility has concrete curbs on all sides, with roll-over curbs for vehicle access. Storm water collected in this secondary containment area is released to the ground after visual inspection, through a manually-operated valve near the southeast corner of the pad. A corrugated metal shed (no numerical designation), located to the west of Building 1620, is empty and may be demolished in the future.

Storm water generated in other areas are site either pool in the grass area surrounding Building 1620, or a discharged to Kaneohe Bay via surface runoff or Outfall 027.

Building 6802 is swept daily; spills are cleaned with absorbents. The grass in the compound is cut on Fridays. No street sweeping is conducted at the facility.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Boat Shop, Building 6802:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Loading and unloading of significant materials is conducted at the entrance of Building 6802 and at the gasoline AST.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. Significant materials associated with boat repairs are stored inside hazardous materials lockers and wastes are stored on spill containment pallets within Building 6802. The gasoline AST is located near Building 1620.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Boat Shop include boat rinsing (with fresh water only and no detergent), maintenance, parking, and fueling. Boat rinsing, with fresh water only and no detergent, is considered an allowable occasional incidental non-storm water discharge for this facility. Any boat rinsing activities using engine wash or detergents with be conducted in the concrete, bermed Boat Rinse Facility, with discharge released to the adjacent grass area after passing a visual inspection.

D. Significant Materials Inventory

The following significant materials are located at the Boat Shop:

- Gasoline
- Fuel Conditioner
- Paint
- Paint Thinner
- Hydraulic Fluid
- Brake Fluid
- Engine Wash (“Salt Away”)
- Grease
- Lube Oil
- Air Tool Oil
- Adhesive
- Used Oil
- Bilge Water

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Boat Shop if not properly managed:

- Gasoline

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Lab/Boat Shop employs good housekeeping practices throughout its operations. Good housekeeping practices for the Boat Shop are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Lab/Boat Shop have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 6802 are shown in Table 2-1.

Modifications to the existing BMPs at Building 6802 are listed in Table 2.-2.

New BMPs for implementation at Building 6802 are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers and the tank are labeled.
003	Perform Regular Cleaning	Regular sweeping is conducted at Building 6802.
006	Control Spills	Absorbent material and spill kits are available on-site.
011	Construct Berm or Dike around Critical Areas	The concrete access driveway to the boat rinse facility/AST fuel dispensing area has concrete curbs on all sides, with roll-over curbs for vehicle access.
035	Park Vehicles on an Impervious Surface	Boats and trailers are parked on the concrete floor inside Building 6802 and outside on the concrete pavement to the south of the building.
039	Wash Equipment and Vehicles in Designated Area	Boats are washed at the designated boat rinse facility, only with fresh water (no detergents).
042	Use Drip Pans under Leaking Equipment	Drip pans are used under leaking equipment (in Building 6802).
044	Conduct Maintenance Within a Building or Covered Area	All boat maintenance is conducted indoors (at Building 6802).
057	Store Liquids and Significant Materials Within a Building or Covered Area	All significant material containers, including used rag containers, are located within a covered area (in Building 6802).
067	Protect Tanks from Being Damaged by Vehicles	Bollards are erected in front of the gasoline AST to protect it from being damaged by vehicles.
077	Do Not Discharge Bilge Water in Harbor	Bilge Water is disposed of in 55-gallon drums.
100	Conduct Personnel Training Regarding the SWPPP	Spill prevention training is given to site personnel quarterly.

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
032	Dispose of Obsolete Equipment, Inoperable Vehicles, and Surplus Materials	Demolish and/or remove former SAS near Building 6802 and the one empty storage shed near Building 1620 if it will no longer be utilized.	S	2016

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. The Facility Spill Response Manager provides personnel with SPCC training on a quarterly basis.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Lab/Boat Shop facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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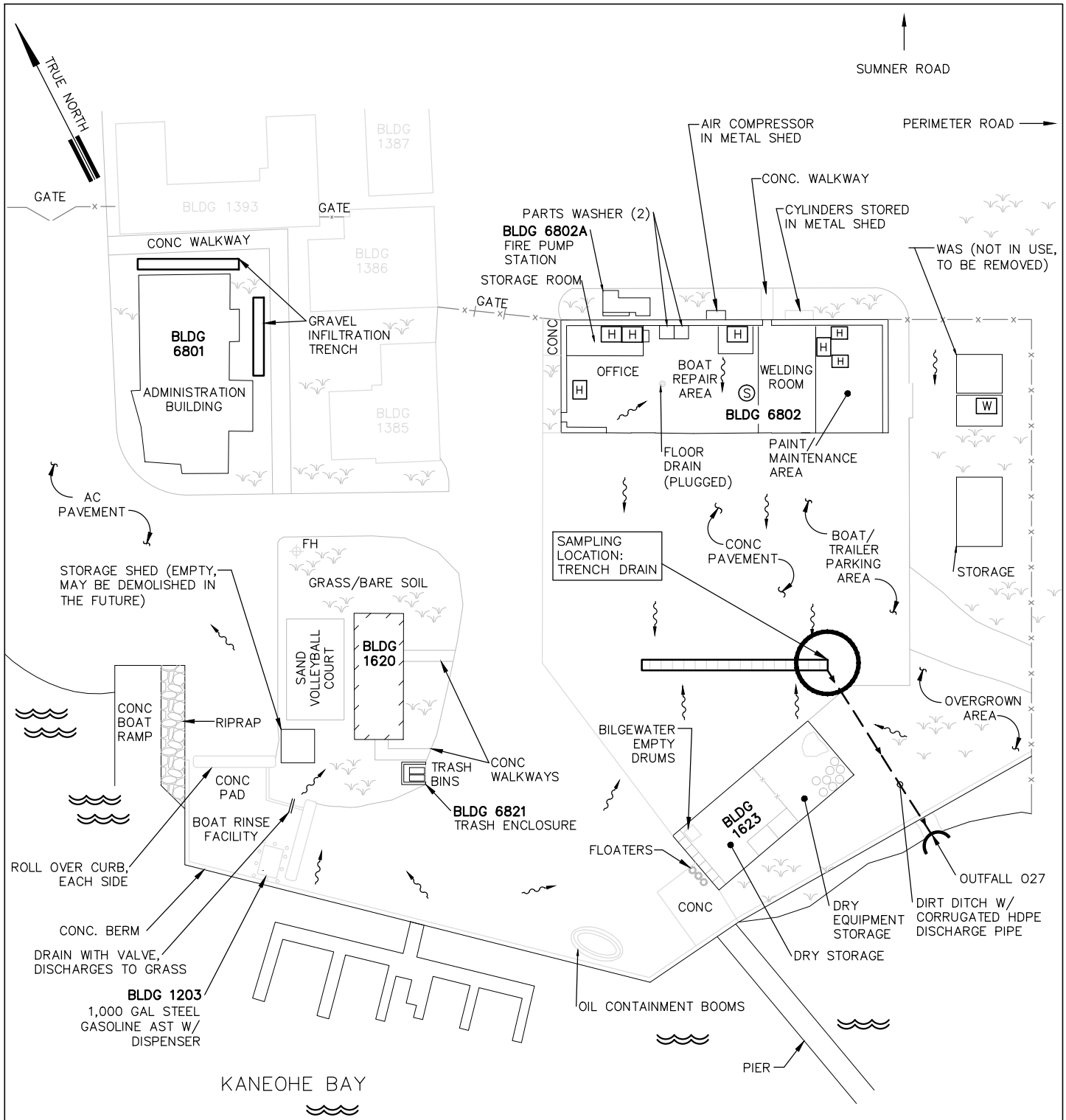

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- STORM DRAIN SYSTEM
- STORM DRAIN INLET
- FLOW ARROW

LAB/BOAT SHOP (BUILDING 1388)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 3.2 ACRES ASSOCIATED WITH BUILDING 6802 (FORMERLY BUILDING 1388) IS DISCHARGED TO KANEOHE BAY VIA OUTFALL 027.
2. CONCRETE FLOORS IN BUILDINGS UNLESS OTHERWISE NOTED.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: LAB/BOAT SHOP (BUILDING 1388)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

GROUND SUPPORT EQUIPMENT SHOP (BUILDING 1619)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CBMH	catch basin manhole
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
GSE	Ground Support Equipment
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	Satellite Accumulation Site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Ground Support Equipment Shop, Building 1619

The Ground Support Equipment (GSE) Shop, Building 1619, is located within MCB Hawaii, Kaneohe Bay on 1st Street between "B" Street and "C" Street. The facility encompasses approximately 3.8 acres and can be found in grid H18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

AS2 Hamm (808-257-0023)

CPL Boose, MALS-24

The GSE Shop stores and maintains ground support equipment such as bucket lifts, engine hoists, pulleys, and stands. The GSE facility consists of five single-story, corrugated metal buildings (with the exception of the building still under construction at the north side of the compound, which is constructed of concrete) and a storage locker 5062 and storage shed 5064, secured within chain-linked fencing. Building 1619 located at the west side of the compound houses offices and a maintenance area with a parts washer and a battery charging station.

Building 4036 is located at the south (front) of the compound and is used as a GSE Holding Shed. A roof structure covers the area between Buildings 4035 and 4036, and extends to the western side of Building 320. The covered area is used for storage of equipment as well as the two satellite accumulation sites (SASs), Lockers T036 and T037, along with other amounts of significant materials stored in flammable lockers or on spill pallets. The equipment is typically stored within spill containment bladders.

Building 4035, attached to Building 4036 to its northwest, is a completely self-contained spray painting booth, internally divided for painting and sandblasting. A precipitator for collecting sand particles is attached on the north-central side of the booth. An open concrete slab with a grated inlet adjacent to Building 4036 is used for support vehicle and equipment washing. The grated inlet drains to a below-grade oil/water separator (OWS), located at the southwest corner of the facility, and discharges to the sanitary sewer system.

Building 320, located to the east of Building 4036, was formerly used as the Field Maintenance Shop, but is currently used as a locker room and long-term storage area. The building is a Quonset-hut style structure with domed metal roof and concrete slab floor. A wash pad with wash water recycling equipment is located at the northwest corner of Building 320.

The majority of the compound (with the exception of a small grass/gravel area to the southeast of Buildings 320 and 4036) is paved with asphalt or concrete. Storm water runoff from the concrete surfaces west of Building 1619 flows into a trench drain that is connected to the OWS. Storm water runoff from the paved areas between Buildings 1619 and 4035/4036 flows southerly down the driveway, enters 1st Street, and then flows southeasterly into two catch basins (320-1 and the other identified) associated with Outfall 017, which discharges to Kaneohe Bay. A trench drain at the west side of Building 4036 (constructed primarily to collected rain water from the roof gutters of Building

4036) can also collect water in this area, conveying water to the same catch basin manhole (CBMH) (320-1). The remaining runoff drains away from the building in all directions and percolates into the grass areas outside of the compound. During the site visit it was observed that a trench drain adjacent to the west side of Building 4036 is connected to the storm drain system. It is recommended that this drain be disconnected from the storm drain system and all runoff directed to the OWS which connects to the sanitary sewer system. Interim protection BMPs should be added immediately to prevent this drain from coming into contact with pollutants. Any washing or temporary equipment or material storage activities should be conducted away from this area, and in secondary containment.

The concrete floors in Buildings 1619 and 4036 are swept at the end of each day. Any oil spills are hand-wiped with absorbents, collected together with any used absorbents from the drip pans/pallets or bladders, double-bagged, and stored in the SAS. Once about every three months, the floors are cleared for pressure-washing after the daily procedure of sweeping and cleaning of oil spills. The wash water enters the drain at the center of the concrete wash down area, which is connected to an oil water separator and discharges to the sanitary sewer system. Hydroponic pads are used to collect grease and occasionally dirt from the wash down, and are disposed along with the other absorbents in the SAS.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Ground Support Equipment Shop, Building 1619:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Loading and unloading of significant materials is conducted at the roll-up doors at the southeast side of Building 1619 and along the southwest and south sides of Building 4036.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. Significant materials stored in flammable lockers or on spill containment pallets are primarily located throughout Building 4036. Additional amounts of materials are stored in Building 1619 and Building 4035 (Paint Booth). Waste materials are stored in SAS Lockers T036 and T037 in Building 4036, as well before being sent to the MCB Hawaii HazMin Center for disposal.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the GSE Shop include the loading/unloading and transporting of materials, washing GSE and the floors of Building 4036 (wash water is swept outside to drain into the OWS), and vehicle parking. GSE maintenance is performed under cover.

D. Significant Materials Inventory

The following is a list of significant materials found at the GSE Shop:

- Gasoline
- Diesel Fuel
- Hydraulic Fluid
- Lube Oil
- Grease
- Solvents
- Isopropyl Alcohol
- Paints
- Paint Thinner
- Antifreeze
- Brake Fluid
- Battery Acid
- Used Oil
- Used Fuel

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 1619 if not properly managed:

- Used oil

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite. Spills occurring within the GSE and Building 4036 are spot cleaned prior to floor washing, when wash water is swept outside to the OWS drain inlets.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the GSE Shop employs good housekeeping practices throughout its operations. Good housekeeping practices for the GSE Shop are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective

action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas at the GSE Shop have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the GSE Shop are shown in Table 2-1.

Modifications to the existing BMPs at the GSE Shop are listed in Table 2-2.

New BMPs for implementation at the GSE Shop are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers of significant materials are labeled.
002	Restrict Access to Area and Equipment	The facility is fenced and gates padlocked outside normal working hours to restrict access to the site.
006	Control Spills	Spill kits are provided at the facility. Absorbents are used to clean spill on a daily basis. Absorbents are also utilized within drip pans/bladders to facilitate cleaning.
028	Keep Equipment and Vehicles Clean	Vehicles and GSE are cleaned regularly at a designated area.
029	Maintain Equipment in Good Condition	Vehicles and mobile support equipment are inspected for leaks regularly and repaired or replaced as required.
034	Park Vehicles or Equipment Indoors or under a Roof	All equipment is parked under a roof.
035	Park Vehicles on an Impervious Surface	All vehicles are parked on an impervious surface.
039	Wash Equipment and Vehicles in Designated Area	Vehicles and equipment are washed at a designated area.
040	Discharge Waste Water to Sanitary Sewer	The wash down water collects in the OWS and discharges to the sanitary sewer.
042	Use Drip Pans under Leaking Equipment	Drip pans/pallets and bladders, along with absorbent pads, are utilized under leaking equipment.
044	Conduct Maintenance within a Building or Covered Area	Maintenance of GSE is conducted at a designated and covered area.
057	Store Liquids and Significant Materials within a Building or Cover Area	All significant materials are stored within a building or covered area.
071	Vacuum Particulate Wastes from Sanding or Painting Operations	Precipitator is constructed for particulate wastes from the spray painting booth.

BMP No.	BMP Title	Description
085	Construct OWS	A below-grade OWS for the wash down area is located at the southwestern corner of the facility.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
006	Control Spills	Clean oil spots in asphalt parking lot.	NS	2016
009	Permanently Seal Floor Drains that Discharge to the Storm Drain System	Permanently seal trench drain adjacent to Building 4036.	S	2016
039	Wash Equipment and Vehicles in Designated Area	Construct a concrete berm long the eastern and southern borders of the asphalt parking area south of Building 4036 to better contain the floor wash water.	S	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Additional training is conducted weekly or every two weeks; training topics include spill containment, and general cleanup and spill response.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Ground Support Equipment Shop.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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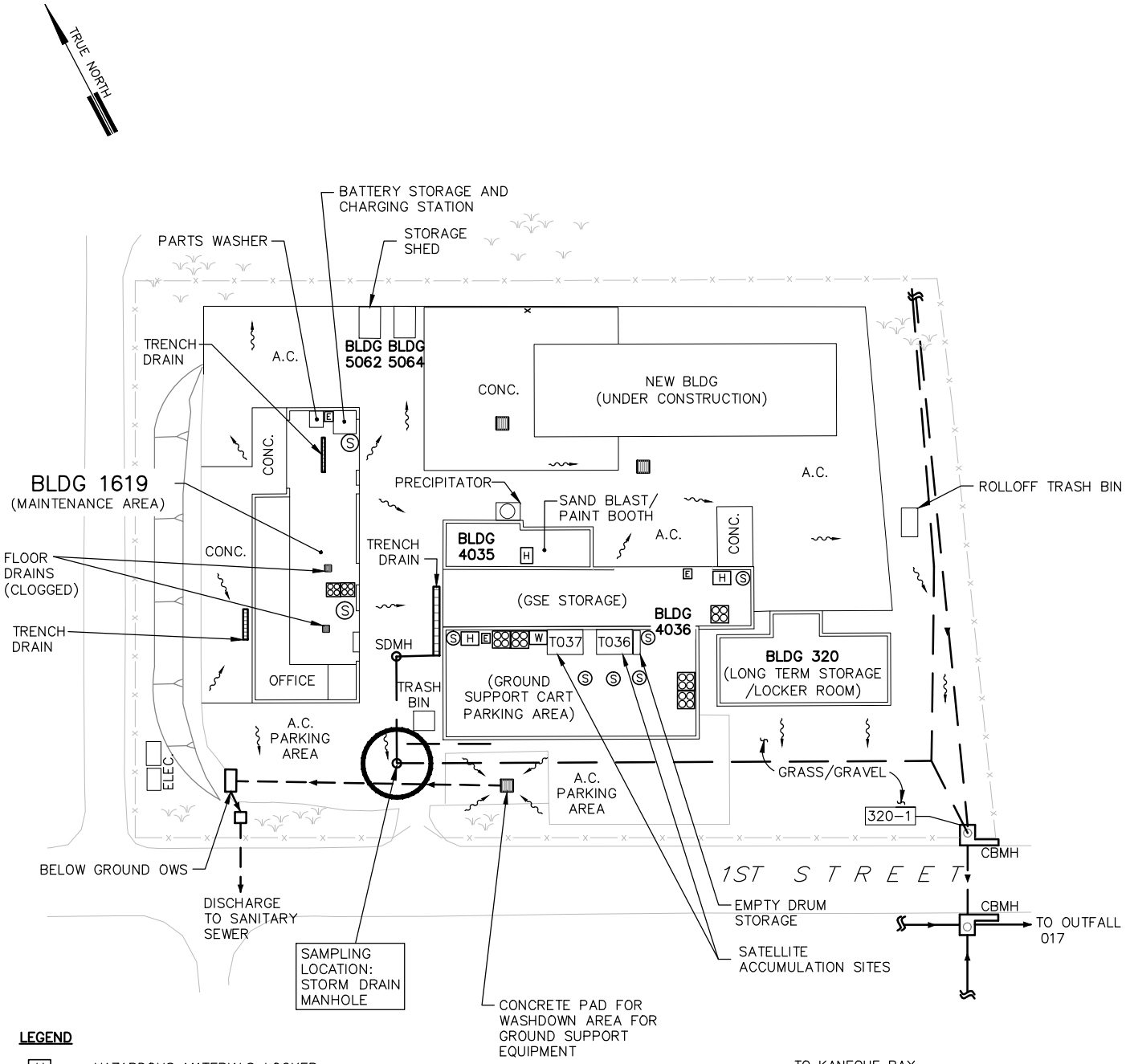

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- STORM DRAIN INLET
- SANITARY SEWER SYSTEM
- FLOW ARROW

GROUND SUPPORT EQUIPMENT SHOP (BUILDING 1619)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 3.8 ACRES ASSOCIATED WITH BUILDING 1619, DISCHARGES TO KANEOHE BAY VIA OUTFALL 017.
2. ALL BUILDINGS HAVE CONCRETE FLOORS UNLESS NOTED OTHERWISE.
3. FLOOR DRAINS IN BUILDING 1619 DRAIN TO OWS.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: GROUND SUPPORT EQUIPMENT SHOP (BUILDING 1619)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

AIRCRAFT WASH AND RINSE FACILITY (BUILDING 1631)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

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1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

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1.2 Updating the SWPCP

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The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

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- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Aircraft Wash and Rinse Facility, Building 1631

The Aircraft Wash and Rinse Facility, Building 1631, is located within MCB Hawaii, Kaneohe Bay on "B" Street between 1st Street and 3rd Street. The facility encompasses approximately 1.6 acres and can be found in grid J18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Augustine Valencia (808-257-0906)

The Aircraft Wash and Rinse Facility is used to hand-wash aircraft using detergents and to rinse aircraft using high pressure water. The facility is comprised of a bermed concrete pad with roll-over curbing at its north side. The pad is sloped toward two drains that empty into a large below-grade oil/water separator (OWS) located to the east of the pad. The OWS separates oil from the wash water before discharging the wash water to the sanitary sewer system. The separated oil is pumped to a double-walled steel aboveground storage tank (AST), within a concrete containment structure, where the oil is stored until 75 percent of its capacity is reached. A contractor empties the AST when needed. Maintenance of the OWS and AST is performed by personnel from Building 375 (Aircraft Maintenance).

The Aircraft Wash and Rinse Facility is used by various occupants for vehicle and aircraft washing. Each occupant brings their own detergent at the time of use. When the wash/rinse pad is not in use, a manually-operated valve normally kept closed is opened to allow storm water on the pad to be discharged to the surrounding grass area if there is no evidence of oily sheen. Due to the potential for wash water residue, containing detergent, dirt, and petroleum constituents, MCB Hawaii is in the process of redesigning the facility to prevent storm water from discharging from the wash area. In the interim, pavement within the wash area shall be cleaned off between aircraft washes to prevent potential pollutants from contacting storm water in case of overflow. In all other circumstances the valve shall remain closed at all times and storm water captured within the concrete wash area will be discharged to the OWS.

The Aircraft Wash and Rinse Facility is located on a relatively flat area. Areas outside of the bermed concrete wash pad are grass on all sides, with the exception of an asphalt taxiway to the north. Storm water runoff from the western and southern areas of the facility flows to grass areas and percolates into the ground. Runoff from the northern area of the facility flows easterly along the taxiway to "B" Street, then into the storm water drain system via a catch basin. Runoff from the eastern area of the facility flows easterly, and either enters the same catch basin or percolates into the grass/bare soil ground. The storm water drain system discharges through Outfall 018 to Kaneohe Bay.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Aircraft Wash and Rinse Facility, Building 1631:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Detergents are unloaded at the aircraft wash area on the bermed concrete wash pad. An OWS and oil AST are also located at the facility.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. Detergents are not stored at Building 1631, but are brought to the facility by the occupant using it. A mixed solution of detergent and water is stored in a steel container on the concrete pad when being used, and in Building 1631 when not in use. Rinse water flows to the OWS, then to the sanitary sewer system. Recovered oil is stored in the AST and disposed of as needed.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Aircraft Wash and Rinse Facility include the washing and rinsing of aircraft, and removal of oil and sludge from the OWS.

D. Significant Materials Inventory

The following significant materials are located at the Aircraft Wash and Rinse Facility:

- Detergents
- Metals (from aircraft)
- Waste Oil and Sludge

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Aircraft Wash and Rinse Facility if not properly managed:

- Detergent
- Metals
- Dirt/Sediment from wash water

Materials that have <u>*not*</u> been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Aircraft Wash and Rinse Facility employs good housekeeping practices throughout its operations. Good housekeeping practices for the Aircraft Wash and Rinse Facility are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems exposed to storm water on a regular basis.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.5.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Aircraft Wash and Rinse Facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures. There is bare soil within the OWS fenced enclosure, but the enclosure is surrounded entirely by grass.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 1631 are shown in Table 2-1.

Modifications to the existing BMPs at Building 1631 are listed in Table 2-2.

New BMPs for implementation at Building 1631 are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
002	Restrict Access to Area and Equipment	The facility is located on the flight line. The OWS is located within a locked, chain-linked fenced enclosure.
011	Construct Berm or Dikes Around Critical Areas	The concrete wash and rinse pad is bermed to contain the wash water and drain to the OWS. The AST is located within a concrete containment structure.
016	Limit Significant Materials Inventory	Detergents are brought onto the facility only when needed. Minimal excess detergent mixtures are stored inside Building 1631 when not in use.
040	Discharge Wash Water to a Sanitary Sewer	Wash water is routed through the OWS, and effluent is discharged to the sanitary sewer.
049	Use Outside Contractors For Handling Used Solvents and Other Significant Materials	A contractor is notified to empty the AST when it reaches 75 percent of its capacity.
085	Construct OWS	An OWS accepts the wash water from the concrete pad at the aircraft wash and rinse facility.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
003	Perform Regular Cleaning	Perform regular cleaning of the concrete wash down area between aircraft washes to remove any residual detergents, dirt, or petroleum from the surface.	NS	2016--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

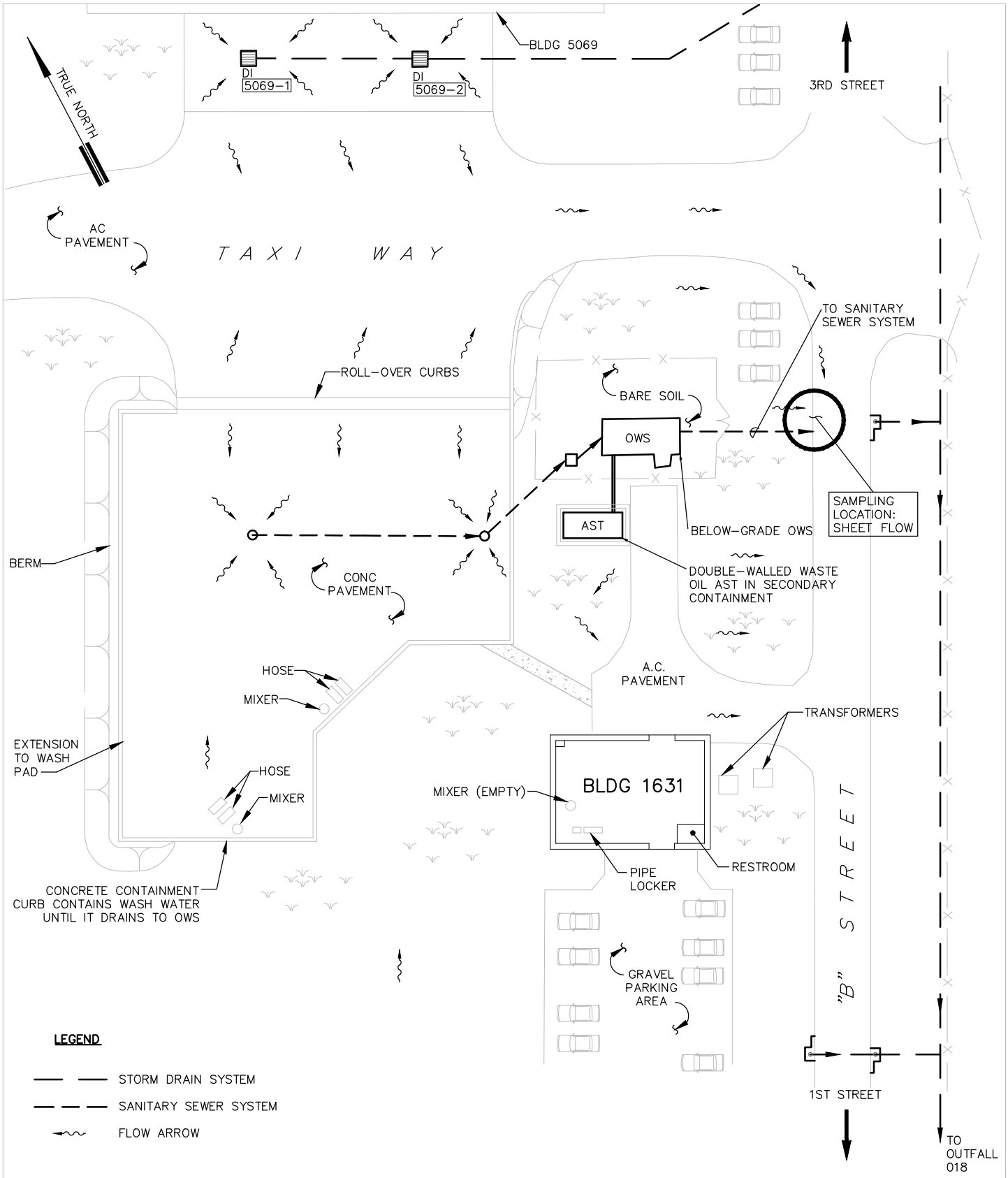
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Aircraft Rinse Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



AIRCRAFT WASH & RINSE FACILITY (BUILDING 1631)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 1.6 ACRES ASSOCIATED WITH BUILDING 1631, DISCHARGE TO THE SANITARY. IN THE UNLIKELY EVENT THAT THE SECONDARY CONTAINMENT OVERFLOWS, STORM WATER WOULD FLOW TO OUTFALL 018 AN BE DISCHARGED TO KANEOHE BAY.
2. CONCRETE FLOORS IN BUILDINGS UNLESS OTHERWISE NOTED.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: AIRCRAFT WASH & RINSE FACILITY (BUILDING 1631)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

CORROSION CONTROL FACILITY (BUILDING 5069)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	satellite accumulation site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Corrosion Control Facility, Building 5069

The Corrosion Control Facility, Building 5069, is located within MCB Hawaii, Kaneohe Bay at the southwest corner of intersection of "B" Street and 3rd Street. The facility encompasses approximately 1.9 acres and can be found in grid J18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1. The facility has recently being transferred to another tenant.

Hazardous Materials Coordinator:

TBD

The Corrosion Control Facility consists of an aircraft hangar-type structure designed to accommodate aircraft equal in size to a Lockheed C-130. Corrosion resistant coatings are applied to aircraft, aircraft parts, vehicles, and equipment inside the work area located in the western portion of building, while offices occupy the eastern side of building. A movable partition located within the work area separates it into two spaces. All equipment undergoing corrosion prevention treatment is stored indoors.

The floor of the facility is concrete with four trench drains that run the North-South length of the building, and capture and convey fire protection foam and water to an unlined collection pit located outside the southwestern corner of the building. Recovered waste material from the pit is pumped to an aboveground storage tank (AST) located between the pit and building. Paints and other significant materials are stored on shelves at the center of the building. Waste materials are segregated and stored in separate containers on containment pallets in a separate room at the northeastern corner of the building. A strip tank room is located at the northern corner of the facility.

A monthly test of the fire suppression system at the facility discharges approximately 25,000 gallons of potable water, stored in two water ASTs on the eastern side of Building 5069, onto the nearby grass area. The water flows to the catch basin along "B" Street and discharges to Kaneohe Bay through Outfall 021.

The facility is surrounded by grass on the west, north, and east sides, and concrete pavement on the south side. Storm water runoff on the southern side of the facility sheet flows on the concrete surface to two drain inlets (5069-1 and 5069-2). The inlets direct storm water to the catch basin on "B" Street, which discharges to Kaneohe Bay via Outfall 021. Runoff also flows to the taxiway south of the facility. Runoff on the remaining three sides of the facility percolate into the grass. Runoff on the northwest corner of the building can also enter a gravel retention basin.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Corrosion Control Facility, Building 5069:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. The loading and unloading of significant

materials are conducted on the driveway in front (south) of the facility. Heavy loads are driven into the building for loading and unloading.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are procured through and returned for disposal to the MCB Hawaii Materials Minimization (HazMin) Center. Significant materials and waste materials are stored in flammable storage lockers and on spill pallets inside the building. Hazardous wastes are stored in the satellite accumulation site (SAS) located inside a room at the northeast corner of the building.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Corrosion Control Facility include the transfer of materials into and out of the facility, and monthly fire suppression system test discharge.

D. Significant Materials Inventory

The following significant materials are located at the Corrosion Control Facility:

- Paint Thinner
- Solvents
- Corrosion-Inhibiting Paints
- Foam Water

2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Corrosion Control Facility.

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Corrosion Control Facility employs good housekeeping practices throughout its operations. Good housekeeping practices for the Corrosion Control Facility are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis.

Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Corrosion Control Facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 5069 are shown in Table 2-1.

Modifications to the existing BMPs at Building 5069 are listed in Table 2-2.

New BMPs for implementation at Building 5069 are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers and drums are labeled.
034	Park Vehicles or Equipment Indoors or Under a Roof	All equipment undergoing corrosion prevention treatment is stored indoors.
044	Conduct Maintenance Within a Building or Covered Area	All aircraft repair and maintenance are conducted inside the facility.
049	Use Outside Contractors for Handling Used Solvents and Other Significant Materials	A contractor is notified to empty the AST when the AST reaches 75 percent of tank capacity.
057	Store Liquids And Significant Materials Within A Building Or Covered Area	All containers of significant materials are stored indoors.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category(1)	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category(1)	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Personnel also receive weekly to monthly hazardous materials training.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Corrosion Control Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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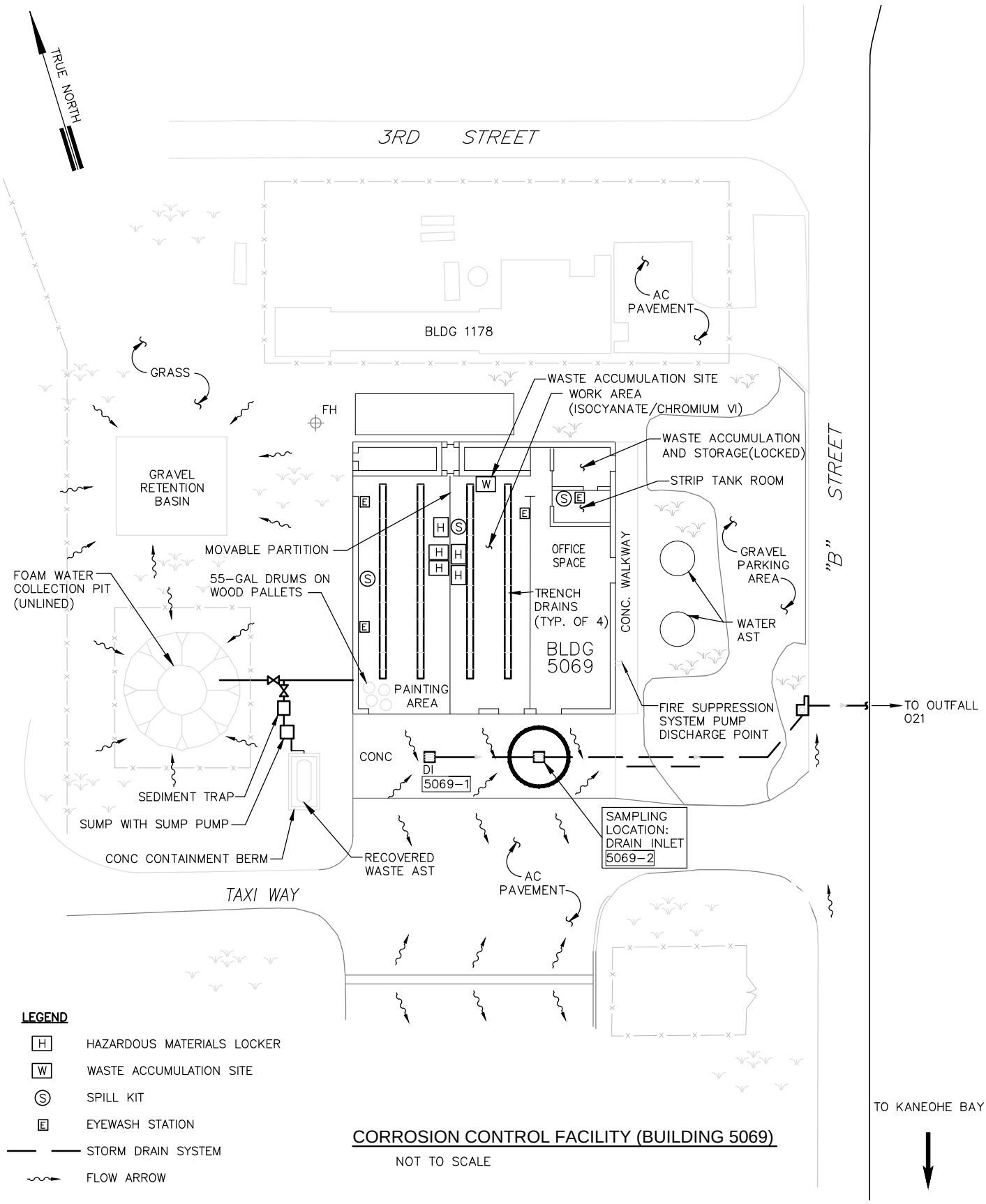

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- FLOW ARROW

CORROSION CONTROL FACILITY (BUILDING 5069)

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 1.9 ACRES ASSOCIATED WITH BUILDING 5069, DISCHARGES TO KANEOHE BAY VIA OUTFALL 021, AND TO ADJACENT GRASS AREAS.
2. UNLESS NOTED ON DRAWING, FLOORS INSIDE HANGAR 5069 ARE CONCRETE.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: CORROSION CONTROL FACILITY (BUILDING 5069)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

LIQUID OXYGEN/LIQUID NITROGEN FACILITY (BUILDING 6025)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
GSE	Ground Support Equipment
HazMin	Hazardous Materials Minimization
LIN	Liquid Nitrogen
LOX	Liquid Oxygen
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Liquid Oxygen/Liquid Nitrogen Facility, Building 6025

The Liquid Oxygen (LOX) / Liquid Nitrogen (LIN) (a.k.a. Cryogenics), Building 6025, is located within MCB Hawaii, Kaneohe Bay on Mokapu Road, just south of where Palakiko Drive intersects Mokapu Road. The facility encompasses approximately 1.9 acres and can be found in grid N18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

LCpl Dakota Appodaca, MALS 24 (808-257-3648)

The LOX/LIN Facility consists three primary buildings (Buildings 6025, 6775C3, and 6148) secured within a chain-linked fenced compound. The rest of the compound consists of asphalt parking, some used to temporarily store Ground Support Equipment (GSE).

Building 6025, which is located near the southeast corner of the compound, is a single-story, corrugated metal structure, which consists of offices at its northern half and three maintenance/repair bays at its southern half. Minor repairs conducted on site including servicing of carts, to include replacing hoses and levers, checking brakes, applying grease, hand sanding, and touch-up painting. When needed, materials are picked up from Aircraft Maintenance Hangar 375, who procures materials through the MCB Hawaii Hazardous Materials Minimization (HazMin) Center. All materials are returned to Hangar 375 when work is complete. Therefore, there are no flammable storage lockers on site, since no more than five gallons of materials are needed on site at any given time. There is no spill kit on site, either, as personnel are instructed to call personnel at the HazMin to respond if a large spill occurs. Any small spills are cleaned up immediately.

Building 6775C3, which is located at the southwest corner of the compound, is a Big Top Fabric Structure that is used to store equipment.

Building 6148, which is located at the northwest corner of the compound, consists of a corrugated metal canopy structure over a concrete pad with nitrogen and oxygen filling stations. Vehicles enter through the south end of the facility, fill their tanks, and exit at the north end. Two 1,000-gallon aboveground storage tanks (ASTs) containing LOX and LIN are located to the west (behind) the building. The area is surrounded with concrete curbing and chain-linked fencing.

Building 6025 is swept weekly. The maintenance bays in Building 6025 are also cleaned weekly, by first cleaning any oil spots with absorbent material, sweeping, pressure-washing, then sweeping the water outside.

Storm water runoff generated onsite flows along the existing grade as surface flow. Along the east fenceline is a grass swale which appears to ponds and convey some storm water to the north. The site is surrounded by grass areas and vegetation and is approximately 450-ft away from Kaneohe Bay at its closest point.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the LOX/LIN Facility:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Small amounts of materials are loaded and unloaded near the entrance to the various buildings within the compound on asphalt paved surfaces.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water runoff. All materials are procured through Hangar 375 when needed and returned when work is complete; and since repairs are so small, significant amounts of materials are not stored on site.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the LOX/LIN Facility include loading and unloading at the maintenance bays in Building 6025, and outdoor storage of vehicles and equipment.

D. Significant Materials Inventory

The following is a list of significant materials found at the LOX/LIN Facility:

- Grease
- Paint

2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 6025.

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the LOX/LIN Facility employs good housekeeping practices throughout its operations. Good housekeeping practices for the LOX/LIN Facility are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis.

Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas at the LOX/LIN Facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the LOX/LIN Facility are shown in Table 2-1.

Modifications to the existing BMPs at the LOX/LIN Facility are listed in Table 2-2.

New BMPs for implementation at the LOX/LIN Facility are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
002	Restrict Access to Area and Equipment	Area is completely enclosed by chain-linked fencing, including a gate for entry/exit access.
003	Perform Regular Cleaning	Building 6025 is swept weekly. The maintenance bays in Building 6025 are also cleaned weekly, by first cleaning any oil spots with absorbents, sweeping and pressure-washing, then sweeping the water outside.
006	Control Spills	Absorbent material is readily available at the facility to clean spills.
029	Maintain Equipment in Good Condition	All vehicles and equipment are maintained in good condition.
033	Check Vehicles and Equipment for Leaks	Vehicles and equipment are checked for leaks on a regular basis.
035	Park Vehicles on Impervious Surface	Vehicles and equipment are parked outside on asphalt paved surfaces.
044	Conduct Maintenance within a Building or Covered Area	Maintenance is conducted inside Building 6025.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
004 / 040	Avoid Hosing Down the Site Discharge Wash Water to a Sanitary Sewer	Consider using mops and buckets to clean the maintenance bay in Building 6025, then dispose of the wash water to the sanitary sewer system.	NS	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives. Periodic spill response training is conducted at the Aircraft Maintenance Hangar 375.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Liquid Oxygen/Liquid Nitrogen Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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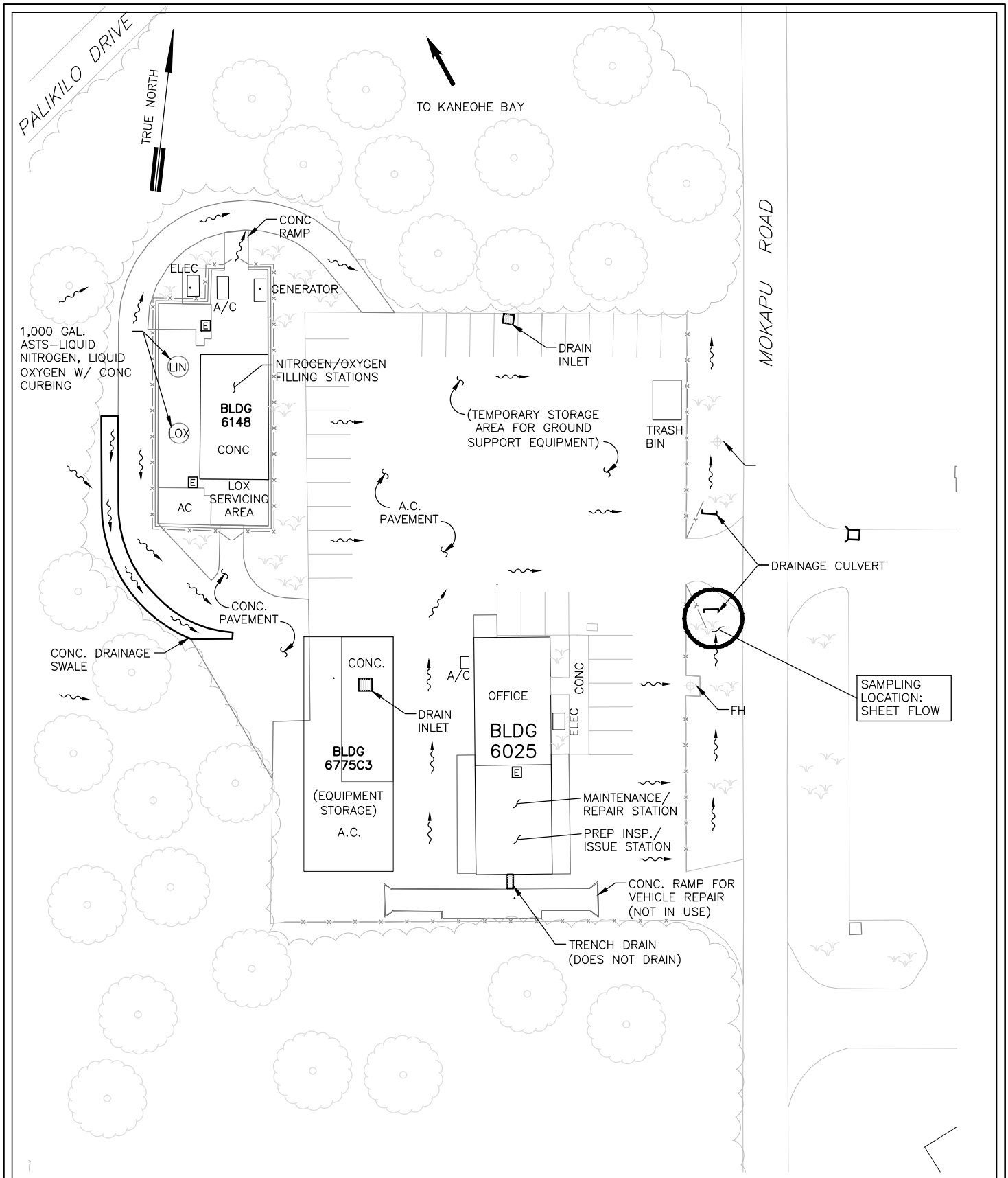

LIQUID OXYGEN/LIQUID NITROGEN FACILITY (BUILDING 6025)

NOT TO SCALE

LEGEND

E — EYEWASH STATION

FLOW ARROW

NOTES:

STORM WATER, FROM APPROXIMATELY 1.9 ACRES ASSOCIATED WITH BUILDING 6025, DISCHARGES OFFSITE TO ADJACENT GRASSY AREAS AS SHEET FLOW. THE NEAREST RECEIVING WATER BODY IS KANEOHE BAY.

DATE:	PROJECT TITLE:
FEB 2016	STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
FIGURE TITLE: LIQUID OXYGEN/LIQUID NITROGEN FACILITY (BUILDING 6025)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

AIRCRAFT RINSE FACILITY (BUILDING 6107)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Aircraft Rinse Facility, Building 6107

The Aircraft Rinse Facility, Building 6107, is located within MCB Hawaii, Kaneohe Bay near the northwestern end of Taxiway A. The facility encompasses approximately 1.4 acres and can be found in grid M16 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Jeff Larson, ENV (808-257-6920)

The Aircraft Rinse Facility is used to rinse debris from aircraft after returning from missions. Only fresh water is used; no detergents or cleaning solutions are used. The outdoor facility is comprised of a concrete pad with containment curbing and trench drains, various piping, spray nozzles, an oil/water separator (OWS), and an effluent irrigation system. The water jet spray system used to rinse the surface of aircraft is activated by airfield personnel. Trench drains spanning the concrete area drains the rinse water into the below-ground OWS located to the northwest of the rinse pad. Effluent from the OWS is collected in a sump and reclaimed to irrigate grass areas along the airfield (on the other side of Taxiway A), under a gravity system triggered by a sensor when the OWS is full. The OWS and trench drains are maintained and cleaned on a regular basis. On occasion, the collected oil and sludge in the OWS is removed.

The Aircraft Rinse Facility is surrounded by grass, with no nearby storm drain inlet. There is a sump located on the west side of the site, however the drain is blocked due to current construction activities, so any overflow from the site would pond and percolate into the ground. The nearest receiving water is the Pacific Ocean located 1,500-ft away from the site, mainly over flat grassy areas. It was observed that runoff from the rinse water overflows at the northeast corner of the concrete rinse pad. It is recommended that an additional berm be constructed to contain all rinse water, which is conveyed to the OWS. However, there is no immediate perceived threat to receiving water quality due to the long, grassy flow path.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Aircraft Rinse Facility, Building 6107:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. On occasion, the collected oil and sludge in the OWS is removed.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. Rinse water flows to the OWS and is reclaimed for irrigation under a gravity system. On occasion, the collected oil and sludge in the OWS is removed.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Aircraft Rinse Facility include rinsing of aircraft and removing of oil and sludge from the OWS.

D. Significant Materials Inventory

No significant materials are stored or used at the Aircraft Rinse Facility.

2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Aircraft Rinse Facility.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Aircraft Rinse Facility employs good housekeeping practices throughout its operations. Good housekeeping practices for the Aircraft Rinse Facility are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.5.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures

listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Aircraft Rinse Facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Aircraft Rinse Facility are shown in Table 2-1.

Modifications to the existing BMPs at the Aircraft Rinse Facility are listed in Table 2-2.

New BMPs for implementation at the Aircraft Rinse Facility are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
011	Construct Berm or Dike around Critical Areas	The concrete pad is constructed with containment curbing.
014	Recycle	Effluent from the OWS is collected in a sump and reclaimed to irrigate grass areas along the airfield.
029	Maintain Equipment in Good Condition	The facility appears to be in good working condition.
085	Construct Oil/Water Separator	Rinse water is collected in the OWS; effluent is reclaimed for irrigation purposes.
097	Regularly Inspect and Maintain Storm Water Conveyance Systems	The trench drains and OWS are maintained and cleaned on a regular basis.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category(1)	Implementation Schedule
011	Construct Berm or Dike around Critical Areas	Raise the containment curbing to contain all the rinse water within the concrete pad.	S	2016

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category(1)	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Aircraft Rinse Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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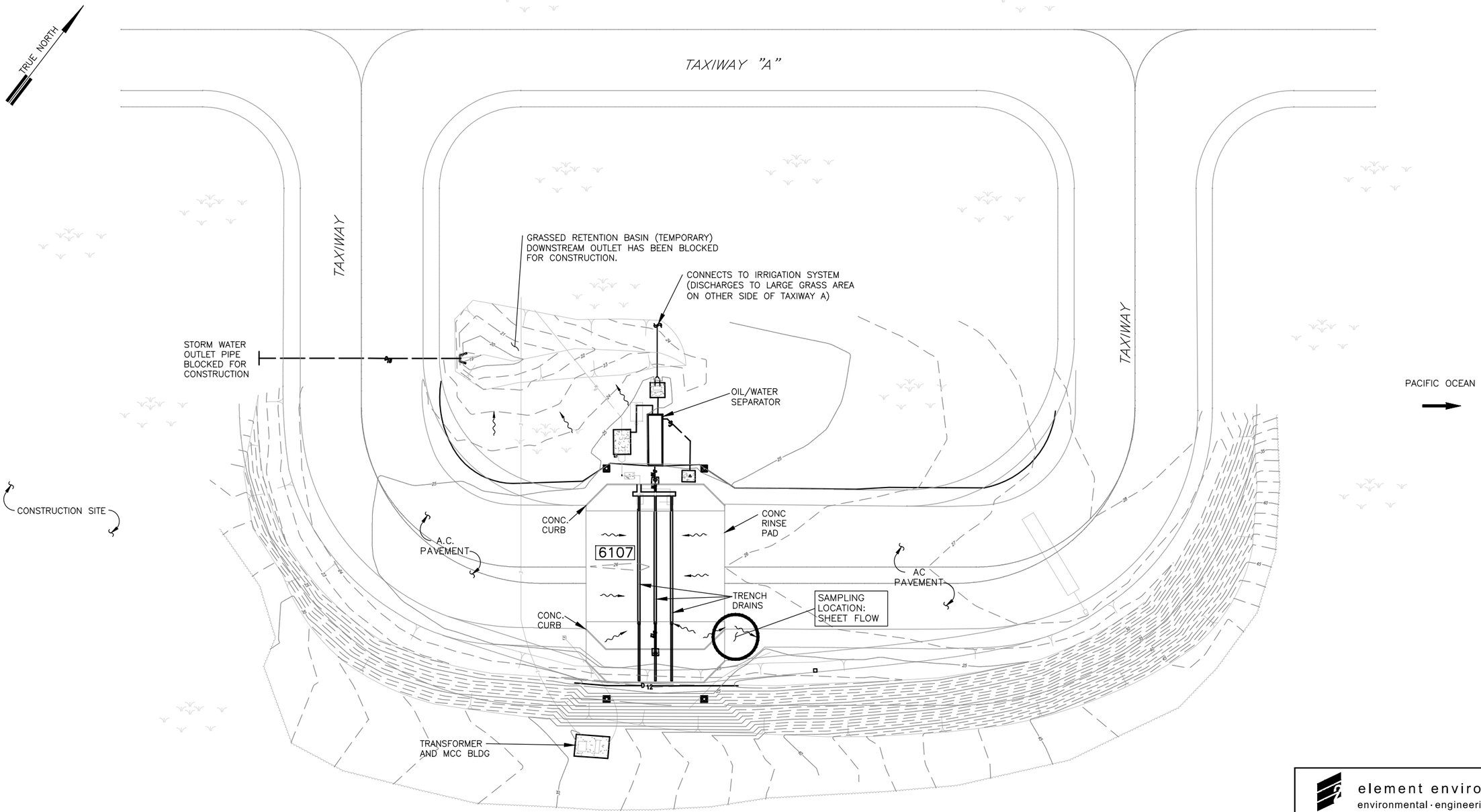

AIRCRAFT RINSE FACILITY (BUILDING 6107)

NOT TO SCALE

LEGEND

STORM DRAIN SYSTEM

FLOW ARROW

NOTES:

STORM WATER, FROM APPROXIMATELY 1.4 ACRES ASSOCIATED WITH FACILITY 6107. PRIMARILY DISCHARGES TO AN OIL/WATE SEPARATOR AND ADJACENT GRASSY AREAS. THE NEAREST RECEIVING WATER BODY IS THE PACIFIC OCEAN.

element environmental llc
environmental · engineering · water resources

PROJECT TITLE:
STORM WATER POLLUTION CONTROL PLAN
MCB HAWAII, KANEOHE BAY, OAHU, HAWAII

FIGURE TITLE:
AIRCRAFT RINSE FACILITY
(BUILDING 6107)

DATE: FEBRUARY 2016

FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

FUEL DELIVERY BRANCH/REFUELER TRUCK PARKING (BUILDING 6182)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a “new source,” from which there is or may be discharge of pollutants, once construction commences;
- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Fuel Delivery Branch/Refueler Truck Parking, Building 6182

The Fuel Delivery Branch/Refueler Truck Parking, Building 6182, is located within MCB Hawaii, Kaneohe Bay at the northwest corner of the intersection of "C" Street and 3rd Street. The facility encompasses an area of approximately 2.8 acres and can be found in grid J17 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Ed Campbell (808-257-3187)

The Fuel Delivery Branch/Refueler Truck Parking Facility is operated under the MCB Hawaii Fuel Division and consists of two buildings and a large concrete paved parking area, enclosed within barbed-wire, chain-linked fencing. Building 6182 is a single-story structure of concrete block construction that is used as offices for administrative needs for fuel handling requests. Building 6510 is a single-story concrete block structure that is used as a fitness center. The concrete slab is used for parking of refueler trucks. At the time of the site visit there were eight JP-8 refueler trucks.

The concrete paved area is used as parking for the 11 refueler trucks the facility operates and maintains. Nine of the refueler trucks are 5,000-gallon capacity and are used to transport JP-8 fuel. The remaining two refueler trucks are 1,200-gallon capacity; one is used to transport diesel fuel and the other is used to transport gasoline. The refueler trucks are normally kept full when parked at the facility.

A concrete berm surrounds the entire parking area, with the entry and exit driveways sloped to retain liquids within the parking area. Storm water that accumulates within the bermed parking area flows to a series of four drain lines located at the eastern side of the parking area near Building 6182. Each drain line has a manually-operated valve that is normally kept closed. If no sheen or other indication of contamination is present in collected storm water based on visual inspection, the valve is opened. During site visit the valve was observed to be open. It is recommended that it remain closed at all times, until a visual inspection can be conducted to ensure that runoff does not contain fuel product. Each drain line is connected to a perforated piping system that allows the storm water to percolate into the ground. Runoff generated on the entry and exit driveways sheet flows south (down) the driveways and into a catch basin along 3rd Street, where it is discharged to Kaneohe Bay via Outfall 021.

A small waste accumulation shed is located at the northeastern corner of the parking area. The shed consists of chain-linked fencing on three sides, a sloped roof, and concrete floor with a concrete containment berm on three sides. The open side of the shed and containment berm faces the refueler parking area. Waste fuel is stored in 55-gallons drums on wooden pallets.

The buildings and adjacent parking area are surrounded mostly by grass, with the exception of the vehicle parking area to the east of Building 6182 and the entry and exit driveways to the refueler parking area. Storm water runoff generated south of Building 6182 generally sheet flows away from the building and percolates into the surrounding grass areas.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Fuel Delivery Branch/Refueler Truck Parking, Building 6182:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. There are no loading or unloading activities done at the facility. All refueler trucks are loaded at the tanker truck loading racks, located at Buildings 1254, 1563, and 6504.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. The refueler trucks are kept full when parked at the facility. Waste fuels from samples that are collected from the refueler trucks are stored in 55-gallon drums in the waste accumulation site at the northeastern corner of the parking area. Full drums are brought to the 90-day Hazardous Waste Minimization Center.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Refueler trucks are parked outside in the concrete parking area. Occasionally, fuel samples are drawn from the refueler trucks when they are parked.

D. Significant Materials Inventory

The following is a list of significant materials found at the Fuel Delivery Branch/Refueler Truck Parking:

- Jet Fuel
- Diesel Fuel
- Gasoline

2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 6182 or the Refueler Truck Parking Area.

Materials that have <u>*not*</u> been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Fuel Delivery Branch/Refueler Truck Parking employs good housekeeping practices throughout its operations. Good housekeeping practices for the Fuel Delivery Branch/Refueler Truck Parking are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay EQA program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas at the Fuel Delivery Branch/Refueler Truck Parking have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Fuel Delivery Branch/Refueler Truck Parking are shown in Table 2-1.

Modifications to the existing BMPs at the Fuel Delivery Branch/Refueler Truck Parking are listed in Table 2-2.

New BMPs for implementation at the Fuel Delivery Branch/Refueler Truck Parking are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks and Valves	All drums, containers, tanks, and valves are labeled.
006	Control Spills	Absorbent materials are kept onsite to address spills.
011	Construct Berm or Dike Around Critical Areas	A concrete berm surrounds the entire parking area and waste accumulation site.
028	Keep Equipment and Vehicles Clean	Refueler trucks are kept clean and well-maintained.
033	Check Vehicles and Equipment for Leaks	Refueler trucks are checked for leaks on a regular basis and repaired or replaced as necessary.
035	Park Vehicles on an Impervious Surface	Private vehicles and refueler trucks are parked on an impervious surface.
039	Wash Equipment and Vehicles in Designated Areas	Refueler trucks are cleaned and washed at a designated area.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-2 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

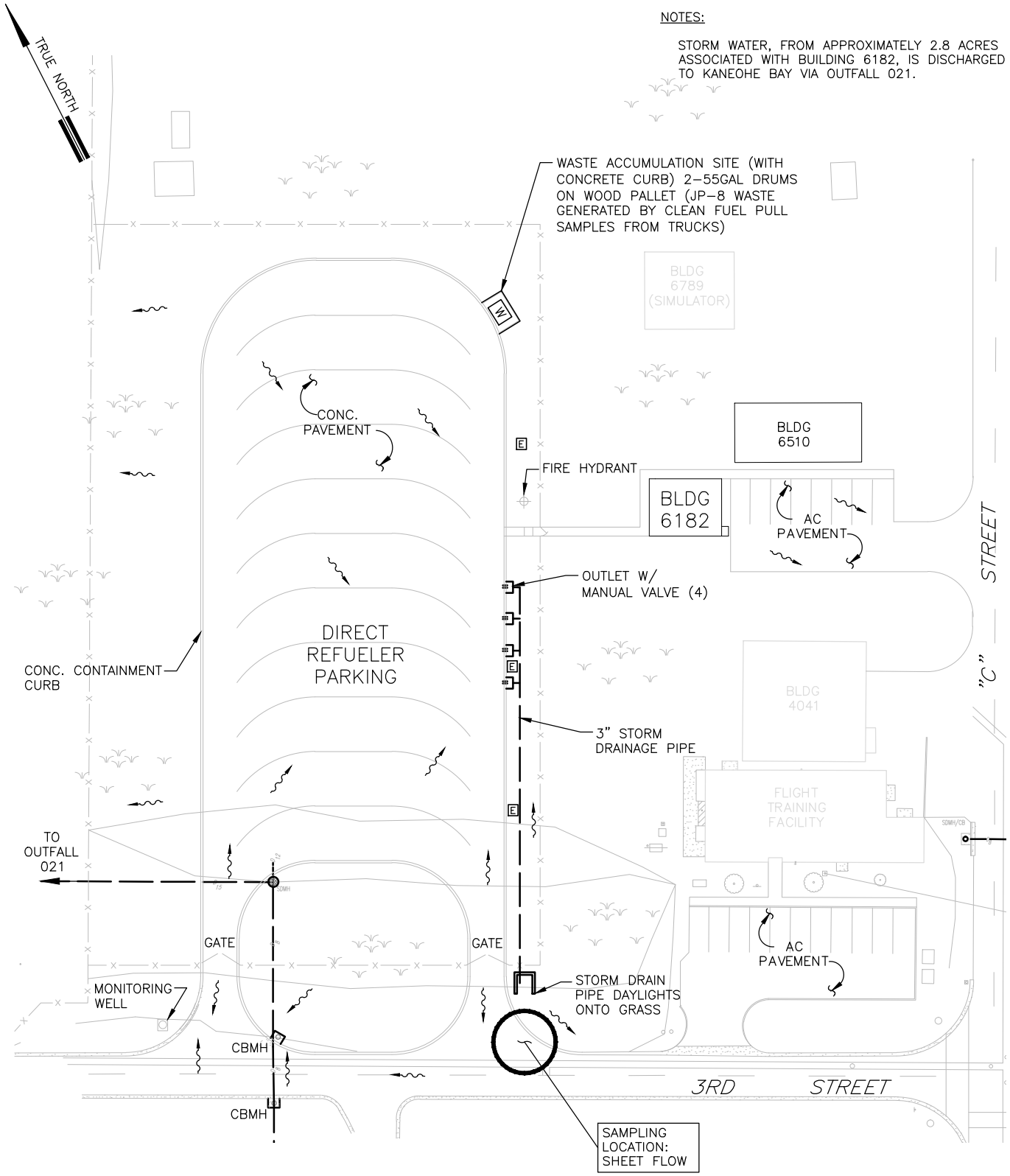
At the time of this update, there have been no past spill or leak incidents reported for the Fuel Delivery/Branch/Refueler Truck Parking.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

NOTES:

STORM WATER, FROM APPROXIMATELY 2.8 ACRES ASSOCIATED WITH BUILDING 6182, IS DISCHARGED TO KANEOHE BAY VIA OUTFALL 021.



FUEL DELIVERY BRANCH/REFUELER TRUCK PARKING (BUILDING 6182)

NOT TO SCALE

LEGEND

- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- E — EYEWASH STATION
- STORM DRAIN SYSTEM
- FLOW ARROW

	DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
	FIGURE TITLE: FUEL DELIVERY BRANCH/REFUELER TRUCK PARKING (BUILDING 6182)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

ENGINE TEST FACILITY (BUILDING 6183)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
OWS	oil/water separator
POC	Point of Contact
SAS	satellite accumulation site
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Engine Test Facility, Building 6183

The Engine Test Facility, Building 6183, is located within MCB Hawaii, Kaneohe Bay along an inactive runway north of Sumner Street and west of Palikilo Road. The facility encompasses approximately 1.1 acres and can be found in grid M19 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Sgt. Chappell (808-257-2959)

The Engine Test Facility is used to test aircraft engines that have been repaired, prior to reinstallation on aircraft. Portable generators are located at the facility to provide the necessary electrical power for engine testing. The facility, which is enclosed within barbed-wire chain-linked fencing, consists of an office building (Building 6183), storage shed, and a concrete test pad area.

Building 6183, which has offices, and the storage shed, are located at the southeast corner of the concrete test pad area. Significant materials on containment pallets and waste materials are stored within the shed in an area enclosed by a concrete containment curb. Two spill kits and spill response equipment are also located in the shed. Other areas within the shed are used for the storage of dry materials and other equipment used for engine testing activities.

There are also two storage tents, portable generators, and various storage containers located throughout the facility on the concrete test pad area. A concrete berm completely surrounds the area, except at the entry and exit driveways, which are sloped to retain liquid within the concrete test pad area. The concrete test pad area is sloped so that liquids flow towards a series of drains that convey the liquids to an oil/water separator (OWS), located at the eastern corner of the concrete test pad area. Effluent from the OWS is discharged to the sanitary sewer system. Waste oil recovered from the OWS is pumped into a 500-gallon capacity aboveground storage tank (AST), within its own containment structure, adjacent to the OWS. The OWS skimmed weekly.

Storm water runoff generated outside and on all sides of the facility sheet flows away from the concrete pad area and percolates into the soil and grass areas adjacent to the facility. The facility is surrounded by grass, and the nearest pathway to receiving water is Kaneohe Bay approximately 750-ft away.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Engine Test Facility, Building 6183:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Loading and unloading of materials is done at the engine test area, the Building 6183 shed, portable generators, and the OWS used oil AST.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. All significant materials are procured through the MCB Hawaii HazMin Center. Significant materials are stored in hazardous materials lockers, or on spill pallets, located centrally under Building 6183 shed. Waste materials are also stored under Building 6183 shed, before being sent to the MCB Hawaii HazMin Center for disposal. Other significant materials are stored in the fuel tanks of the portable generators, located on the concrete test pad area.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Engine Test Facility include the testing of aircraft engines, storage and use of portable generators, removing of oil and sludge from the OWS, and loading and unloading of materials.

D. Significant Materials Inventory

The following significant materials are located at the Engine Test Facility:

- Jet Fuel (JP-8)
- Diesel
- Paint
- Hydraulic Fluid
- Lube Oil
- Detergent
- Used Oil
- Isopropyl Alcohol

2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from Building 6183 or the Engine Test Area.

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Engine Test Facility employs good housekeeping practices throughout its operations. Good housekeeping practices for the Engine Test Facility are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Engine Test Facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at Building 6183 are shown in Table 2-1.

Modifications to the existing BMPs at Building 6183 are listed in Table 2-2.

New BMPs for implementation at Building 6183 are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label All Drums, Cans, Containers, Tanks, and Valves	All containers in the building are labeled.
002	Restrict Access to Area and Equipment	The facility is completely enclosed by chain link fencing and access gates.
006	Control Spills	Absorbent materials are kept onsite to control spills.
011	Construct Berm or Dike around Critical Areas	The concrete pad is constructed with containment curbing.
017	Provide Roof to Cover Source Area	A roof over Building 6183 exists over the significant materials storage and waste accumulation areas.
050	Properly Store Containers	Significant materials are stored in hazardous materials lockers or on spill pallets.
085	Construct Oil/Water Separator	Storm water is collected in the OWS connected to the sanitary sewer system.
101	Store Containers Inside Secondary Containment	Fuel tanks for the portable generators are double-walled. The used oil AST is stored inside a secondary containment structure. Significant materials are stored in hazardous materials lockers or on spill containment pallets under cover.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training (including Hazard Communication training) as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

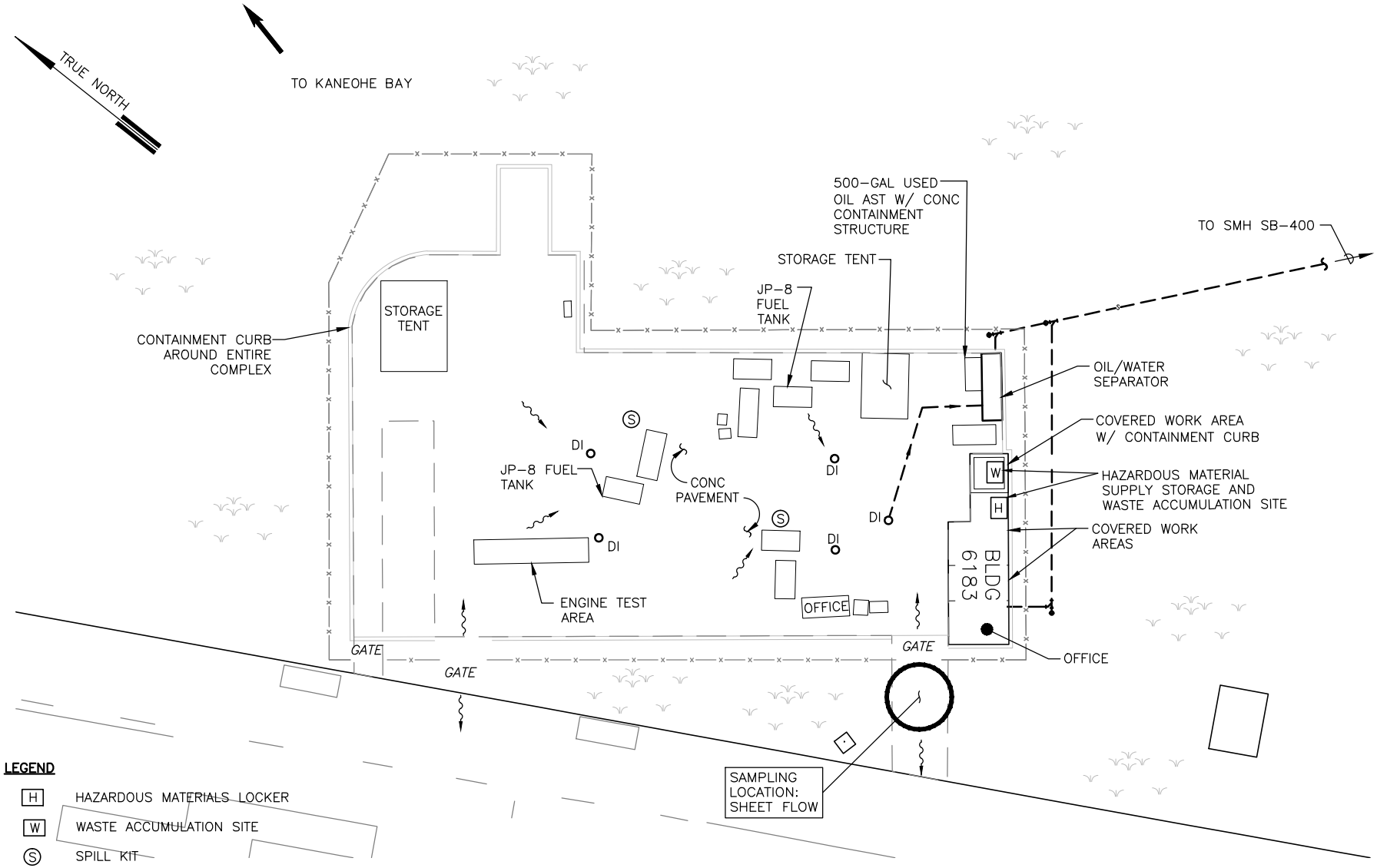
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Engine Test Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- W — WASTE ACCUMULATION SITE
- S — SPILL KIT
- SANITARY SEWER SYSTEM
- FLOW ARROW

NOTES:

STORM WATER COLLECTED BY FLOOR DRAINS IS DISHCARGED TO THE OIL/WATER SEPARATOR. ANY OVERFLOW OF STORM WATER, FROM APPROXIMATELY 1.1 ACRES ASSOCIATED WITH BUILDING 6183 IS DISCHARGED AS SHEET FLOW TO ADJACENT GRASS AND PAVEMENT. THE NEAREST RECEIVING WATER IS KANEOHE BAY.

ENGINE TEST FACILITY (BUILDING 6183)

NOT TO SCALE

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: ENGINE TEST FACILITY (BUILDING 6183)		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

AIRCRAFT READY FUEL STORAGE (BUILDING 6479)

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Aircraft Ready Fuel Storage, Building 6479

The Aircraft Ready Fuel Storage is located within MCB Hawaii, Kaneohe Bay along the north side of 3rd Street between "B" and "C" Streets. The facility encompasses approximately 1.4 acres and can be found in grid J18 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Ed Campbell (808-257-3187)

The Aircraft Ready Fuel Storage consists of a JP-5 fuel aboveground storage tank (AST, Tank 6479) and fuel pumps that transfer the fuel underground to the Aircraft Fuel Islands (Facilities 1170 and 1171). The fuel is received at the facility (Tuesday through Thursday) via pumping through a series of aboveground piping from Tanks 1252 and 1253, located about 500 feet to the northeast of the compound. Tank 6479 is located within an impervious, lined, secondary containment berm. Fuel filters, a sump with pumps, piping, and two smaller rectangular, double-walled, fuel holding ASTs (Tanks 6139 and 6140) are also located inside the berm. Tank system leak tests are completed every six months .

A tanker truck loading concrete pad, with concrete curbing and roll-over curbs at both ends, is adjacent to the containment berm, where fuel returned for testing is transferred for temporary storage in Tanks 6139 and 6140. Upon approval of test results, the returned fuel is transferred back to Tank 6479. If the fuel does not meet approval, it is removed and disposed of in accordance with standard Fuel Division procedures.

Buildings 370 and 349 are located at the south-central portion of the compound, which is enclosed within chain-linked fencing. Building 370 is used as office space. Building 349 is a corrugated metal shed used for the storage of maintenance materials, such as pump parts, cleaners, cleaning supplies, hoses, wood, pallets, trailers, empty drums, and flammable lockers used to store fuel retention samples, gasoline for pumps, and oil. A cylindrical propane AST is located between the two buildings (near empty small portable propane tanks).

The area around the Aircraft Ready Fuel Storage Facility is generally flat. Storm water runoff generated within the containment berm flows to the collection sump where, upon visual verification of the lack of sheen or other signs of contamination, it is pumped onto the adjacent grass areas. A broken pipe was observed in the overflow box connected the containment area. Runoff that enters the box would overflow to the nearby aboveground storm drain manhole. It is recommended that this box be fitted with a valve that would remain closed until runoff is visually inspected and free of any sheen or indication of pollutants. Runoff generated outside of the containment berm percolates into the surrounding grass and gravel areas. Storm water that reaches 3rd Street flows into catch basins that eventually discharges to Kaneohe Bay through Outfall 018. Runoff generated around Building 370 flow into drain inlets at the northwest and southeast sides of the building. An aboveground manhole without a cover is located near the northwest drain inlet. These features are a part of the same drainage system to Kaneohe Bay via Outfall 021. It is recommend that this manhole be fitted with a cover to prevent any potential dumping.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with Aircraft Ready Fuel Storage, Building 6479:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and may be carried away by storm runoff. Loading and unloading associated with the Aircraft Ready Fuel Storage facility include fuel transfers via pipelines and pumps at Tank 6479. Returned fuel that does not meet reuse criteria is loaded back onto tanker trucks via a hose connection that extends beyond the containment berm near Tanks 6139 and 6140. Additional loading and unloading of small amounts of materials occurs at Building 349.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. The majority of major facilities associated with the Aircraft Ready Fuel Storage facility is located within the lined containment berm. Jet fuel is stored in the ASTs in the berm. Additional storage of small amounts of materials in flammable lockers occurs at Building 349.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Aircraft Ready Fuel Storage facility include storage and transfer of fuel via pumps and piping to and from ASTs, and storage of other small amounts of materials.

D. Significant Materials Inventory

The following significant materials are located at the Aircraft Ready Fuel Storage:

- Jet Fuel
- Oil
- Grease
- Cleaners

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Aircraft Ready Fuel Storage if not properly managed:

- Jet Fuel

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Aircraft Ready Fuel Storage Facility employs good housekeeping practices throughout its operations. Good housekeeping practices for the Aircraft Ready Fuel Storage are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to the ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Aircraft Ready Fuel Storage Facility have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Aircraft Ready Fuel Storage Facility are shown in Table 2-1.

Modifications to the existing BMPs at the Aircraft Ready Fuel Storage Facility are listed in Table 2-2.

New BMPs for implementation at the Aircraft Ready Fuel Storage Facility are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All containers and tanks at the facility are labeled.
002	Restrict Access to Areas and Equipment	The facility is surrounded by chain-linked fencing.
011	Construct Dike or Berm around Critical Areas	All of the Aircraft Ready Fuel Storage facilities are located within an impervious, lined, secondary containment berm. The return fuel holding ASTs (Tanks 6139 and 6140) are double-walled tanks and also stored within the berm.
050	Properly Store Containers	Additional storage of small amounts of materials in flammable lockers occurs at Building 349.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained at least annually in spill response procedures.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
066	Keep Tanks, Piping, and Valves in Good Condition	Tanks, pumps, seals, piping and valves are visually inspected for signs of structural integrity and/or leaks. The overflow box connected to the containment area is to be fitted with a valve to prevent overflow of contaminants into the sewer system. A manhole cover is to be fitted for the aboveground manhole.	S	2016--

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category[1]	Implementation Schedule
118	Spill Prevention and Control	Obtain and store a spill kit at the facility.	NS	2016

Notes:
[1] NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Aircraft Ready Fuel Storage Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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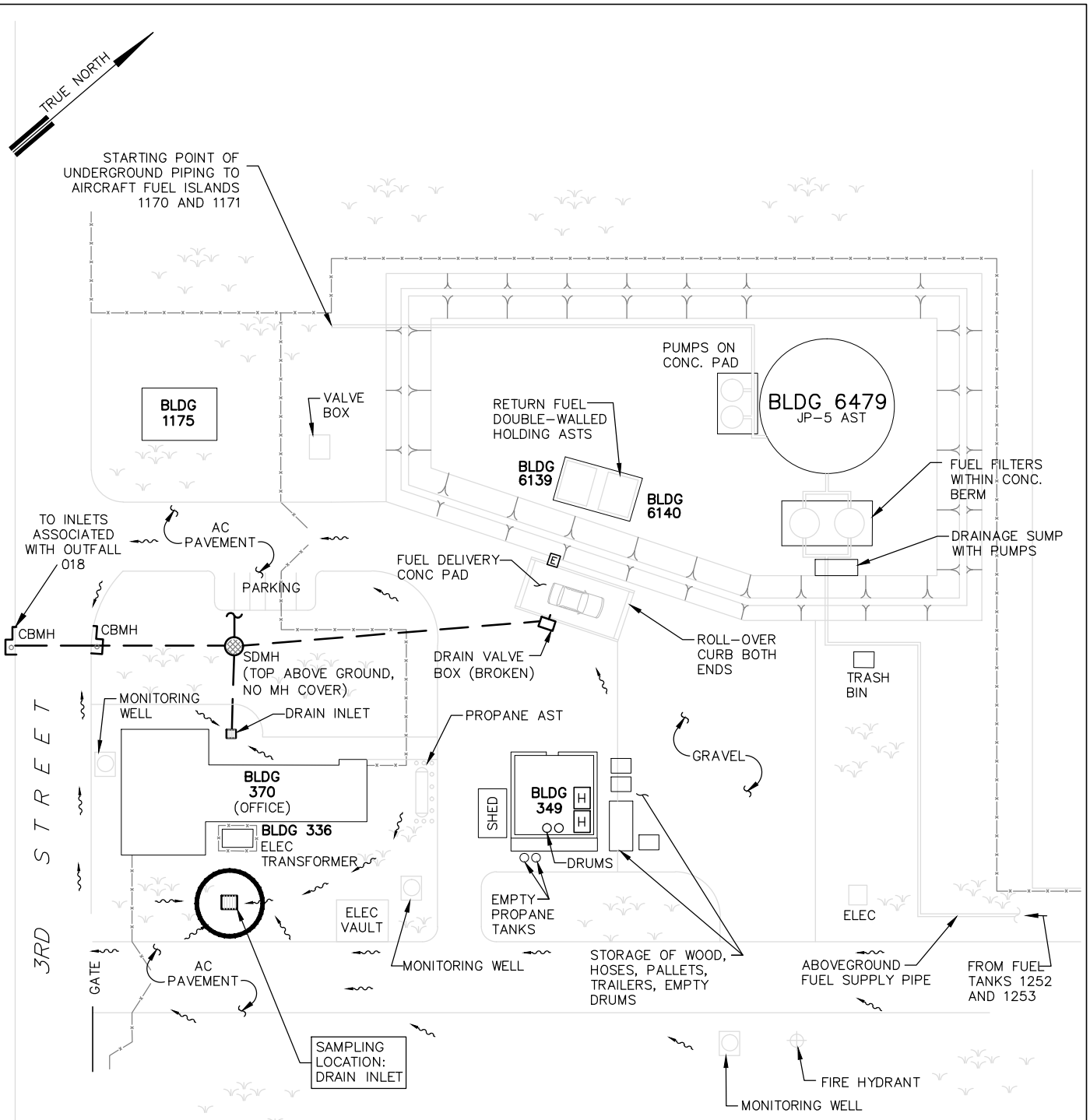

AIRCRAFT READY FUEL STORAGE (BUILDING 6479)

NOT TO SCALE

LEGEND

- [H] HAZARDOUS MATERIALS LOCKER
- [E] EYEWASH STATION
- STORM DRAIN SYSTEM
- FLOW ARROW

NOTES:
STORM WATER, FROM APPROXIMATELY 1.4 ACRES ASSOCIATED WITH BUILDING 6479, DISCHARGES TO KANEOHE BAY VIA OUTFALLS 018 & 021.

DATE:	PROJECT TITLE:
FEB 2016	STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII
FIGURE TITLE: AIRCRAFT READY FUEL STORAGE (BUILDING 6479)	FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

SANITARY LANDFILL

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Sanitary Landfill

The Sanitary Landfill is located within MCB Hawaii, Kaneohe Bay between Lower Magazine Road to the north and Middaugh Street to the south on the eastern slope of Ulupau Crater, on the eastern side of MCB Hawaii, Kaneohe Bay. Daly Road is located further to the west. The facility encompasses approximately 34.1 acres and can be found in grids K6 and K7 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Brett Chambers, ENV (808-257-7001)

The Sanitary Landfill is the designated landfill for MCB Hawaii and is comprised of two general areas: an area of active landfill operations and an area where fill material is excavated. The landfill is utilized as a disposal site for certain types of solid wastes generated at the MCB Hawaii, Kaneohe Bay facilities, including industrial areas, offices, administration facilities, and various barracks areas. Solid waste generated from military family housing areas and food wastes generated by the dining facilities are disposed of off-site by a commercial waste hauler.

The topography of the Sanitary Landfill slopes southerly toward Middaugh Street. The northern boundary adjacent to Lower Magazine Road is bounded by a bermed vegetated area. A chain-linked fence runs along the perimeter of the landfill. Storm water runoff flows outside the bermed area and along Middaugh Street in concrete-lined channels that discharge to a sedimentation basin. Storm water runoff in the sedimentation basin either percolates into the ground or enters two concrete drainage structures (LF1 and LF2), which convey the runoff underneath Middaugh Street to discharge into Kailua Bay.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Sanitary Landfill:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Trash is taken by trucks to the landfill via the entrance from Middaugh Street and is deposited at the designated disposal area for the given day.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. The Sanitary Landfill is serviced by a bulldozer on a daily basis. Waste is spread on the working surface and compacted by the bulldozer. Cover soil from the excavated fill is spread and compacted to a minimum six-inch thick cover on the working surface at the end of each working day.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Sanitary Landfill include the despositing, compacting, and covering of various solid wastes onsite.

D. Significant Materials Inventory

The following significant materials are located at the Sanitary Landfill:

- Diesel fuel (in bulldozer)
- Hydraulic fluid (in bulldozer)
- Household hazardous waste
- Municipal solid waste

2.2 Potential Storm Water Pollutants

The following pollutants have been identified as having a reasonable potential to be present in storm water discharges from the Sanitary Landfill if not properly managed:

- Sediments
- Solid Waste
- Chemical Oxygen Demand (COD)

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Sanitary Landfill employs good housekeeping practices throughout its operations. Good housekeeping practices for the Sanitary Landfill are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the landfill are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water Best Management Practices (BMPs) at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent

opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the Sanitary Landfill have been identified as having a high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Sanitary Landfill are shown in Table 2-1.

Modifications to the existing BMPs at the Sanitary Landfill are listed in Table 2-2.

New BMPs for implementation at the Sanitary Landfill are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
057	Store Liquids and Significant Materials within a Building or Covered Area	A minimum six-inch thick layer of "Cover Soil" shall be applied at the end of each working day to act as a cover that minimizes storm water contact with refuse.
097	Regularly Inspect and Maintain Storm Water Conveyance System	The drainage structures located along Lower Magazine Road shall be maintained free of sediment build-up to help prevent clogging or blockage of the drainage system.
116	Dust Control	The facility utilizes screens to keep dust and debris on site.
120	Waste Management	The facility is used to landfill materials from portions of the Base.
143	Temporary Storm Drain Diversion	A storm water run-on/run-off control system has been constructed at the landfill. The system includes a sedimentation basin to control storm water run-off generated within the landfill. Under typical rainfall events, storm water will be retained within the basin and allowed to evaporate and percolate into the soil.
144	Topsoiling	Daily soil cover is applied over the solid waste material disposed of and compacted that day.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
097	Regularly Inspect and Maintain Storm Water Conveyance System	Remove vegetation and repair eroding concrete spalls throughout the concrete-lined drainage structure.	S	2016

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
115	Erosion Prevention on Temporary and Private Roads	Train site personnel on the proper construction and management of temporary soil slopes.	NS	2016
122	Hydromulching	Utilize gravel to control erosion and prevent sediment runoff. Hydromulch has not taken at the facility.	S	2016

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

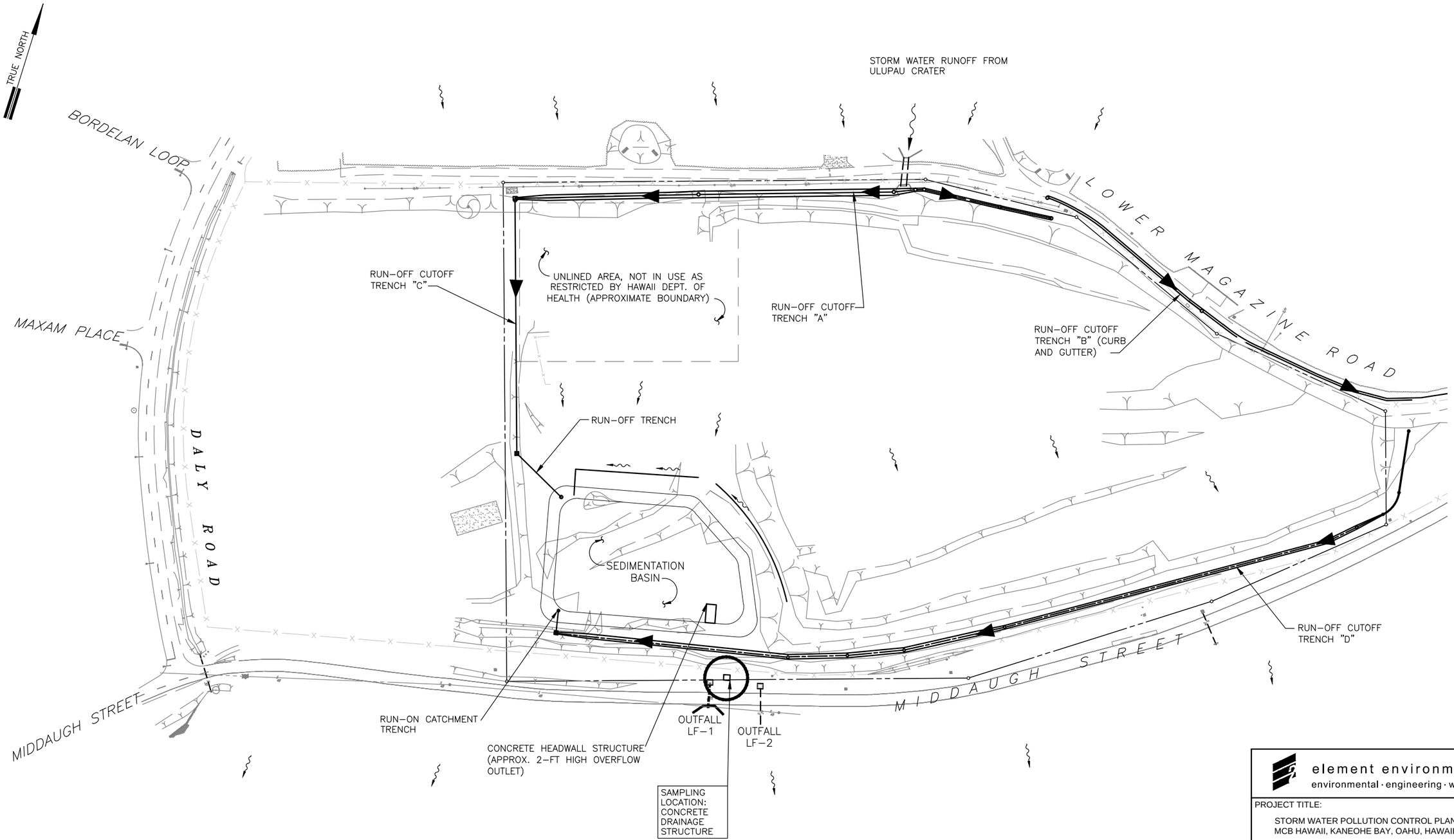
It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Sanitary Landfill.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)



SANITARY LANDFILL

NOT TO SCALE

NOTE:

STORM WATER, FROM APPROXIMATELY 34.1 ACRES ASSOCIATED WITH THE SANITARY LANDFILL, IS DISCHARGED TO KAILUA BAY VIA OUTFALLS LF-1 AND LF-2.

element environmental llc
environmental · engineering · water resources

PROJECT TITLE:
STORM WATER POLLUTION CONTROL PLAN
MCB HAWAII, KANEOHE BAY, OAHU, HAWAII

FIGURE TITLE:
SANITARY LANDFILL

DATE:
FEBRUARY 2016

FIGURE NO.:
2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

WATER RECLAMATION FACILITY

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AST	aboveground storage tank
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EQA	Environmental Quality Assurance
HazMin	Hazardous Materials Minimization
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan
WRF	Water Reclamation Facility

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a “new source,” from which there is or may be discharge of pollutants, once construction commences;
- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 Water Reclamation Facility

The Water Reclamation Facility (WRF) is located within MCB Hawaii, Kaneohe Bay at the southern end of MCB Hawaii, south of 3rd Street, approximately 1,000 feet northwest of the H-3 Main Gate entrance to MCB Hawaii, Kaneohe Bay. The facility encompasses approximately 4.6 acres and can be found in grids G15 and G16 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Gaylord Lewis (808-257-2217)

The WRF treats an average of approximately 1.2 million gallons per day of wastewater generated at MCB Hawaii using advanced secondary treatment technology. Treated effluent from the WRF is either pumped to the City and County of Honolulu Mokapu ocean outfall or reused as irrigation water at the Klipper Golf Course at MCB Hawaii. Approximately two dozen numerically identified structures are associated with the WRF; however, only six were identified as storage of significant materials (Buildings 896, 1403, 1413, 1682, 1683, and 6850).

Building 896 is a flammable materials storage facility and is the primary storage for significant materials at the WRF. Building 1403 is the influent pump station for the facility. Building 1413 was used to house chlorination equipment, but is now used as a tool room. The original chlorination system was replaced with a new liquid bleach treatment process. The liquid bleach equipment is housed in a new structure located near the aerated effluent polishing pond (the liquid bleach equipment structure has no building designation). A storage shed is also located near the aerated effluent polishing pond and is used to store chlorine tablets. Three diesel ASTs are located on site adjacent to the three emergency generator buildings (Buildings 1682, 1683, and 6850).

Storm water runoff generated at the WRF either percolates into the ground or flows via sheet flow into the surrounding vegetated areas. No storm water drain inlets exist at the facility. A grated inlet is located next to the grit chamber (Building 1378) to capture wastewater lost during transfer of materials for disposal. The inlet conveys the captured wastewater back to the WRF headworks. Surface runoff leaves the site at a low point near the southwest corner toward Kaneohe Bay. This is also the designated sampling point for the site. The nearest point from the WRF to Kaneohe Bay is approximately 220-ft along flat vegetated ground.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the WRF:

A. Material Loading and Unloading Areas

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Material loading and unloading at Building 896 is done on the southeast side through a bermed door. Additional materials are unloaded outside of the building on the northwest and northeast sides. Material loading and unloading at Building 1403

is done on the northwest side of the building. Material unloading at Building 1413 is done on the southeast side of the building.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. Building 896 is a bermed concrete block structure used as a flammable storage locker that stores hydraulic oil, grease, paints, paint thinner, and diesel fuel. All materials are housed on shelves with the exception of diesel fuel, grease, and paint cans. Five-gallon containers and 55-gallon drums of hydraulic fluid are stored outdoors under a covered awning at the northeastern side of the building. All containers are stored on pallets and covered with canvas.

The facility's liquid bleach contact system and equipment are located near the southern corner of the compound. The contact system consists of two liquid bleach mixing tanks. Chlorine tablets are also stored in a shed next to the contact system.

Three diesel ASTs are located next to new Building 6850, Building 1683, and Building 1682. Diesel fuel is used by the emergency generators. The three ASTs are double-walled tanks.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the WRF include loading and unloading of significant materials, sewage treatment, parking of heavy vehicles, and maintenance of WRF equipment.

D. Significant Materials Inventory

The following significant materials are located at the WRF:

- Liquid Bleach
- Hydraulic Fluid
- New and Used Oils
- Solvents
- Paint Thinner
- Grease
- Diesel Fuel
- Raw Sewage
- Sludge
- Paints
- General Purpose Cleaner
- Lime

2.2 Potential Storm Water Pollutants

No pollutants have been identified as having a reasonable potential to be present in storm water discharges from the WRF.

Materials that have *not* been included as a potential storm water pollutant, but have been included as part of the significant materials inventory list, are considered to present a negligible risk to storm water quality. This is based on the nature/location of the primary activities performed with these materials and the BMPs that are in place. Material transport (loading/unloading) is not considered to be a significant threat to storm water, due to spill response procedures, training, and spill kit materials available onsite.

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the WRF employs good housekeeping practices throughout its operations. Good housekeeping practices for the WRF are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas of the WRF have been identified as having a high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the WRF are shown in Table 2-1.

Modifications to the existing BMPs at the WRF are listed in Table 2-2.

New BMPs for implementation at the WRF are listed in Table 2-3.

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
001	Label all Drums, Cans, Containers, Tanks, and Valves	All tanks, containers, and drums are properly labeled.
002	Restrict Access to Area and Equipment	Access to the facility and adjoining compound area is restricted by chain-link fencing around the entire compound.
003	Perform Regular Cleaning	The facility is clean and well kept, with cleaning conducted on a routine basis.
005	Perform Regular Pavement Sweeping	Pavements are kept clean; they are in excellent condition and well maintained.
029	Maintain Equipment in Good Condition	Equipment and facilities are well maintained and in excellent working condition.
051	Use Over-pack Containers or Containment Pallets to Store 1-Pint to 55-Gallon Drums or Containers Outside of Storage Areas	Pallets and containment pallets are used to prevent contact with storm water.
057	Store Liquids and Significant Materials within a Building or Covered Area	Significant materials are stored within a building or covered area.
083	Divert Drainage to Treatment Facility/Sanitary Sewer	An area drain, located outside of Building 1378 (grit chamber), is connected to a sanitary sewer line.
100	Conduct Personnel Training Regarding the SWPPP	Personnel are trained regularly (initial orientation, annual refresher, and weekly topics).
101	Store Containers inside Secondary Containment	All significant materials are stored on spill pallets or in hazardous material storage lockers.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
--	--	Reserved for Future Use		

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category [1]	Implementation Schedule
-	--	Reserved for Future Use		

Notes:
[1] NS = Non-structural; S = Structural
Refer to Appendix 11-3 for BMP descriptions and additional information.

2.4 Personnel Training

Facility personnel receive annual training at minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives.

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Water Reclamation Facility.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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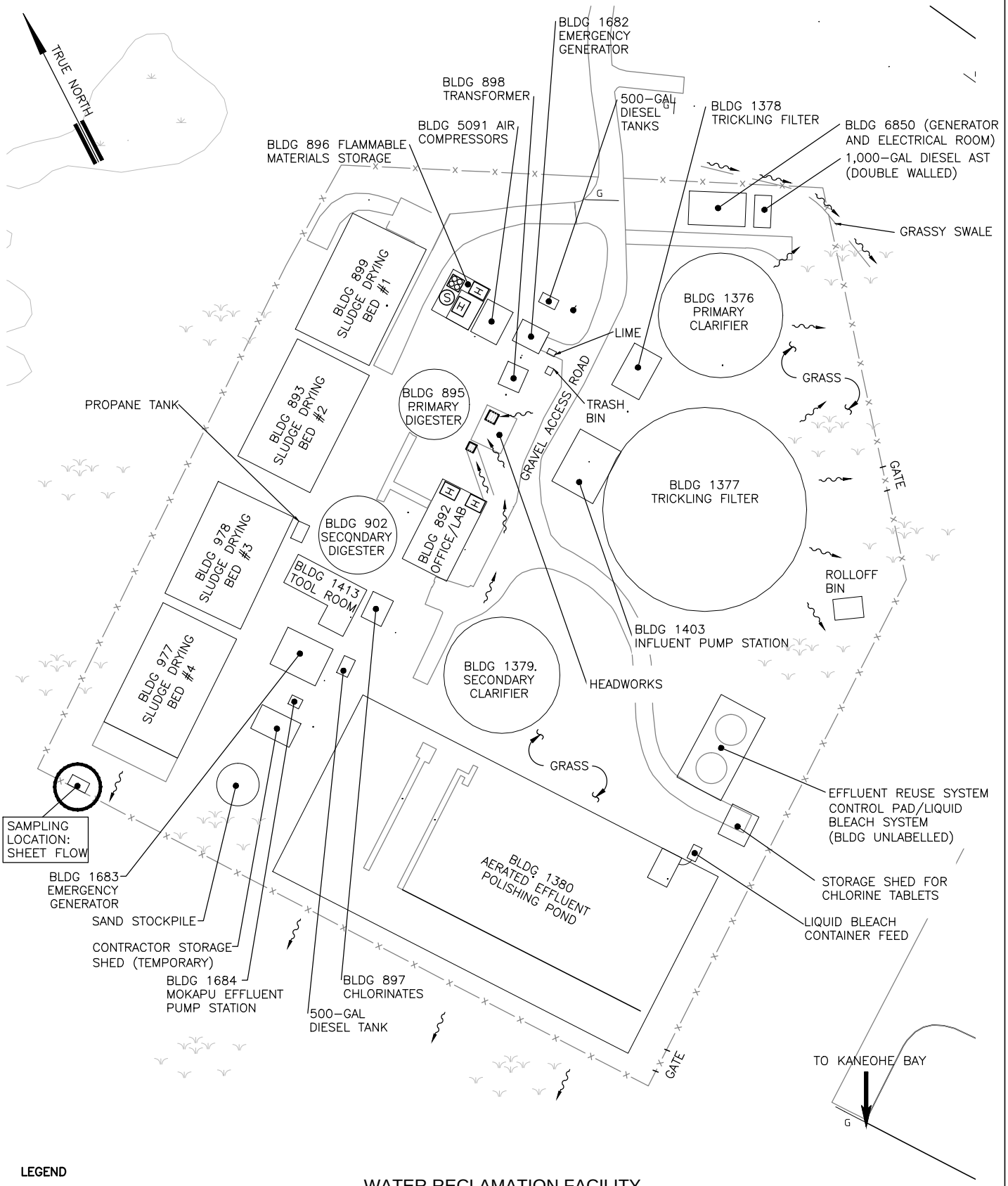

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- SPILL PALLET W/DRUMS
- S — SPILL KIT

WATER RECLAMATION FACILITY

NOT TO SCALE

NOTES:

1. STORM WATER, FROM APPROXIMATELY 4.6 ACRES, ASSOCIATED WITH THE WATER RECLAMATION FACILITY, DISCHARGES TO KANEOHE BAY VIA SURFACE RUNOFF.

DATE: FEB 2016	PROJECT TITLE: STORM WATER POLLUTION CONTROL PLAN MCB HAWAII, KANEOHE BAY, OAHU, HAWAII	
FIGURE TITLE: WATER RECLAMATION FACILITY		FIGURE NO.: 2-1

Draft

STORM WATER POLLUTION CONTROL PLAN

Storm Water Management Plan
Marine Corps Base Hawaii
NPDES Permit No. HI S000007

P-3 AIRCRAFT PARKING APRON

Kaneohe Bay, Oahu, Hawaii

Prepared by:

Marine Corps Base Hawaii

February 2016

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List of Acronyms and Abbreviations

AFR	Aircraft Fire and Rescue
BMP	Best Management Practice
CWA	Clean Water Act
CWB	Clean Water Branch
DOH	State of Hawaii Department of Health
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
EQA	Environmental Quality Assurance
MCB Hawaii	Marine Corps Base Hawaii
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
O&HS SCP	Oil and Hazardous Substance Spill Containment Plan
POC	Point of Contact
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan

1 Introduction

As part of Federal regulations administered through the Clean Water Act (CWA), the State of Hawaii, Department of Health (DOH) has issued the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000007 (referred to herein at the "MS4 Permit") to Marine Corps Base Hawaii (MCB Hawaii). The MS4 Permit requires that MCB Hawaii provide all existing industrial facilities, identified in MCB Hawaii's MS4 Permit application, and any newly identified industrial facilities, submitted to DOH using the "MS4 NPDES Individual Permit – Industrial Storm Water Discharge Notification Form," with a Storm Water Pollution Control Plan (SWPCP) for storm water associated with industrial activities.

The purpose of the regulations is to protect water quality by reducing the amount of pollutants in storm water runoff caused by industrial activities.

1.1 SWPCP Implementation

The storm water management controls of this plan are MCB Hawaii procedure for the applicable industrial facility. An up-to-date copy of the SWPCP shall be maintained on site and at the Marine Corps Base Hawaii Environmental Department (ENV). Management staff, maintenance personnel, contractor staff, and other personnel involved in onsite industrial activities, are knowledgeable of the plan and follow the guidelines set forth in it, in addition to any other pertinent base-wide, state, and federal regulations.

Implementation of the SWPCP is the responsibility of the site Point of Contact (POC) identified at the beginning of each plan. Enforcement of the permit conditions and this SWPCP are the responsibility of the ENV and additional escalating levels of authority as specified in the Enforcement Response Plan developed by MCB Hawaii for its base-wide Storm Water Management Plan (SMWP).

1.2 Updating the SWPCP

This SWPCP will be reviewed as needed to identify necessary changes, at a minimum of annually. Updates may be required due to current best management practice (BMP) failures, spill events, changes in industrial activities, changes in features, or other necessary changes. In addition to observations made by ENV, the site POC will also be responsible for collaborating with the ENV regarding any changes that should be made to the SWPCP.

The ENV will be responsible for approving revisions to the SWPCP. In the event the plan is modified, a copy of the updated SWPCP will remain at the ENV and will be provided to the applicable facility. As required by the HAR 11-55 Appendix B, ENV shall document and report any major changes of this SWPCP to the DOH, Clean Water Branch (CWB), within thirty days of when the changes arise.

Furthermore, the site POC is to inform the ENV of any planned physical alternations or additions the industrial facility covered by this SWPCP, per HAR Ch. 11-55 Section 10(d). The ENV will determine if these planned changes meet any of the following summarized criteria:

- The alteration or addition meets criteria of what is considered to be a "new source," from which there is or may be discharge of pollutants, once construction commences;

- The changes totally replace the industrial activity, process or production equipment, that is documented to cause potential discharge of pollutants as documented in the existing plan; or
- The alteration or addition includes industrial processes substantially independent of the existing source at the same site.

These criteria are provided in more detail in CFR 122.41(l)(1). All planned changes will be reported by ENV to the Director of Health CWB on a quarterly basis.

2 P-3 Aircraft Parking Apron

The P-3 Aircraft Parking Apron (Aircraft Parking Apron) is located within MCB Hawaii, Kaneohe Bay, roughly parallel to Taxiway "A" and extending from 1st Street (see grid J19 of Figure I-1) to the Aircraft Fire and Rescue Building, Building 6822. The facility can be found in grids J19, K18, and K19 of the MCB Hawaii Base Map, see Figure 11-2-1 (Appendix 11-2). The facility-specific map is shown on Figure 2-1.

Hazardous Materials Coordinator:

Mr. Ed Campbell, Fuels (808-257-3187)

SSgt. Joshua Shannon, On-Site, Bldg 6822 (808-257-2501)

The Aircraft Parking Apron consists of a concrete slab where aircraft are parked and cold-fueled, and electrical systems are charged. The facility is approximately 2,100 feet in length, extending from the Direct Refueler Support Office, Bldg 6180 in the west to the Aircraft Fire and Rescue (AFR), Building 6822 in the east. The Aircraft Parking Apron encompasses an area of approximately 23 acres.

The facility is located on a relatively flat area of MCB Hawaii, Kaneohe Bay. Storm water runoff is intercepted by a storm water conveyance system consisting of a series of inlets, drain lines (A, B, C, and D), and an outfall (Outfall 024) into Kaneohe Bay. Runoff from the Aircraft Parking Apron enters this system through a series of inlets located northeast of the fuel islands and through a double inlet near Building 6822. Drain Line 3 runs perpendicular to Drain Lines C and D and conveys runoff from the radar stations, a series of roads, the fuel island area, and part of the runway.

Storm water runoff from the north and northeast areas of the Aircraft Parking Apron sheet flows across concrete or asphalt areas and into Drain Lines C and D. Runoff to the northwest flows across the hot-refueling island area (Facilities 1170 and 1171) and enters the four inlets for Drain Line 3. Storm water runoff to the southeast and southwest sheet flows across concrete or asphalt areas to grass buffers, a series of swales, and then to Drain Lines A and B. Drain Line 3 conveys runoff to Outfall 024. Other drain lines in the Aircraft parking Apron drainage system converge into Drain Line A1, which conveys runoff to Outfalls 018 and 021. Outfall 018 is an existing outfall that was expanded to accommodate the increased runoff from the Aircraft Parking Apron.

2.1 Sources of Pollutants

The following is an inventory of potential pollutants associated with the Aircraft Parking Apron:

A. *Material Loading and Unloading Areas*

Materials that are spilled, leaked, or lost during loading or unloading may collect in the soil or on paved surfaces and be carried away by storm runoff. Aircraft are cold-fueled with jet fuel at the Aircraft Parking Apron.

B. On-Site Material Storage and Disposal Practices

Leaks, drips, or spills of materials that are stored or disposed of in areas exposed to rainfall can be carried away by storm water. Jet fuel is stored within the aircraft.

C. Outdoor Activities

Many outdoor activities at MCB Hawaii, Kaneohe Bay use materials or create wastes that have the potential to pollute storm water runoff. Outdoor activities at the Aircraft Parking Apron include parking of aircraft, vehicle operation, minor repairs, and cold fueling of the aircraft.

D. Significant Materials Inventory

The following is a list of significant materials found at the Aircraft Parking Apron:

- Jet Fuel

2.2 Potential Storm Water Pollutants

The following pollutant has been identified as having a reasonable potential to be present in storm water discharges from the Aircraft Parking Apron if not properly managed:

- Jet Fuel

2.3 Best Management Practices (BMPs)

A. Good Housekeeping Practices

In general, the Aircraft Parking Apron employs good housekeeping practices throughout its operations. Good housekeeping practices for the Aircraft Parking Apron are included in Tables 2-1 through 2-3.

B. Preventative Maintenance

Preventive maintenance is important as water pollution control measures may be of little or no use if devices and equipment have not been properly maintained. Facility personnel conduct inspection of facility equipment and storage systems that are exposed to storm water on a regular basis. Inspections of the waste accumulation sites are conducted on a monthly basis, with monthly inspection reports submitted to ENV.

C. Visual Inspections

Annual site inspections are required by the NPDES permit and are part of the MCB Hawaii, Kaneohe Bay Environmental Quality Assurance (EQA) Program. The annual site inspections are used to determine an overall evaluation of the effectiveness of the storm water BMPs at the facility. Visual inspection provides a valuable subjective assessment of the status of storm water management systems. They are easily performed and allow the relatively frequent opportunity for corrective action, if necessary. Site inspections and documentation requirements are addressed in Chapter 10, Section 10.4.

D. Spill Prevention and Response

Areas where significant material spill or leakage can occur are identified in Section 2.1 and shown on Figure 2-1. The storm water systems and their accompanying drainage points are also shown on Figure 2-1. Refer to Tables 2-1 through 2-3 for BMPs related to spill preventative measures for material handling procedures, storage requirements, and equipment usage.

In the event of a hazardous or significant material spill or leak, the Spill Prevention, Control, and Countermeasures (SPCC) Plan and/or Oil and Hazardous Substance Spill Containment Plan (O&HS SCP) will be consulted, and the instructions carried out in strict accordance with the procedures listed therein. In the event of a reportable quantity spill, a spill message will be issued, and a copy of the spill message will be retained by MCB Hawaii, Kaneohe Bay.

E. Erosion and Sediment Controls

No areas at the Aircraft Parking Apron have been identified as having high potential for significant soil erosion that would require erosion and sediment control measures.

F. Best Management Practices to Minimize Pollutant Contact with Storm Water

Existing BMPs that require no modifications at the Aircraft Parking Apron are shown in Table 2-1.

Modifications to the existing BMPs at the Aircraft Parking Apron are listed in Table 2-2.

New BMPs for implementation at the Aircraft Parking Apron are listed in Table 2-3

Appendix 11-3 has been included for reference in MCB Hawaii's Storm Water Management Plan. This appendix provides additional information for BMPs listed in Tables 2-1 to 2-3 and also includes additional BMPs other than those identified in the SWPCP, which may be applicable in the future to new or modified facilities.

TABLE 2-1 EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description
002	Restrict Access to Area and Equipment	The facilities are located on the flight line, which is restricted to unauthorized personnel.
006	Control Spills	Absorbent materials are available at the AFR, Bldg 6822 adjacent to the Aircraft Parking Apron, and a spill control kit is stored on the AFR rescue truck.
024	Insert Filter in Catch Basin	Drain inlets at the Aircraft Parking Apron are equipped with filter fabric.
028	Keep Equipment and Vehicles Clean	Designated areas are used to keep aircraft and vehicles clean and to prevent waste products from reaching the storm drain system.
033	Check Vehicles and Equipment for Leaks	Aircraft and vehicles are routinely checked for leaks.
035	Park Vehicles on an Impervious Surface	The Aircraft Parking Apron consists of concrete pads and asphalt driveways.
097	Regularly Inspect and Maintain Storm Water Conveyance System	Aircraft Parking Apron storm drainage facilities are inspected regularly as part of the MCB Hawaii, Kaneohe Bay storm drain inspection program.
131	Inlet Protection	The AFR places sand bags around storm drain inlets in the grass if there is a major spill at the Aircraft Parking Apron.

TABLE 2-2 MODIFICATIONS TO EXISTING BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category(1)	Implementation Schedule
--	--	Reserved for Future Use	--	--

TABLE 2-3 NEW BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Description	Implementation Category(1)	Implementation Schedule
--	--	Reserved for Future Use	--	

Notes:
(1) NS – Non-structural; S – Structural
Refer to Appendix 11-3 for BMP descriptions and additional information

2.4 Personnel Training

Facility personnel receive annual training as a minimum, as well as an initial training for all new personnel. Training information will include the BMPs that have been developed for the facility and a general overview of the storm water program and its objectives

2.5 Record of Past Spills or Leaks of Hazardous Pollutants

It is the responsibility of the site POC to document any existing information regarding significant spills or leaks of toxic or hazardous pollutants that have occurred at this facility within the past five (5) years prior to submittal of this SWPCP (April 15, 2016). Additionally, any information regarding discharge of storm water resulting in the discharge of a reportable quantity of oil is to be included in this SWPCP. This includes any incident, since November 16, 1987, for which notification was required to be given to the National Response Center (NRC), or the Coast Guard or EPA (as the On-Scene Coordinator for the geographic area) in accordance with 40CFR §110.6.

A record of any of the aforementioned incidents will be written on Table 2-4. Copies of any other pertinent information (such as incident reports, evaluation of cause, remediation efforts, etc.) regarding the spill or leak will be attached to the field copy of this SWPCP, and provided to the ENV for inclusion in any future version on this document.

At the time of this update, there have been no past spill or leak incidents reported for the Aircraft Parking Apron.

TABLE 2-4 PAST SPILLS OR LEAKS OF HAZARDOUS POLLUTANTS

Date of Incident	Brief Summary of Incident (POC Active at Time of Incident, Pollutant Type, Estimated Quantity, Location of Spill)

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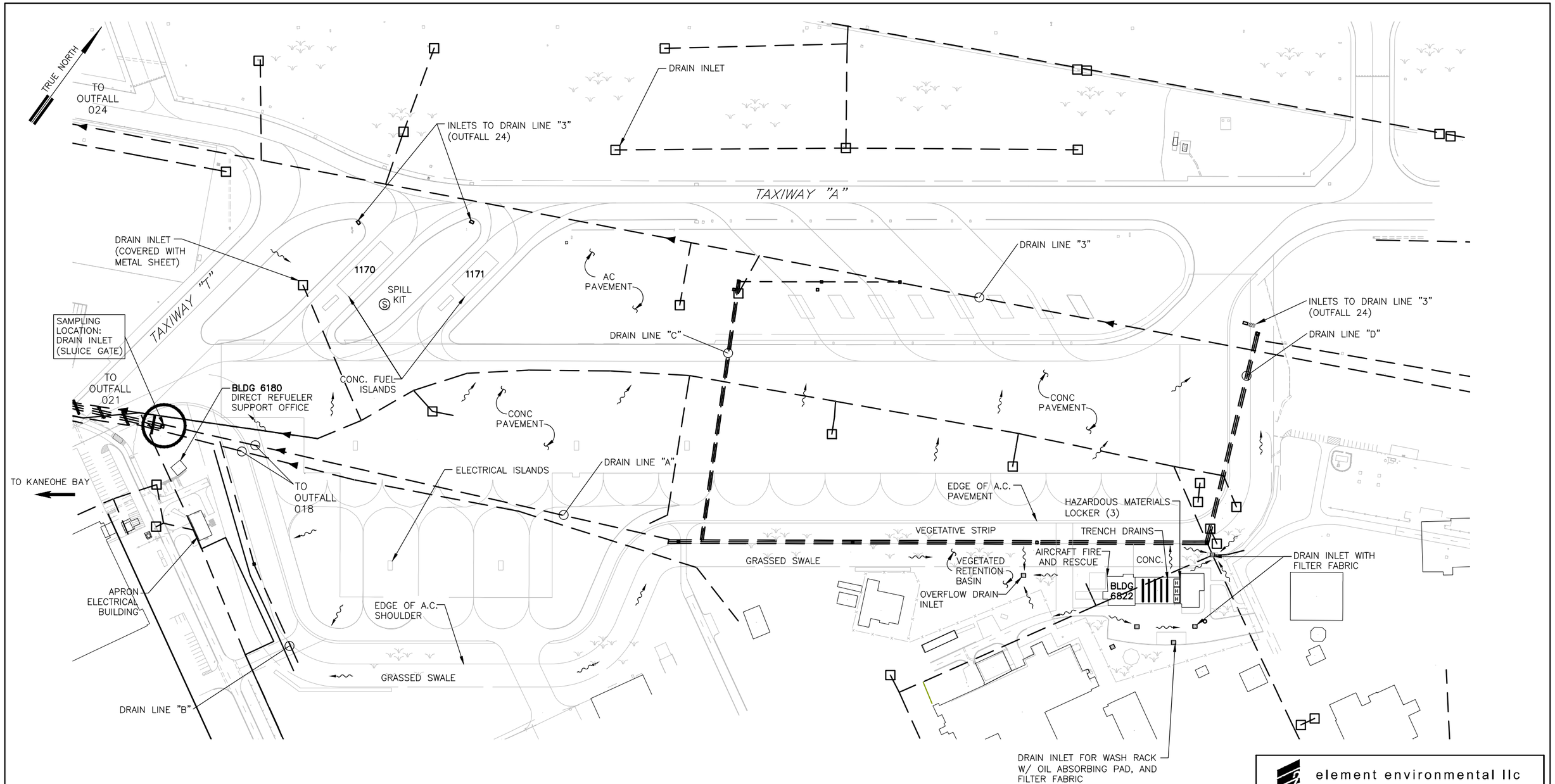


P-3 AIRCRAFT PARKING APRON

NOT TO SCALE

LEGEND

- H — HAZARDOUS MATERIALS LOCKER
- S — SPILL KIT
- STORM DRAIN SYSTEM
- STORM DRAIN INLET
- FLOW ARROW

NOTE:

STORM WATER, FROM APPROXIMATELY 25.8 ACRES ASSOCIATED WITH THE P–3 AIRCRAFT PARKING APRON, DISCHARGES TO KANEOHE BAY VIA OUTFALLS 018, 021, AND 024.

element environmental llc
environmental · engineering · water resources

PROJECT TITLE:
STORM WATER POLLUTION CONTROL PLAN
MCB HAWAII, KANEOHE BAY, OAHU, HAWAII

FIGURE TITLE:
P-3 AIRCRAFT PARKING APRON

DATE: FEBRUARY 2016

FIGURE NO.: 2-1

APPENDIX 11-3

Best Management Practices Fact Sheets

February 2016

Best Management Practices Fact Sheets

This appendix presents generic descriptions of Best Management Practices (BMPs). For ease of reference each BMP has been assigned a number. Table 11-3-1 summarizes all BMPs by its assigned number, name, functional category, and implementation category. Each of the listed BMPs is described in more detail in the pages following. This additional information includes:

- Description of potential pollutants and their sources addressed by the BMP
- Description of the BMP
- Frequency of BMP application (if applicable)
- Training needs
- Effectiveness and cost
- Limitations

The BMPs listed in Table 11-3-1 are either currently used at MCB Hawaii, will be implemented by one of its industrial facilities in accordance with the corresponding Storm Water Pollution Control Plan (SWPCP) in Appendix 11-2, or may become applicable in the future for new or modified facilities.

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
001	Label All Drums, Cans, Containers, Tanks, and Valves	SC	NS	
002	Restrict Access to Area and Equipment	SC	S	
003	Perform Regular Cleaning	SC	NS	
004	Avoid Hosing Down the Site	SC	NS	
005	Perform Regular Pavement Sweeping	SC	NS	
006	Control Spills	SC	NS	
007	Place Trash Receptacles at Appropriate Locations	SC	NS	
008	Train Employees to Properly Dispose of Wastes	SC	NS	
009	Permanently Seal Floor Drains that Discharge to the Storm Drain System	SC	S	
010	Confirm that No Industrial Sinks are Connected to the Storm Drain System	SC	NS	
011	Construct Berm or Dike Around Critical Areas	SC	S	
012	Pave Bermed Areas	SC	S	
013	Provide Valve for Outlet Pipe in Containment Area	SC	S	
014	Recycle	SC	NS	
015	Store Waste and Recycling Materials in Proper Containers	SC	NS	
016	Limit Significant Materials Inventory	SC	NS	
017	Provide Roof to Cover Source Area	SC	S	
018	Control Roof Downspout Discharge	SC	S	
019	Minimize Storm Water Run-On from Adjacent Facilities and Properties	SC	S	
020	Reduce Waste	SC	NS	

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
021	Repair Leaky Roofs	SC	NS	
022	Permanently Seal Drains Within Critical Areas that Discharge to the Storm Drain	SC	S	
023	Place Portable Rubber Mats over Storm Drain Inlets	SC	NS	
024	Insert Filter in Catch Basin	Other	NS	
025	Place Absorbent Blankets in Catch Basin	Other	NS	
026	Routinely Clean Catch Basins	SC	NS	
027	Stencil Signs on Storm Drain Inlets	SC	NS	
028	Keep Equipment and Vehicles Clean	SC	NS	
029	Maintain Equipment in Good Condition	SC	NS	
030	Implement Qualifying Tests for Equipment and Vehicle Operators	SC	NS	
031	Conduct Refresher Courses in Operating and Safety Procedures	SC	NS	
032	Dispose of Obsolete Equipment, Inoperable Vehicles, and Surplus Materials	SC	NS	
033	Check Vehicles and Equipment for Leaks	SC	NS	
034	Park Vehicles or Equipment Indoors or under a Roof	SC	NS	
035	Park Vehicles on an Impervious Surface	SC	NS	
036	Designate Special Areas for Draining or Replacing Fluids	SC	NS	
037	Drain All Fluids from Stored or Salvaged Vehicles and Equipment	SC	NS	
038	Completely Drain Oil Filters Before Disposal	SC	NS	

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
039	Wash Equipment and Vehicles in Designated Area	SC	NS	
040	Discharge Wash Water to a Sanitary Sewer	SC	NS	
041	Recycle Pressure Wash Solvents	SC	NS	
042	Use Drip Pans under Leaking Equipment	SC	NS	
043	Designate Areas for Washing Non-Vehicular Air Filters and Other Greasy Equipment	SC	NS	
044	Conduct Maintenance within a Building or Covered Area	SC	NS	
045	Reduce the Amount of Liquid Cleaning Agents Used	SC	NS	
046	Centralize Liquid Solvent Cleaning to One Location	SC	NS	
047	Substitute Non-Toxic or Less-Toxic Cleaning Solvents	SC	NS	
048	Use Solvents Efficiently	SC	NS	
049	Use Outside Contractor for Handling Used Solvents and Other Significant Materials	SC	NS	
050	Properly Store Containers	SC	NS	
051	Use Overpack Containers or Containment Pallets to Store 55 Gallon Drums or Containers Outside of Storage Areas	SC	NS	
052	Use "Doghouse" Design for Outdoor Storage of Small Liquid Containers	SC	S	
053	Do Not Store Used Parts or Containers Directly on Ground	SC	NS	
054	Do Not Allow Open Flames Near Flammable Material	SC	NS	
055	Use Door Skirt or Seal	SC	S	

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
056	Employ Proper Handling Procedures to Transport Materials and Waste	SC	NS	
057	Store Liquids and Significant Materials within a Building or Covered Area	SC	NS	
058	Provide Overfill Protection	SC	NS	
059	Monitor Major Fueling Operations	SC	NS	
060	Provide Absorbent Booms in Unbermed Fueling Areas	SC	NS	
061	Eliminate Topping off Tanks	SC	NS	
062	Install Leak Detection System	SC	NS	
063	Designate Areas for Fueling from Mobile Fuel Tankers	SC	NS	
064	Restrict Access to Tanks	SC	S	
065	Lock Fuel Tanks When Not in Use or on Standby	SC	NS	
066	Keep Tanks, Piping, and Valves in Good Condition	SC	NS	
067	Protect Tanks from Being Damaged by Vehicles	SC	S	
068	Protect Fill Pipe from Being Damaged by Vehicles	SC	S	
069	Provide Protection for Permanent Aboveground Tanks from Discharge of Firearms	SC	NS	
070	Enclose Outdoor Sanding and Painting Operations and Use Tarps to Contain and Collect Solid Wastes	SC	NS	
071	Vacuum Particulate Wastes from Sanding or Painting Operations	SC	NS	
072	Conduct Indoor Sanding and Painting in an Enclosed Area	SC	NS	

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
073	Avoid Sanding or Painting in Windy Weather	SC	NS	
074	Use Efficient Painting Equipment	SC	NS	
075	Do Not Empty Toilet Tanks During Transit or in the Port	SC	NS	
076	Do Not Discharge Bilge Water in Harbor	SC	NS	
077	Do Not Discharge Bilge Water in Harbor	SC	NS	
078	Use Oil Containment Booms	SC	NS	
079	Properly Dispose of Sediment Generated by Cleaning Sanitary Sewer Lines	SC	NS	
080	Eliminate Treated Wood Products or Use Wood Treated with Less-Toxic Chemicals	SC	NS	
081	Establish Integrated Pest Control	SC	NS	
082	Conduct Pesticide Operations under the Supervision of Licensed Applicator	SC	NS	
083	Divert Drainage to Treatment Facility/Sanitary Sewer	SC	S	
084	Divert Drainage to a Low-Flow Sump	Other	S	
085	Construct Oil/Water Separator	Other	S	
086	Deleted			
087	Deleted			
088	Deleted			
089	Deleted			
090	Deleted			
091	Deleted			
092	Deleted			
093	Deleted			

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
094	Deleted			
095	Deleted			
096	Construct Concrete Grid Pavement	Other	S	
097	Regularly Inspect and Maintain Storm Water Conveyance System	SC	NS	
098	Regularly Inspect and Test Equipment	SC	NS	
099	Prepare Appropriate Spill Prevention and Response Plans	SC	NS	
100	Conduct Personnel Training Regarding the SWPPP	SC	NS	
101	Store Containers Inside Secondary Containment	SC	NS	
102	Control Dust and Particulates	SC	S	
103	Do Not Pour or Deposit Waste into Storm Drains	SC	NS	
104	Routinely Report Any Observed Non-Storm Water Discharges	SC	NS	
105	Deleted			
106	Deleted			
107	Deleted			
108	Deleted			
109	Deleted			
110	Timing of Construction			
111	Staging Areas			
112	Preservation of Existing Vegetation			
113	Clearing Limits			
114	Stabilization of Construction Entrance and Roads			

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
115	Erosion Prevention on Temporary and Private Roads			
116	Dust Control			
117	Cover for Materials and Equipment			
118	Spill Prevention and Control			
119	Vehicle/Equipment Washing and Maintenance			
120	Waste Management			
121	Mulching			
122	Hydromulching			
123	Geotextile			
124	Matting			
125	Pipe Slope Drain			
126	Slope Roughening			
127	Gradient Terracing			
128	Retaining Walls			
129	Gabions			
130	Riprap Slope and Outlet Protection			
131	Inlet Protection			
132	Check Dams			
133	Temporary Stream Crossing			
134	Straw Bales/Biofilter Bags			
135	Silt Fence			
136	Vegetative Buffer Strip			
137	Sedimentation Trap (Basin)			

TABLE 11-3-1 BEST MANAGEMENT PRACTICES

BMP No.	BMP Title	Functional Category(1)	Implementation Category(2)	Implementation Schedule
138	Portable Sediment Tank			
139	Temporary Swale			
140	Earth Dike			
141	Perimeter Dike/Swale			
142	Temporary Berms (Sandbags)			
143	Temporary Storm Drain Diversion			
144	Topsoiling			
145	Seeding			
146	Sodding			
147	Planting			

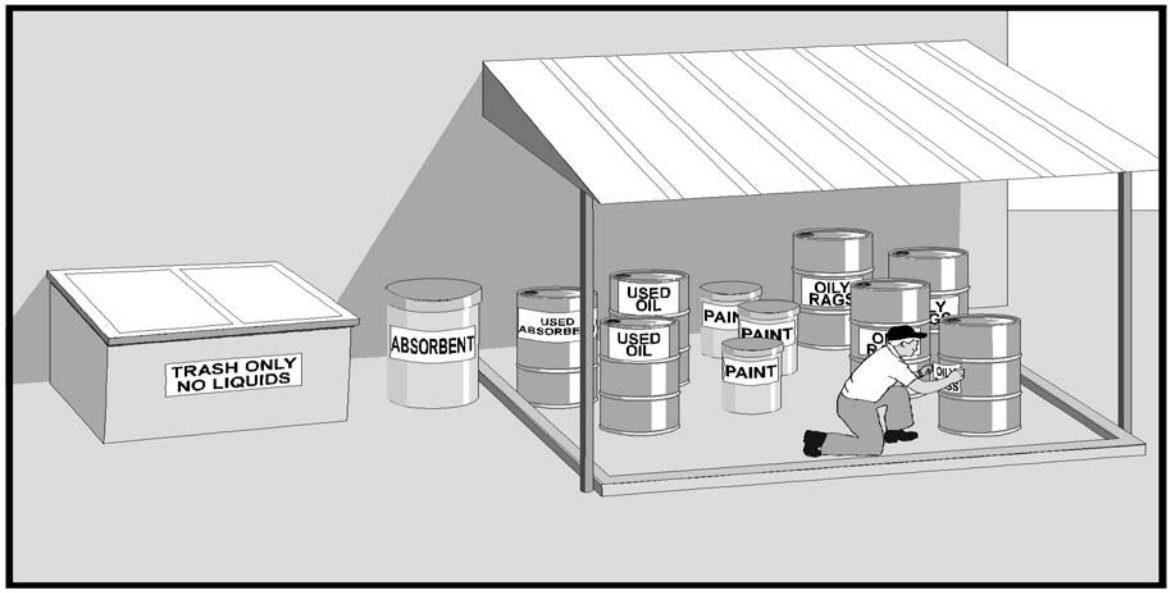
Notes:

(1) SC - Source Control
Other - Best Management Practice Other than Source Control

(2) S - Structural
NS - Non-Structural

Best Management Practices Fact Sheets

BMP 001 - Label All Drums, Cans, Containers, Tanks, and Valves



Description of Potential Pollutant and Source: Drums, cans, and containers can be improperly managed and disposed of due to uncertainty of the container's contents. Tanks which are not labeled may result in improper use of the tank or fuel, which may result in the exposure of significant materials to storm water and/or receiving waters. Similarly, unlabeled valves may be opened without proper precaution due to lack of user information. Storm water quality will be affected if significant materials are improperly disposed to the storm drain and/or receiving waters. Lack of labeling will also make it difficult to quickly identify the type of material released so facility personnel can respond correctly. Labels also identify hazardous materials at the facility and are a good way to request caution in certain areas (e.g., drums indicating flammability).

Description of BMP: Label all drums, valves, pumps, cans, tanks, and containers to reduce the chance of misuse and eventual spills. Labeling ensures that the appropriate procedures, equipment, and storage containers are used. All containers will be labeled as to what is in the container (e.g., used solvent, unleaded gas). In addition, containers of hazardous substances will be labeled regarding the potential hazard (e.g., corrosive, flammable). Department of Transportation (DOT) labeling is an effective labeling method. DOT requires that labels be prominently displayed on transported hazardous and toxic materials. Labeling required by DOT will be expanded to piping and containers, making it easy to recognize materials that are corrosive, radioactive, reactive, flammable, explosive, or poisonous. Fuel tanks will be labeled as to the material stored, such as unleaded gasoline, diesel fuel, and JP-4. An uncontrolled storm drain inlet will not be located inside the bermed area and there will not be any cutouts in the berm to release uncontrolled drainage.

For tanks the posted signs will be no less than 8 inches by 10 inches with 3/4-inch letters. They will describe the products stored in each tank and the tank capacity. The lettering will be of sufficient size and boldness to be legible at a distance of 15 feet or more on all of the tank's visible sides.

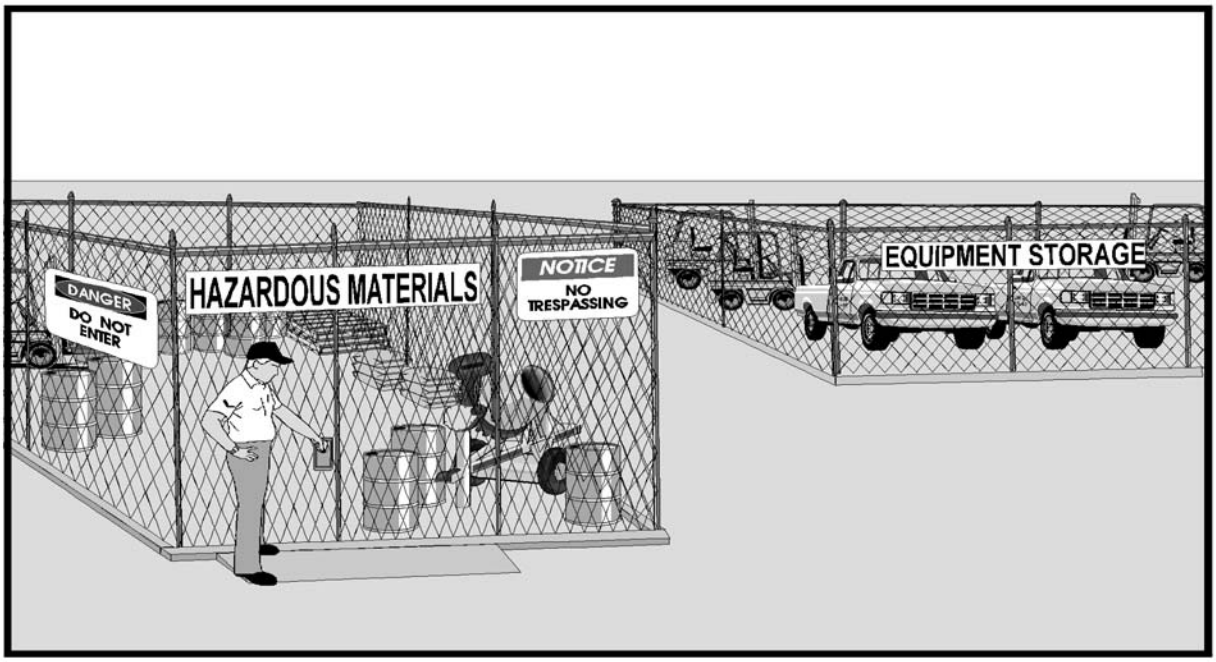
Application Guidance: Proper labeling will always be used.

Training: Personnel will be trained not to remove labels on containers.

Effectiveness and Cost: Proper labeling is an effective, low-cost BMP.

Limitations: None

BMP 002 - Restrict Access to Area and Equipment



Description of Potential Pollutant and Source: Vandalism of vehicles and facility property may result in the release of significant materials.

Description of BMP: Areas where vehicles, equipment and materials are stored and are accessible to the public will be fenced and gated to discourage trespassing. Access to equipment will also be restricted. Only authorized personnel will be allowed to operate equipment. The fences and gates will be properly maintained, and additional security measures including lighting of the area will be implemented if the fencing alone proves insufficient. Where appropriate, security guards or alarms will be used.

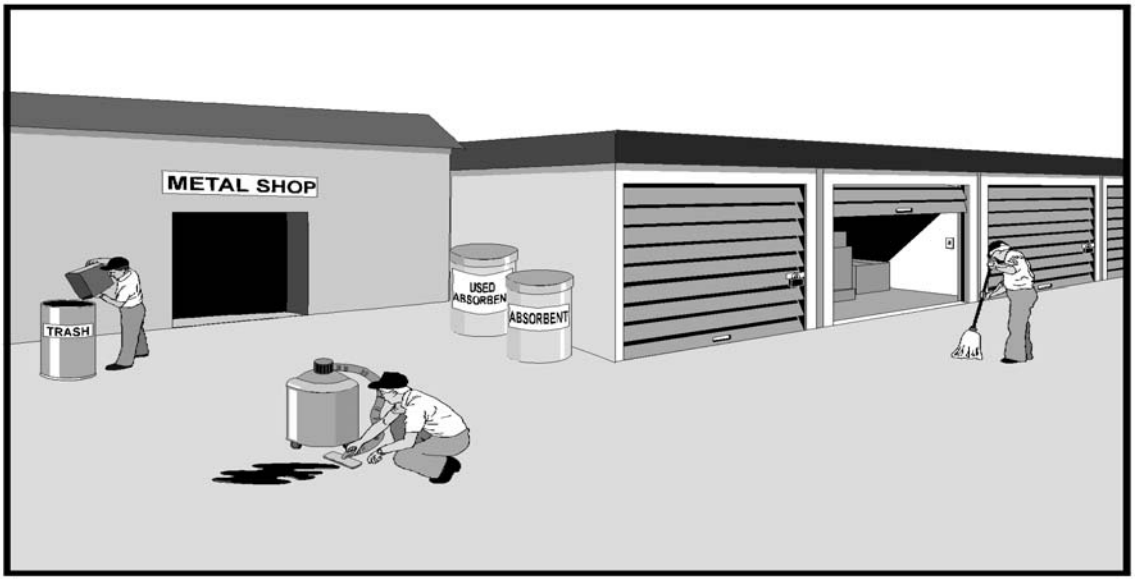
Application Guidance: As needed.

Training: N/A

Effectiveness and Cost: Effectiveness and costs will vary depending on the application.

Limitations: None

BMP 003 - Perform Regular Cleaning



Description of Potential Pollutant and Source: Dirt, surplus materials, and spilled or dropped materials are often allowed to accumulate in areas such as maintenance shops, manufacturing facilities, metal fabrication shops, loading docks, and storage areas. Pollutants from the accumulated material can be transported by storm water to the storm drain system. A clean and orderly work area reduces the possibility of accidental spills caused by mishandling of chemicals and equipment and should reduce safety hazards to personnel.

Description of BMP: Maintaining a regular general sweeping and cleaning schedule reduces buildup of waste materials and minimizes the amount of significant materials exposed to storm water. General cleaning includes dusting and keeping work areas neat and organized.

Floors and ground surfaces will be kept dry using brooms, shovels, vacuum cleaners, or cleaning machines. It is important to perform dry sweeping and dry cleaning (as opposed to hosing down areas as discussed in BMP 004). Garbage and waste materials will be collected and disposed regularly. Particular emphasis will be placed on sweeping and cleaning outdoor areas as close as possible to a forecasted rainfall. Any granular absorbent materials used for spill cleanup will be removed and properly disposed before a rainfall.

Application Guidance: Cleanup and sweeping will be performed daily and more often as necessary to remove all loose trash, paint cans, discarded construction materials, sediment, oil, solvents, plastics and other significant materials. Additional clean up and sweeping will be performed before anticipated storm events. Additionally, a regular sweeping schedule will be maintained.

The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be trained to ensure that all waste be managed within guidelines of applicable federal, state, and local regulations. Signs will be posed as reminders.

Effectiveness and Cost: Regular general cleaning is a highly effective, low-cost BMP.

Limitations: None

BMP 004 - Avoid Hosing Down the Site

Description of Potential Pollutant and Source: Cleaning work sites by hosing down causes wash water to transport pollutants to the storm drain where it can be exposed to storm water.

Description of BMP: Cleaning the work site by hosing down will be avoided and dry methods of cleaning will be used. Dry methods include sweeping or using damp rags or mops. If possible or practical, hoses will be removed. If hosing down is unavoidable, the downstream drain will be temporarily plugged as described in the following BMPs:

- Place Portable Rubber Mats Over Storm Drain Inlets
- Insert Filter In Catch Basin
- Place Absorbent Blankets In Catch Basin

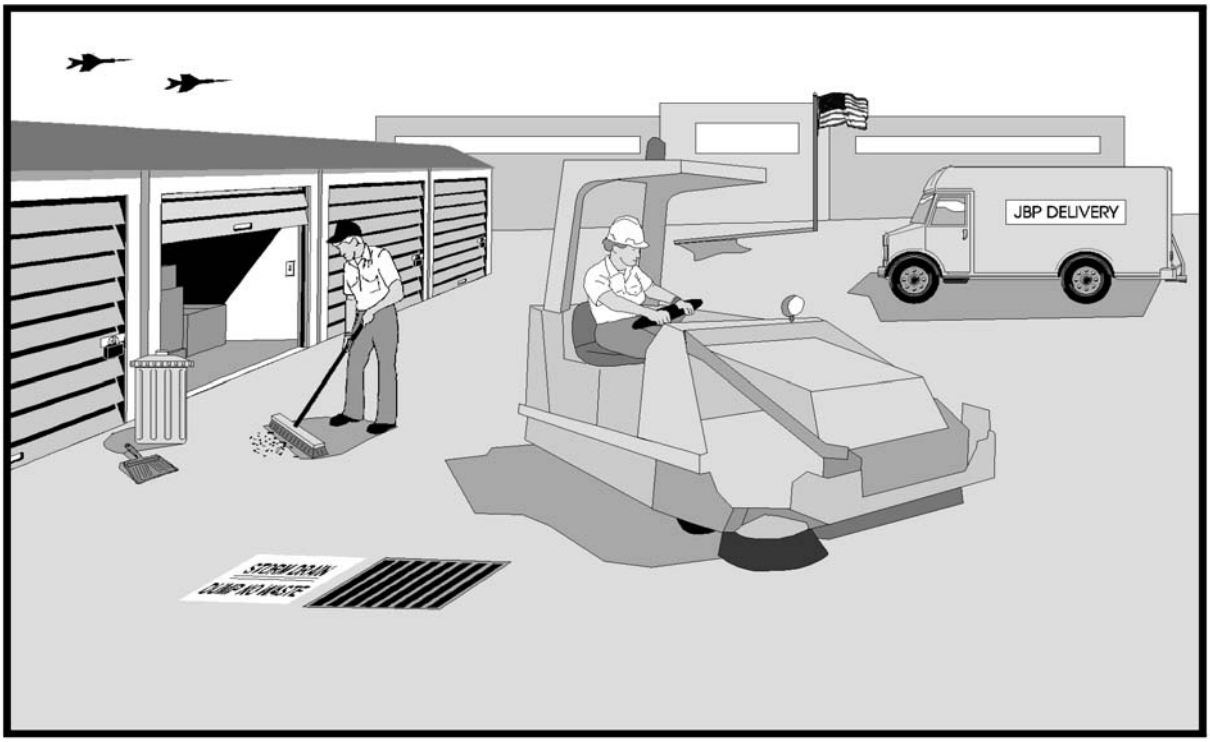
Application Guidance: Methods of dry cleaning will be used whenever possible at all work stations, loading/unloading sites, maintenance sites, storage areas, and parking lots.

Training: New personnel will be notified of the policy; signs should be posted. If possible or practical, hoses should be removed.

Effectiveness and Cost: Eliminating hosing down is a highly effective, low-cost BMP.

Limitations: None

BMP 005 - Perform Regular Pavement Sweeping



Description of Potential Pollutant and Source: Trash, litter and particulate matter typically accumulate on paved surfaces. These materials are then transported during storm events into the storm drain system or directly into receiving waters (e.g., from piers).

Description of BMP: Regular dry sweeping of paved areas will prevent pollutants and debris from entering storm drains.

Application Guidance: Dry sweeping of paved areas will be performed bimonthly. Particular emphasis will be placed on sweeping the paved areas prior to the wet season and frequently during the wet season.

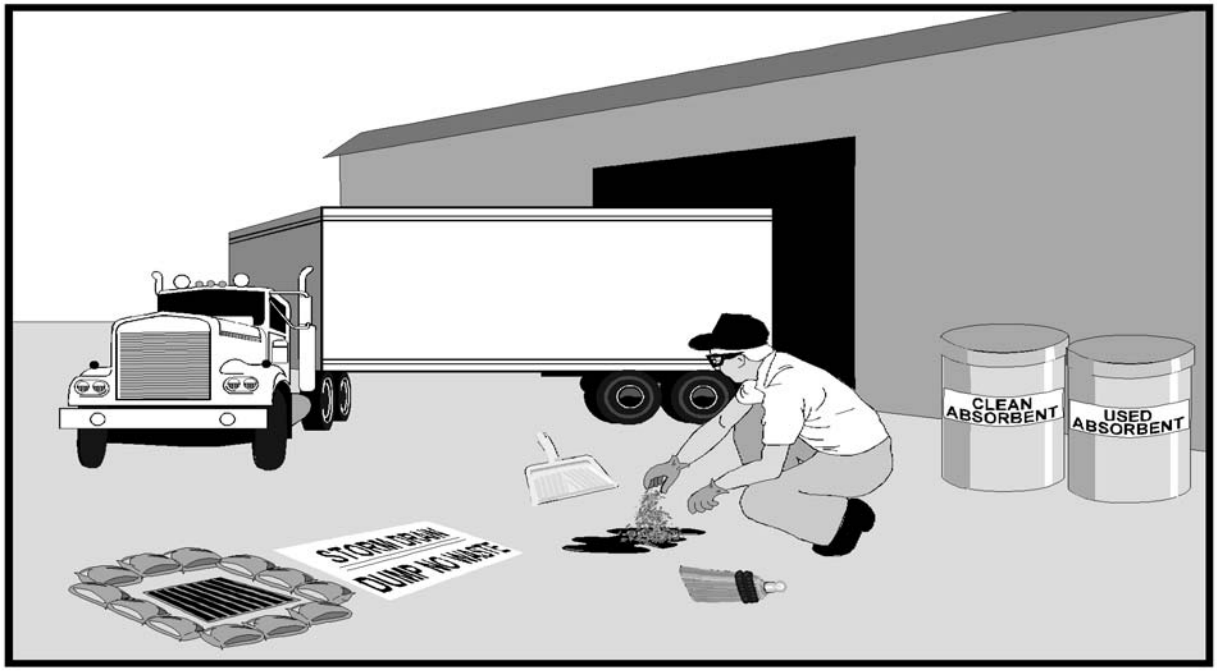
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be trained to use a small vacuum sweeper, if available, instead of a mechanical brush sweeper since the vacuum is more effective at removing fine particulate matter.

Effectiveness and Cost: Dry sweeping is a moderately effective, high-cost BMP, especially if a vacuum sweeper must be purchased.

Limitations: Layout of the site, amount of paved surface area, and the availability of funds for purchase of equipment may limit the use of this practice.

BMP 006 - Control Spills



Description of Potential Pollutant and Source: Spills of significant materials may be exposed to storm water and transported to storm drains and/or receiving waters.

Description of BMP: To reduce the potential for spills, material safety data sheets (MSDS) will be followed for handling, storage, and cleanup of all significant materials.

Any spill, large or small, of significant materials will be controlled immediately to prevent pollutants from being transported to storm drains and/or receiving waters. Appropriate spill control material will be kept on site. Smaller spills will be contained using absorbent material such as kitty litter, straw, or sawdust. Drums of absorbent material will be easily accessible and clearly marked, and containers for spend absorbent material will be readily available. Spend absorbent material will be managed appropriately and disposed in accordance with applicable regulations.

Larger spills will be controlled using spill kits, booms, and other response equipment commensurate with the size of the spill. The methods outlined in the Activity's spill prevention and response for hazardous materials will be followed for spills of any potential storm water pollutants. The date, time, nature and volume of material spilled, and cleanup measures taken will be recorded for all spills.

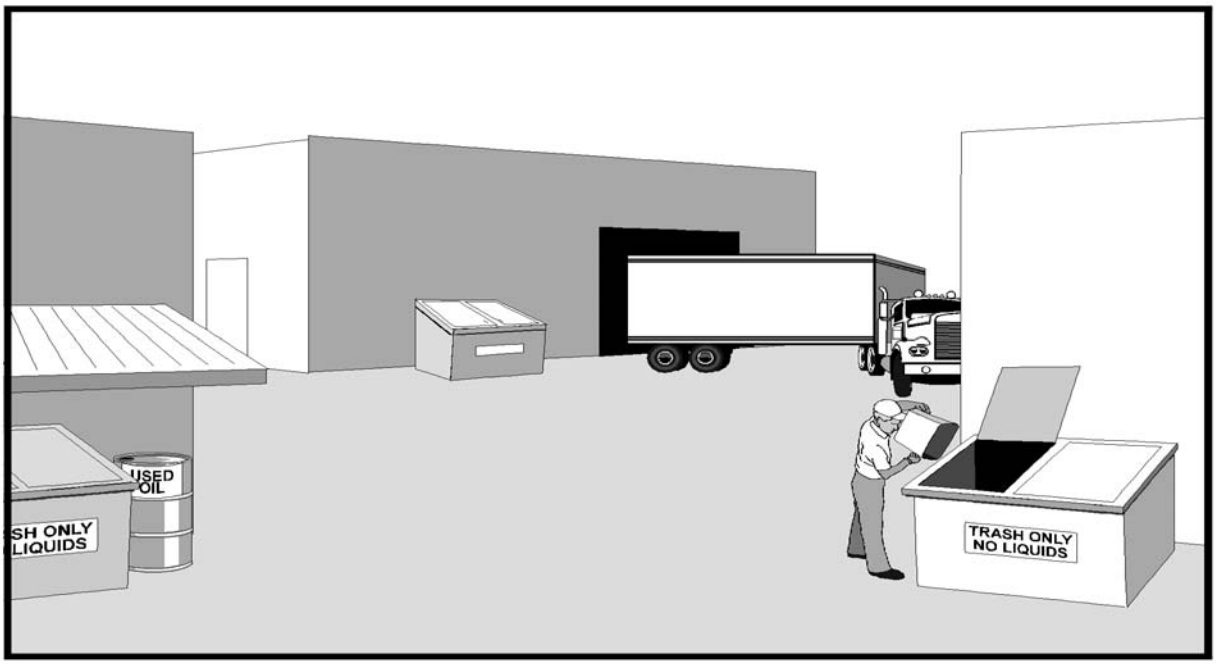
Application Guidance: Controlling spills will be practiced under all working conditions.

Training: Personnel will be trained in spill prevention and response procedures including the use of personal protection equipment (gloves, eye and face protection, etc.). This will include what absorbent or equipment to use, how to use the absorbent or equipment, where to find it, how to dispose of the spent absorbent or other material, and who to notify in the event of a spill.

Effectiveness and Cost: Spill control is a moderately effective, low-cost BMP.

Limitations: None

BMP 007 - Place Trash Receptacles at Appropriate Locations



Description of Potential Pollutant and Source: Improperly located or insufficient numbers of trash receptacles will promote poor housekeeping practices. This will increase the opportunity for pollutants from all source areas to reach storm water.

Description of BMP: Proper and frequent placement of trash receptacles will promote the proper disposal of waste materials. This reduces the opportunity for pollutants to reach storm water. Trash receptacles will be easily accessible for personnel.

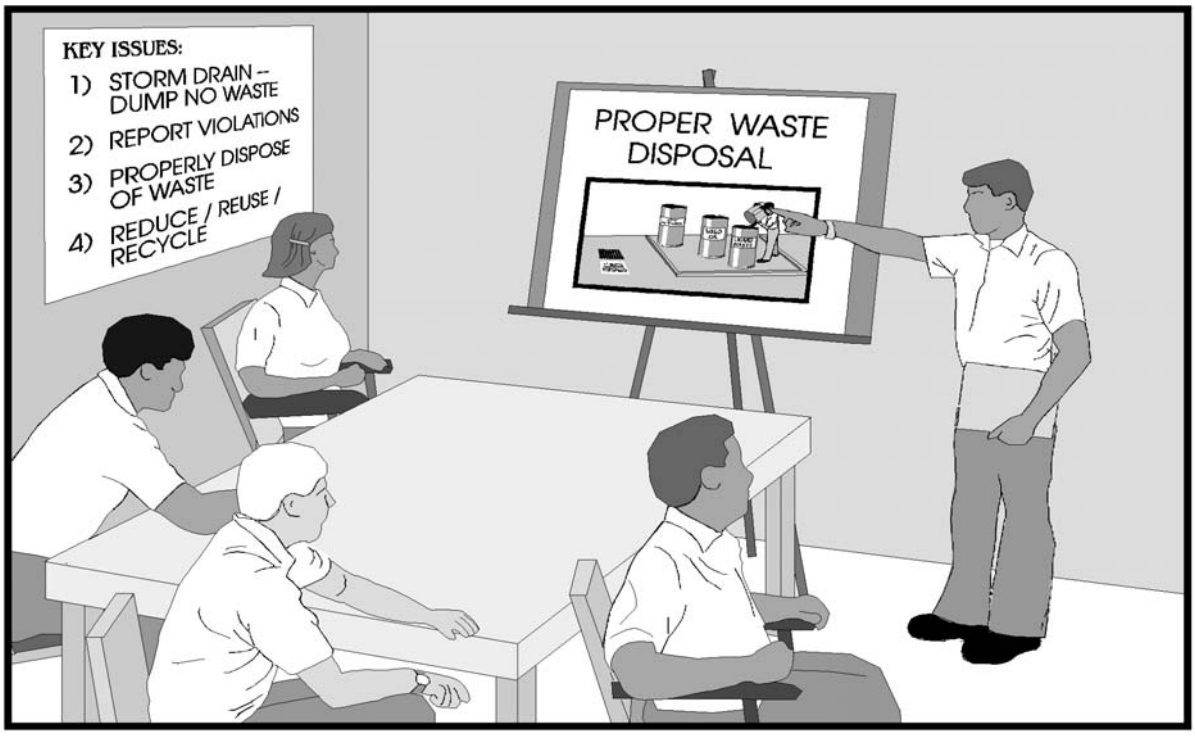
Application Guidance: Placement of trash receptacles at appropriate locations will always be practiced.

Training: Personnel will be trained as to the location of trash receptacles.

Effectiveness and Cost: Appropriately located trash receptacles are an effective, low-cost BMP.

Limitations: None

BMP 008 - Train Employees to Properly Dispose of Wastes



Description of Potential Pollutant and Source: Waste poured or deposited into storm drains contains pollutants which will enter the storm drain system and receiving waters without treatment.

Description of BMP: Employees will be trained on proper waste disposal and recycling procedures.

Application Guidance: Training will be performed for all new personnel and semi-annually for all personnel.

The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Training will include the following:

- Train personnel at all levels not to pour or deposit wastes into storm drains or storm drain connections.

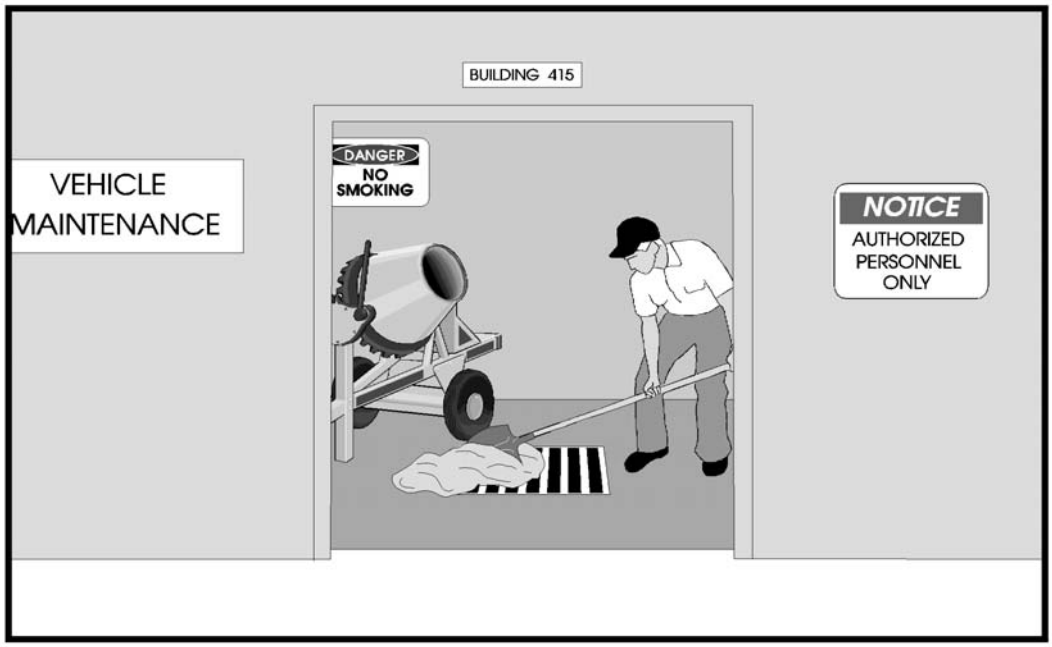
- Train personnel to properly dispose or recycle materials.

- Train personnel at all levels to report any observable non-storm water discharges.

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: None

BMP 009 - Permanently Seal Floor Drains that Discharge to the Storm Drain System



Description of Potential Pollutant and Source: Floor drains that are connected to the storm drain system provide a pathway for spilled or leaked material to enter the system.

Description of BMP: Floor drains inside buildings will be permanently sealed (whenever this would not adversely affect safety or structural integrity) to prevent accidental illegal dumping of pollutants into the storm drain system.

Application Guidance: N/A

Training: N/A

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: None

BMP 010 - Confirm that No Industrial Sinks Are Connected to the Storm Drain System

Description of Potential Pollutant and Source: Industrial sinks connected to the storm drain system can introduce pollutants directly to the storm drain system and receiving waters without treatment.

Description of BMP: Sinks in industrial areas will be connected to the sanitary sewer or other disposal location. "As-builts," piping diagrams, and building or site plans will be inspected to verify that the sinks are not connected to the storm drain system, especially in casually constructed shop areas. Additional reconnaissance may be performed to look for plumbing changes not shown on available plans. If an illicit connection to the storm drain system is suspected, additional testing should be performed.

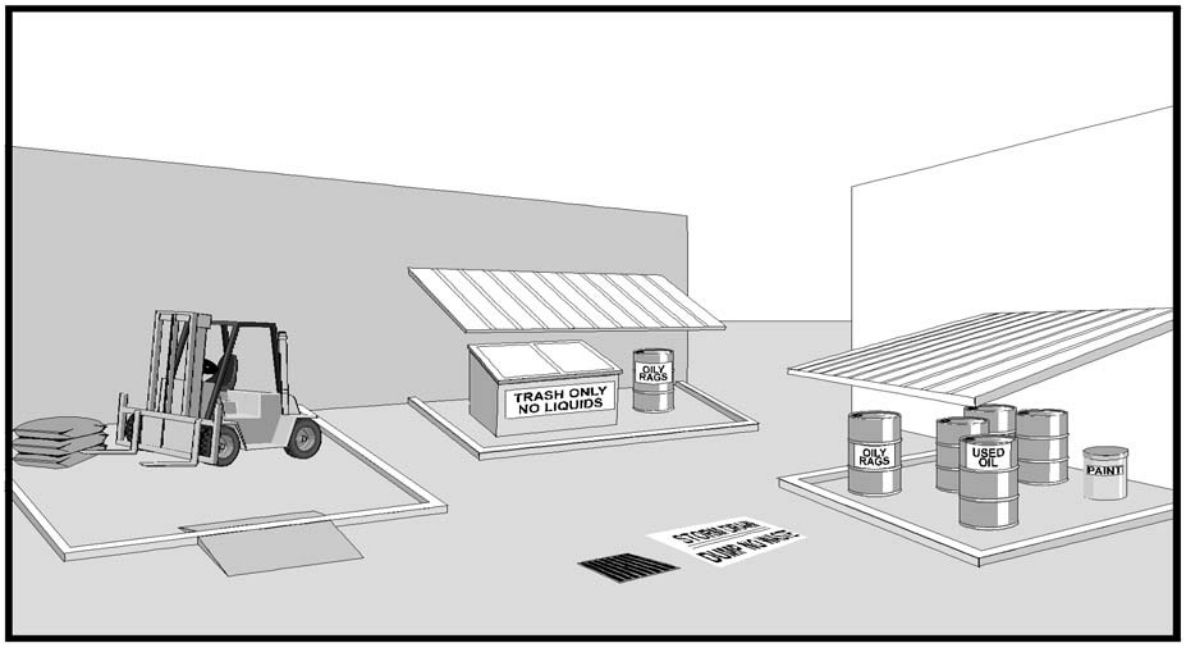
Application Guidance: N/A

Training: N/A

Effectiveness and Cost: This is a highly effective, low- to moderate-cost BMP.

Limitations: None

BMP 011 - Construct Berm or Dike Around Critical Areas



Description of Potential Pollutant and Source: Critical areas are source areas that have a high likelihood for the release of pollutants. This includes material handling areas, material storage areas, and equipment repair and maintenance areas. As a result of spills and leaks or exposure to storm water, pollutants can flow from critical areas into the storm water system. In addition, small spills and leaks can accumulate on the surface area and be washed away by storm water.

Description of BMP: A raised berm or dike will be constructed around a critical areas. This will provide secondary containment and prevent any spills or leaks from leaving the area. This secondary containment will also be provided where mobile tankers containing fuel are customarily stationed. It may be required to construct a "speed bump" to allow vehicle access into the area. (Note: double walled tanks do not require this BMP. Also, 40 CFR 112.7 requires bulk petroleum storage tanks be provided with secondary containment.) A drain valve will be installed and procedures to drain storm water from the bermed area will be posted (see BMP 014).

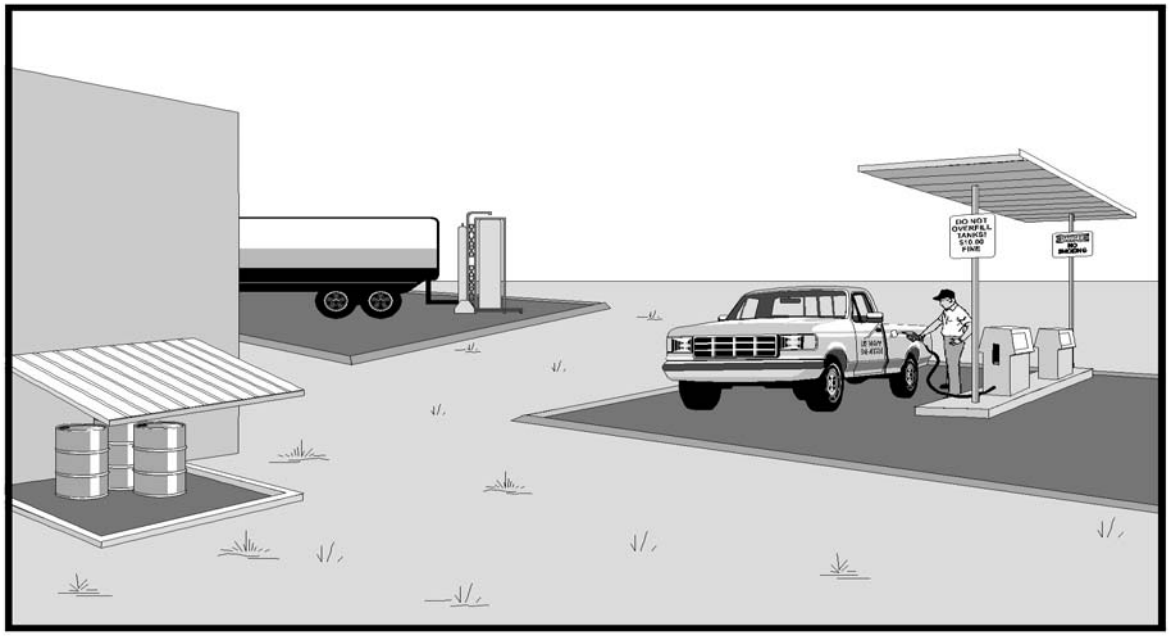
Application Guidance: Install as needed.

Training: N/A

Effectiveness and Cost: This is a highly effective BMP. The cost will vary depending on the size of the fueling operation.

Limitations: The size of some tank and fueling operations areas could make this BMP relatively expensive.

BMP 012 - Pave Bermed Areas



Description of Potential Pollutant and Source: Critical areas are source areas that have a high likelihood for the release of pollutants. This includes material handling areas, material storage areas, and equipment repair and maintenance areas. Material which has leaked or spilled onto the ground surface may infiltrate into the soil and then be transported to storm drains by storm water.

Description of BMP: Critical areas should be contained by a berm or dike. (See BMP 012, "Construct Berm or Dike Around Critical Area.") The area within the berm will be sufficiently impervious to prevent infiltration of the material in the event of a spill. The impervious material will be concrete, asphalt concrete, or other impervious paving material. The lining material will also be clay, plastic or another impervious material. A storm drain must not be located within the impervious area. (Note: 40 CFR 112.7 requires bulk petroleum storage tanks be provided with secondary containment.)

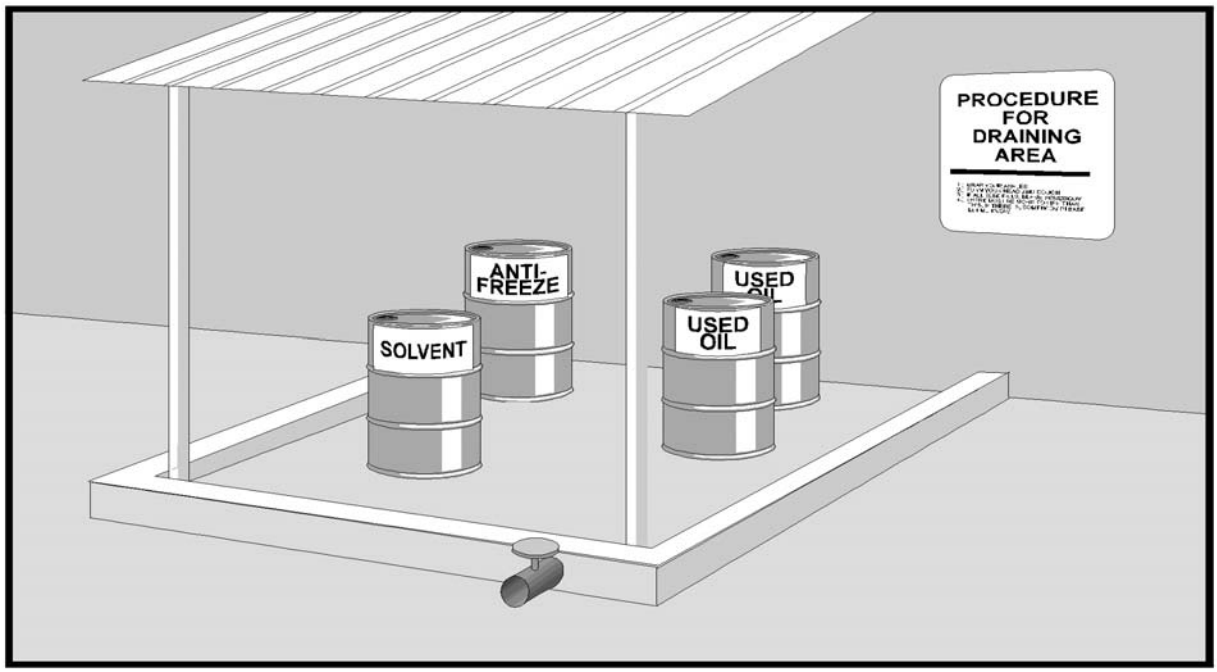
Application Guidance: Install as needed.

Training: N/A

Effectiveness and Cost: This is an effective BMP. Costs will vary based on the size of the area.

Limitations: The size of some tank and fueling operations areas could make this BMP expensive.

BMP 013 - Provide Valve for Outlet Pipe in Containment Area



Description of Potential Pollutant and Source: Spilled or leaked material may be discharged from containment areas through open outlet pipe valves or by overflowing.

Description of BMP: Outlet pipe valves will be installed and kept closed. During storm events, containment areas will be drained following guidelines specifically developed for that area. Storm water accumulated in containment areas may be released to the storm drain system after the water quality has been evaluated based on the types of materials stored in the containment area and/or after laboratory analyses. If sheening, discoloration, odor, or evidence of spills is observed, the water will not be discharged to the storm drain system prior to treatment or further evaluation.

In containment areas where oils are stored, skimming spilled oil off the water using absorbents will be adequate treatment prior to discharge to storm drain system. However, the water will either be pumped out and stored pending chemical analytical results or properly disposed.

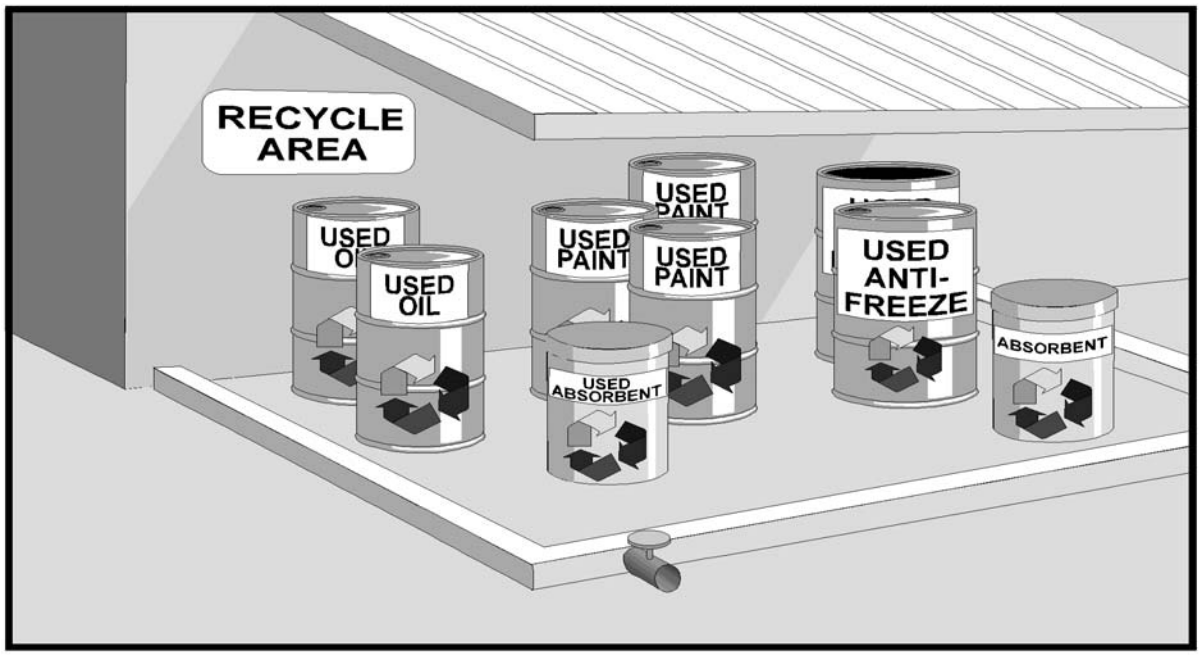
Application Guidance: The accumulated storm water will be released or removed at least every 24 hours during storm events.

Training: Personnel will be trained to drain containment areas according to the procedures developed for each containment area. Personnel will also be trained in the proper method of disposing materials that have been contained in the area after a spill.

Effectiveness and Cost: This is an effective, low to moderate-cost BMP.

Limitations: None

BMP 014 - Recycle



Description of Potential Pollutant and Source: Many materials, both hazardous and non-hazardous, can be sources of pollutants. Recycling will be employed to reduce the amount of waste material exposed to storm water on the Activity.

Description of BMP: Recycling will be used to the fullest extent possible in all situations.

Application Guidance: Recycling collections will be conducted at least weekly for recyclable items such as solvents, oil, scrap metals, wash water and absorbent materials. Separating the recyclable items facilitates recycling.

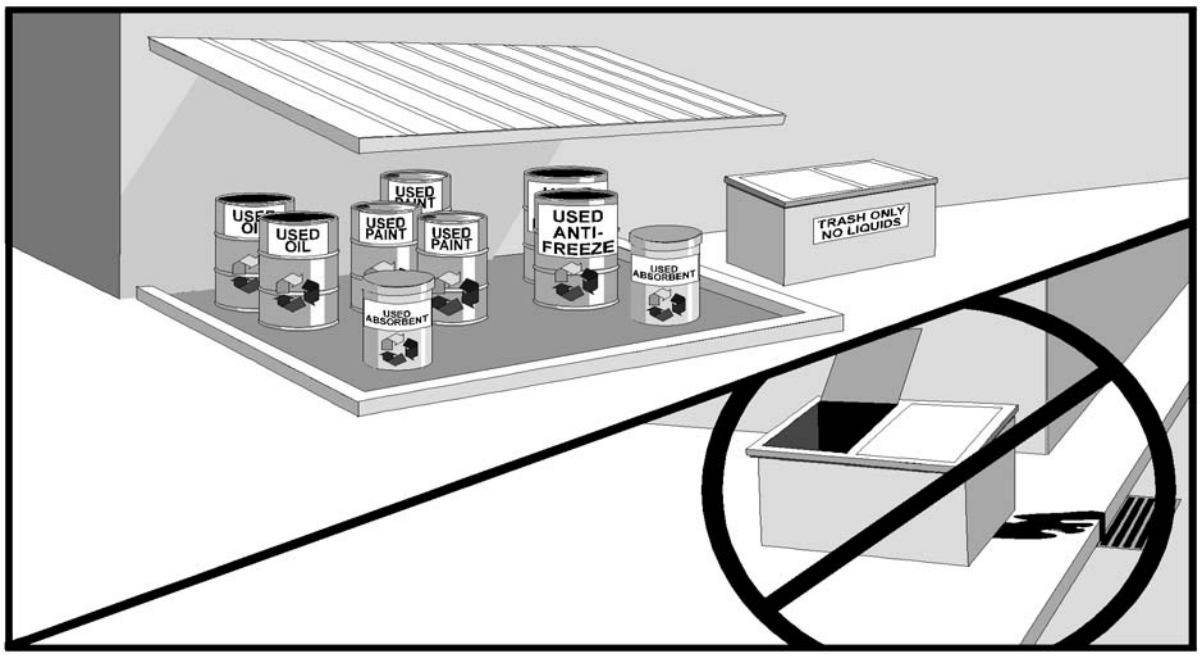
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be trained on proper recycling techniques along with posting and maintenance of signs.

Effectiveness and Cost: Effectiveness and cost will be site specific.

Limitations: Local vendors may not be available to receive certain recyclable materials.

BMP 015 - Store Waste and Recycling Materials in Proper Containers



Description of Potential Pollutant and Source: Dry waste, including items such as scrap metal, floor sweepings, metal chips, and paper goods, can be dispersed by wind or operational error if not stored properly. If a dumpster's lid is not kept closed, animals may carry garbage out of the containers. Uncovered dumpsters also expose waste to storm water, which may leak out of the dumpster and into the storm sewer system.

Description of BMP: Waste and recycling drums and containers will be located in centralized areas that provide proper labeling (both containers and location) and easy access. If possible, the area will have secondary containment. Waste containers will be emptied regularly. Dumpsters will all have lids; lids should be kept closed when not in use. If the dumpster has inadequate capacity and it is not possible to keep the cover closed, the frequency of pick-up will be increased, or the dumpster will be replaced with a model of greater capacity.

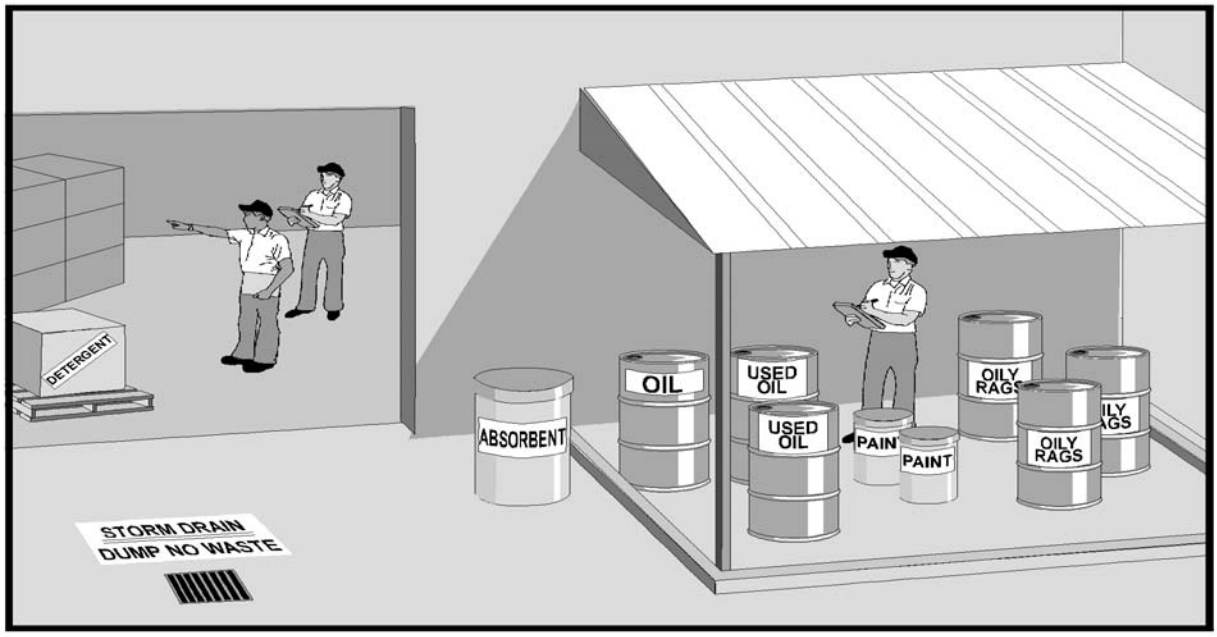
Application Guidance: This practice will be followed wherever waste material, including recycled materials, is stored.

Training: Personnel will be notified of the location of dry waste disposal areas and the proper transportation methods to the sites. Personnel will also be reminded to always keep dumpster lid closed. Signs may be posted at each area indicating type of waste to be disposed depending on need.

Effectiveness and Cost: Controlled waste areas are a moderately effective, low-cost BMP.

Limitations: None

BMP 016 - Limit Significant Materials Inventory



Description of Potential Pollutant and Source: Reducing the amount of significant materials reduces the potential for the material to enter the storm drain system.

Description of BMP: Inventory control will be used to prevent excess storage of unnecessary or infrequently used significant materials.

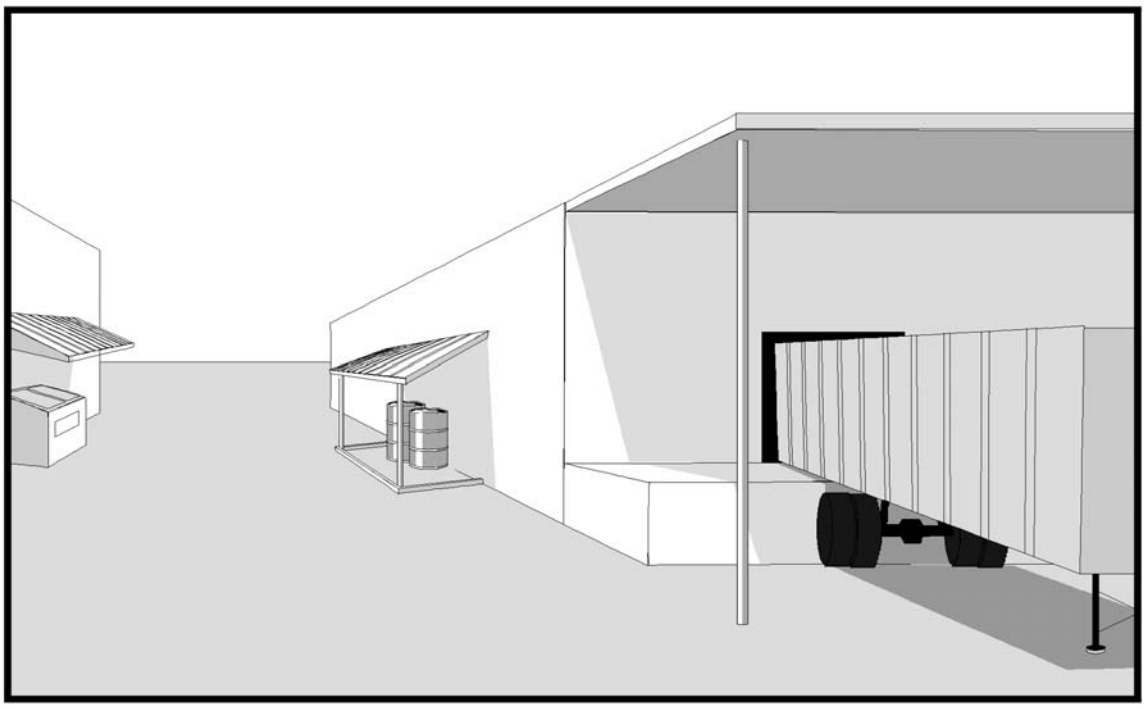
Application Guidance: This BMP will be used in all cases where significant materials are stored.

Training: Procurement officers and warehouse managers will be trained to accurately estimate delivery schedules and user's needs.

Effectiveness and Cost: This is a moderately effective, low-cost BMP.

Limitations: None

BMP 017 - Provide Roof to Cover Source Area

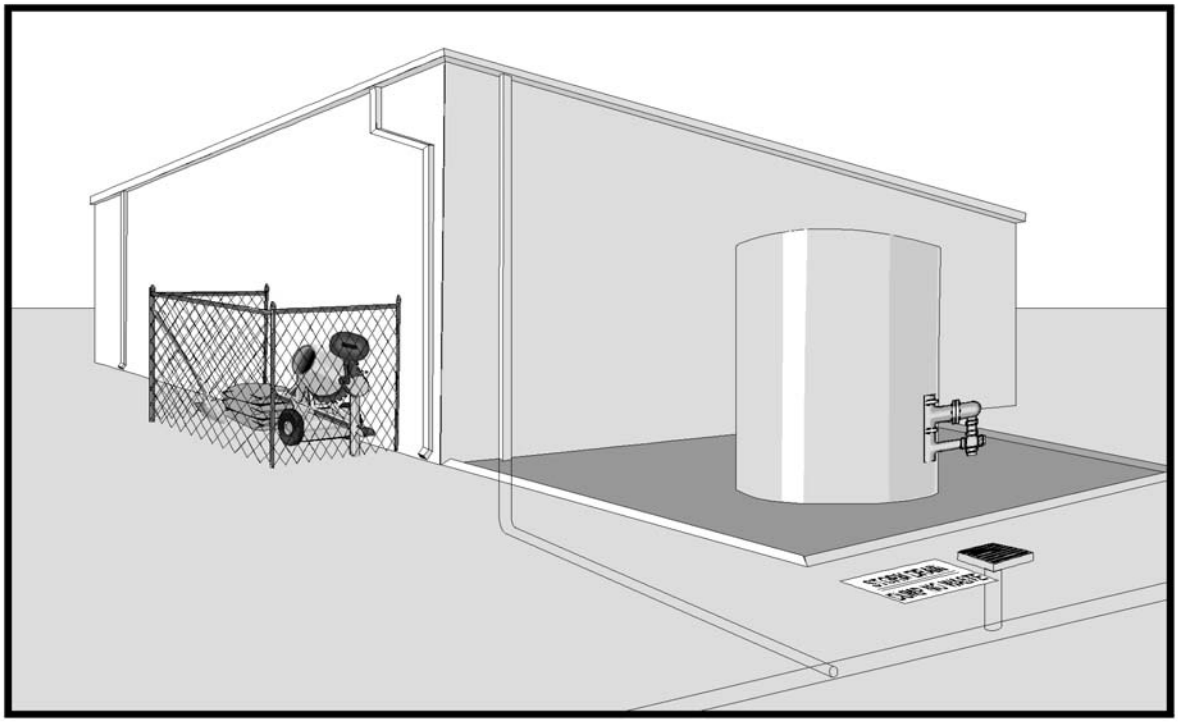


Description of Potential Pollutant and Source: Spills, leaks and outdoor storage of materials can result in the exposure of significant materials to storm water.

Description of BMP: Contact of storm water with significant materials will be minimized by constructing a roof over the source area. Roofs are effective covering for fuel transfer areas, material loading/unloading areas, equipment maintenance, metal fabrication, hazardous waste storage, and materials storage areas.
Application Guidance: Install as needed.
Training: N/A
Effectiveness and Cost: Roofs are an effective, variable-cost BMP. Cost can be high for large areas.

Limitation: The height of the equipment or the size of the area may make this BMP infeasible.

BMP 018 - Control Roof Downspout Discharge



Description of Potential Pollutant and Source: Storm water collected on roofs and directed through downspouts to industrial areas can transport pollutants to the storm drain system.

Description of BMP: Roof runoff will be controlled in areas where roof downspout discharges flow over areas of high pollutant use or storage, such as areas used for fueling, metal fabricating, lead tool and dye storage, or hazardous waste storage. Roof downspouts will be re-directed to non-industrial areas or connected directly to the storm drain system.

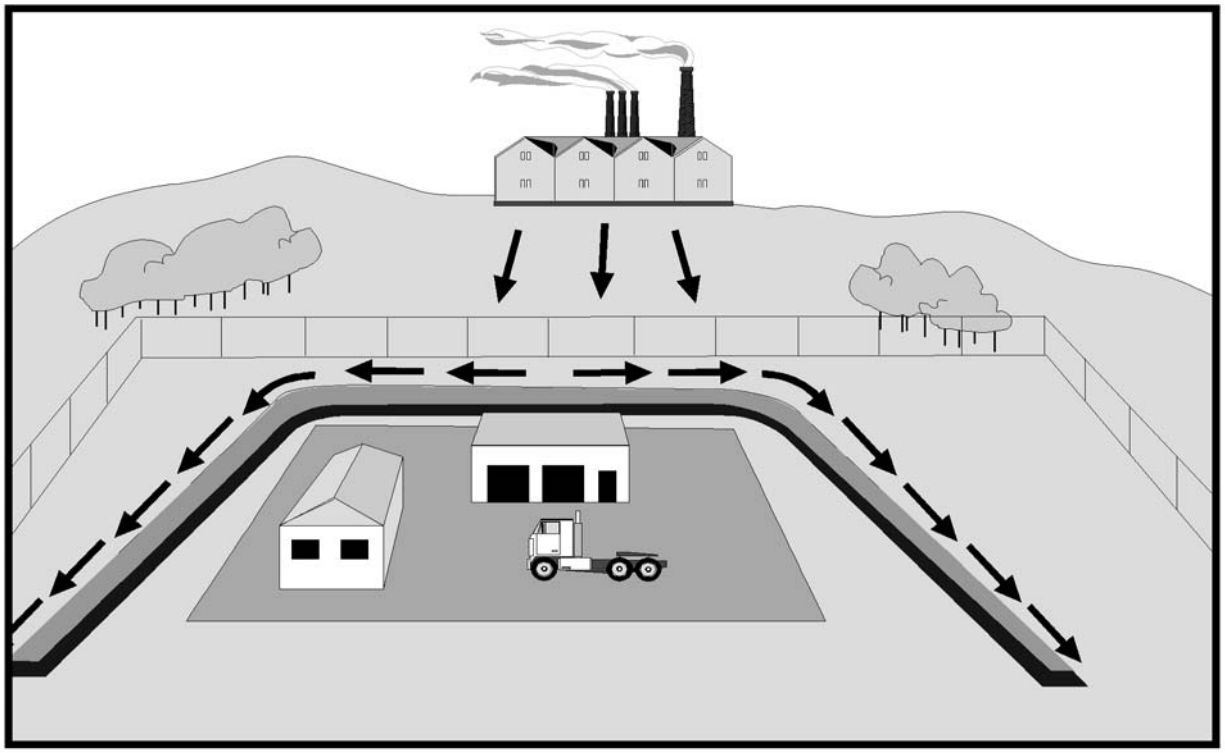
Application Guidance: This BMP will be applied whenever storm water collected on roofs discharges to areas polluted with significant materials.

Training: N/A

Effectiveness and Cost: This is an effective BMP, but costs can be variable. Re-diverting gutters and downspouts can be expensive if diversion distances are great or there are many downspouts to divert.

Limitations: It may not be feasible to relocate roof downspouts to areas where potential pollutants are not present.

BMP 019 - Minimize Storm Water Run-On from Adjacent Facilities and Properties



Description of Potential Pollutant and Source: Significant run-on from other facilities or adjacent properties can result in either increased pollutant exposure to storm water on site (from the increased volume of water movement) or in increased transport of off-site pollutants onto the facility.

Description of BMP: Run-on will be controlled by berming or using diversion ditches to direct flow away from or around the site. Alternatively, run-on will be slowed by use of vegetated strips, grassed swales, or infiltration basins or trenches.

Application Guidance: This BMP will be used whenever a significant volume of off-site drainage flows into an area where possible pollutants are present. This BMP will also be used where run-on may be polluted.

Training: N/A

Effectiveness and Cost: This BMP is effective, but costs can be variable. Creation of diversion channels and an extensive drainage network for a site could be expensive.

Limitations: Concentrating flow in diversion channels may not be possible with the current site drainage system.

BMP 020 - Reduce Waste

Description of Potential Pollutant and Source: Reducing the amount of waste produced at a site reduces the amount of significant materials potentially exposed to storm water.

Description of BMP: Reducing waste will minimize or eliminate the discharge of pollutants to storm water. Methods to reduce waste include, but are not limited to, substituting or eliminating raw materials, modifying existing processes or equipment, planning and sequencing production, tracking waste generation, listing amounts of materials disposed, and separating wastes. Personnel will be trained to: use only the amount needed; buy the least toxic products; use solvents more than once; provide good inventory control; do not overbuy; and purchase long-lasting products.

Application Guidance: These methods will be implemented under most working conditions.

Training: N/A

Effectiveness and Cost: Effectiveness and cost will be site specific.

Limitations: None

BMP 021 - Repair Leaky Roofs

Description of Potential Pollutants and Their Source: Hazardous substances, parts, equipment, vehicles, and materials are often stored indoors or in covered areas. During storage, significant materials such as oil, grease, and solvents may leak or spill onto the floor, ground, or pavement. If storm water enters these areas through leaky roofs, the pollutants may be washed into the storm drain system.

Description of BMP: Repair leaky roofs as required for each building. Alternatively, the stored materials will be moved to another covered area.

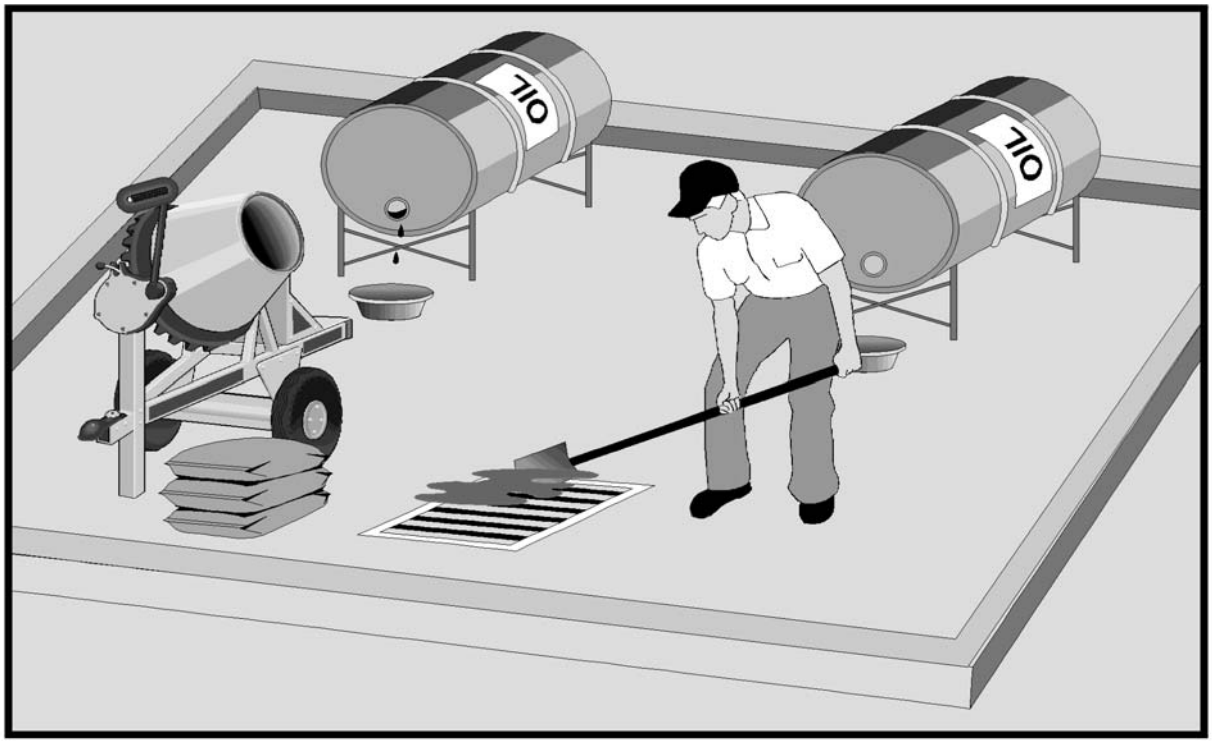
Application Guidance: Leaky roofs will be repaired wherever there is a potential for the exposure of significant materials to storm water.

Training: Personnel will be trained to notify their supervisors when leaks are observed in roofs.

Effectiveness and Cost: This is a moderately effective, variable-cost BMP.

Limitations: None

BMP 022 - Permanently Seal Drains Within Critical Areas that Discharge to the Storm Drain



Description of Potential Pollutant and Source: Certain activities may result in spills. The spilled material may flow or be washed into nearby storm drains, receiving waters, or surfaces resulting in exposure to storm water.

Description of BMP: Seal drains within the critical areas that discharge to the storm drain to prevent significant materials from being washed into the storm drain system. Critical areas are those that have a high likelihood to release pollutants, including material handling areas, material storage areas, and equipment repair and maintenance areas.

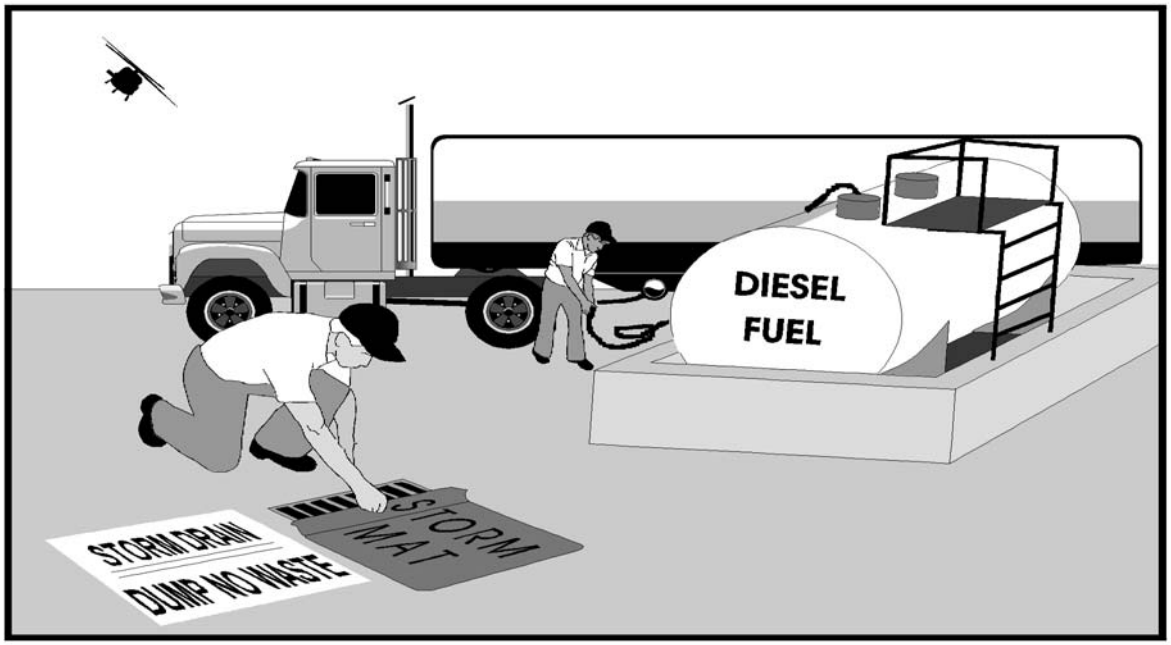
Application Guidance: This BMP will be applied to storm drain inlets in all critical areas as needed.

Training: N/A

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: If the area draining to the storm drain inlet is large and the inlet is at a low point, this is not a practical BMP. Under these circumstances implementation of this BMP will result in ponding. In this case, use BMP 023, "Place Portable Rubber Mats over Storm Drain Inlets."

BMP 023 - Place Portable Rubber Mats over Storm Drain Inlets



Description of Potential Pollutant and Source: Spills are more likely to occur during certain operations, such as materials transfer. If these operations occur near a storm drain, the material may be discharged into the storm drain system.

Description of BMP: If operations which are likely to spill significant materials occur near a storm drain, a rubber portable mat will be placed over the storm drain during the operation. If a spill occurs during the operation, the mat will prevent the pollutant from entering the storm drain system. The spilled material can be properly cleaned up and disposed of before removal of the rubber mat.

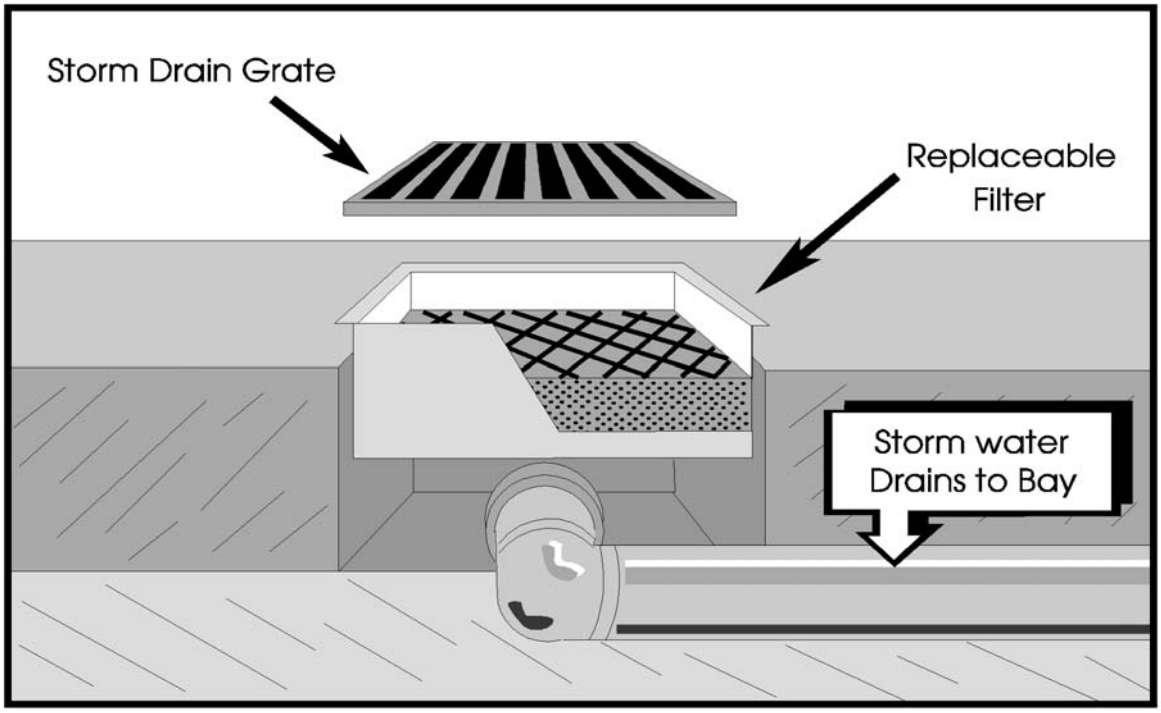
Application Guidance: Portable rubber mats will be placed over the storm drain for the duration of any operation which is likely to discharge pollutants into the storm drain.

Training: Personnel will be trained regarding the use of the portable mat. In addition, personnel will be trained in proper cleanup and disposal of any spilled material.

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: This BMP works best on flat storm drain inlets.

BMP 024 - Insert Filter in Catch Basin



Description of Potential Pollutant and Source: Sediments, oil, and other pollutants generated from industrial activities can pollute storm water.

Description of BMP: Catch basin filters use sand and organic material to trap sediments, oil, and other storm water contaminants. The filters are designed to be easily retrofitted into existing catch basins by suspending the device inside catch basins. Filters will be replaced regularly according to manufacturer's recommendations.

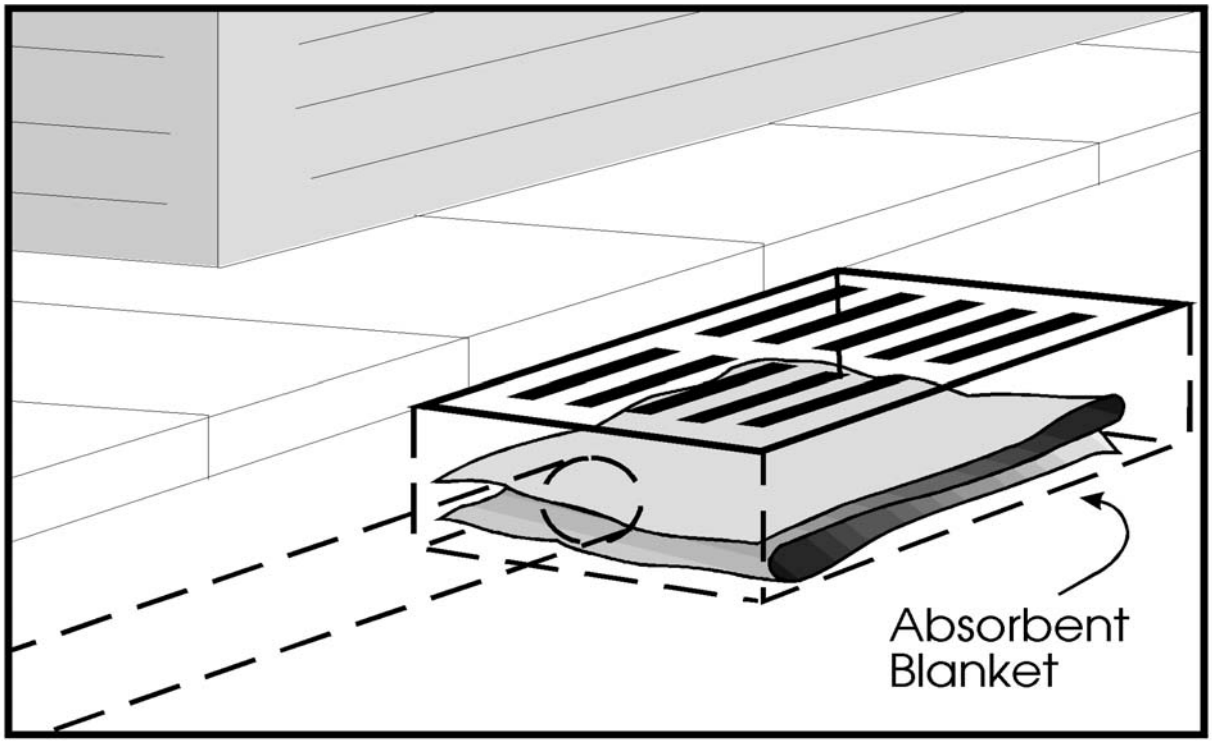
Application Guidance: This BMP will be used in areas where high concentrations of pollutants enter a storm drain catch basin.

Training: N/A

Effectiveness and Cost: Catch basin filters appear to be a moderately effective, moderate-cost BMP. However, this BMP has not been evaluated for effectiveness in Southern California.

Limitations: This BMP should only be used where storm water with high concentrations of pollutants drains into a storm drain inlet.

BMP 025 - Place Absorbent Blankets in Catch Basin



Description of Potential Pollutant and Source: Oil and grease from maintenance activities can be discharged into the storm drain system.

Description of BMP: Oil and grease absorbing blankets will be placed in catch basins and inlets. This BMP will be used in areas where high concentrations of oil and grease are exposed to storm water which can enter a storm drain catch basin or inlet.

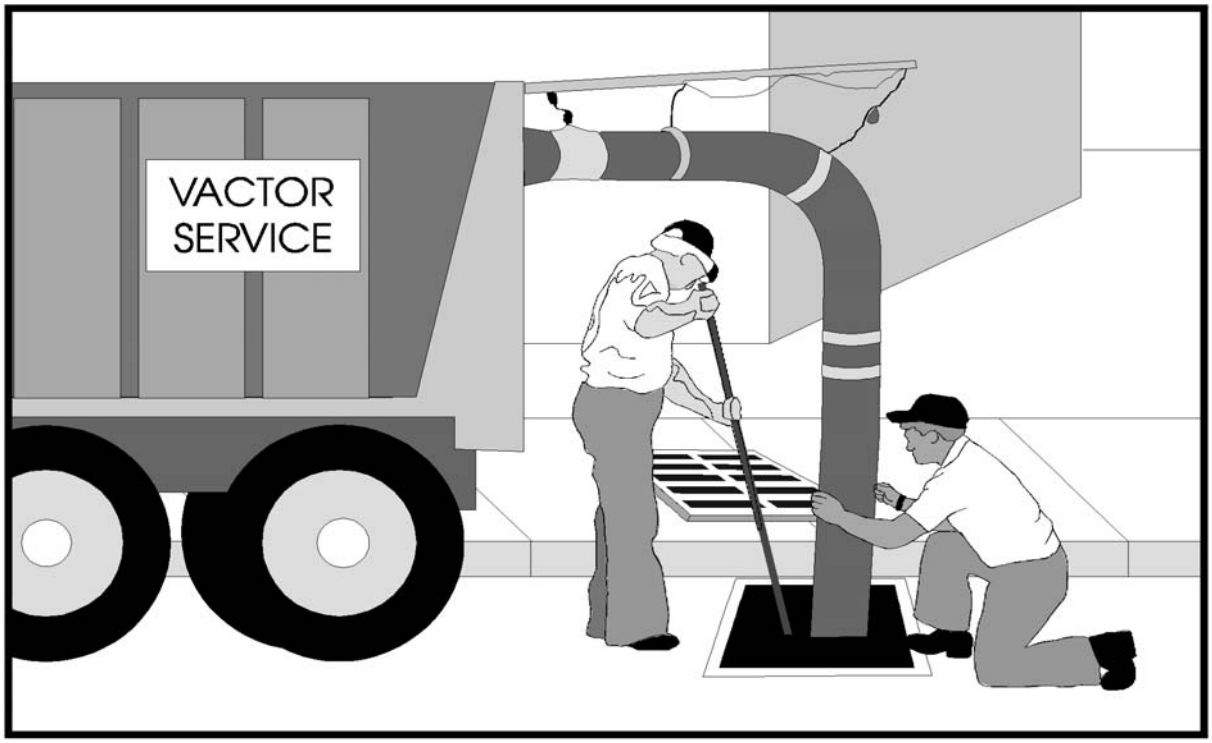
Application Guidance: The blankets will be changed semi-annually (or as needed) to ensure their continued effectiveness.

Training: Personnel will be trained to inspect the blankets monthly and replace them semi-annually or as needed.

Effectiveness and Cost: The blankets are an effective measure to reduce concentrations of hydrocarbons in storm water. The cost is moderate.

Limitations: This BMP can only be used when storm water with high concentrations of oil and grease drains into a storm drain catch basin or inlet.

BMP 026 - Routinely Clean Catch Basins



Description of Potential Pollutant and Source: Depending on their design, catch basins can accumulate sediment, trash, and debris. If the accumulated pollutants are not removed, they may be resuspended by storm water.

Description of BMP: Catch basins will be routinely cleaned to prevent clogging and to remove accumulated pollutants. The accumulated sediment will be tested to determine if it is a hazardous waste and then properly disposed. If the sediment is not a hazardous waste, it may be disposed in a landfill.

Application Guidance: Catch basins will be cleaned at least quarterly. One of these cleanings will be just before the rainy season.

The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be trained in the proper testing, removal, and disposal of the sediment, or a qualified contractor will be used to perform these services.

Effectiveness and Cost: This is a moderately effective, low-cost BMP.

Limitations: The accumulated sediments may be a hazardous waste.

BMP 027 - Stencil Signs on Storm Drain Inlets

Description of Potential Pollutant and Source: Storm drain inlets generally discharge to storm drains or directly into receiving waters (i.e., rivers, oceans, lakes). Some storm drain inlets lead to water quality facilities, such as oil/water separators. However, such facilities are typically only 40 to 80 percent effective in reducing pollutant concentrations and may not be effective in treating storm flows. Therefore, material, such as used oil, solvents, and solid waste, that enters the storm drains may be exposed to storm water.

Description of BMP: Clearly mark storm drain inlets to warn against illegal dumping.

Application Guidance: All storm drain inlets will be properly labeled.

Training: N/A

Effectiveness and Cost: Stenciling storm drains is a variably effective, inexpensive BMP.

Limitations: None

BMP 028 - Keep Equipment and Vehicles Clean

Description of Potential Pollutant and Source: Through usage, equipment and vehicles accumulate oil and grease. During rain events, these pollutants are exposed to storm water and transported into the receiving waters.

Description of BMP: Equipment and vehicles will be cleaned regularly using either dry or wet methods to reduce the amount of pollutants exposed to rainfall.

Application Guidance: All vehicles and equipment exposed to storm water will be washed monthly and as needed to be kept clean.

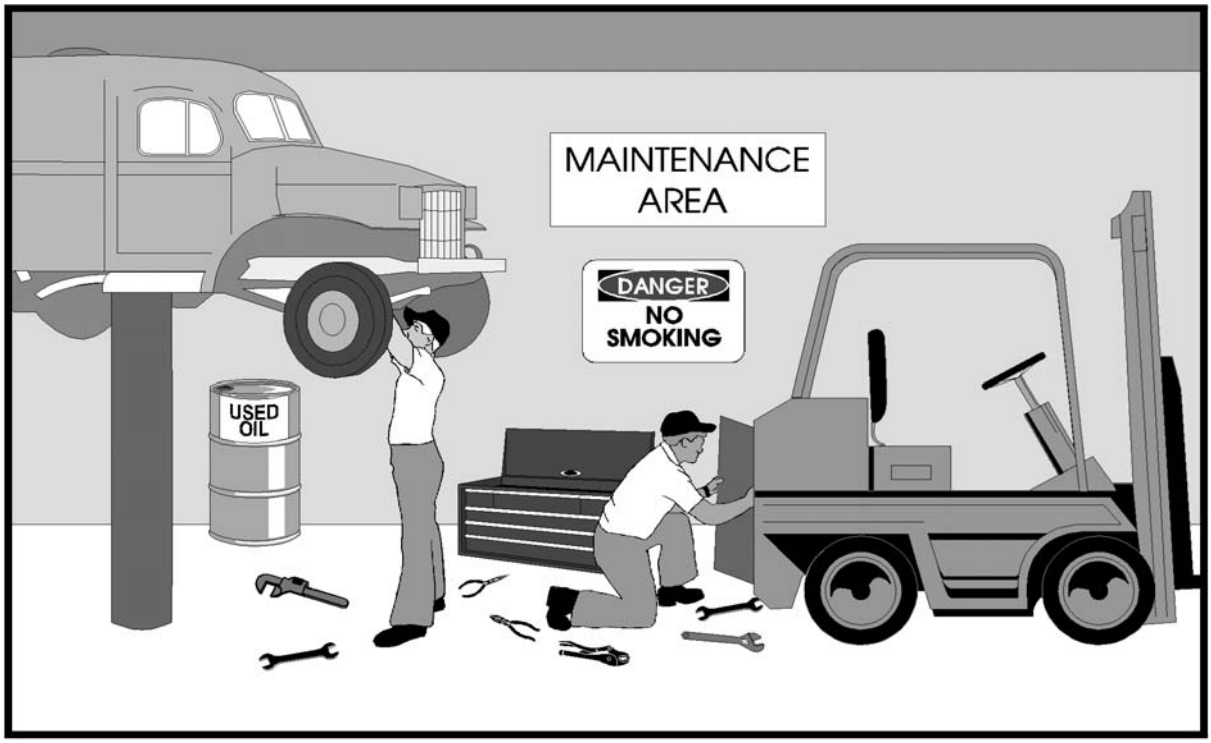
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be instructed on how often to clean and wash vehicles or equipment.

Effectiveness and Cost: Keeping equipment and vehicles clean is a highly effective, low-cost BMP.

Limitations: None

BMP 029 - Maintain Equipment in Good Condition



Description of Potential Pollutant and Source: Equipment may leak fuel, grease, oil, or other potential pollutants due to corrosion, loose fittings, poor welding, and improper or poorly fitted gaskets. Without regular inspection of equipment and facilities, leaking or poorly operating equipment may continue to be used without being repaired.

Description of BMP: Equipment will be kept in good working condition and inspected regularly for fluid leaks. Equipment which is leaking or in poor working condition will be repaired or replaced.

Application Guidance: Equipment will be inspected daily before use for leaks and maintained in good condition at all times. Equipment which is not frequently used will be inspected monthly.

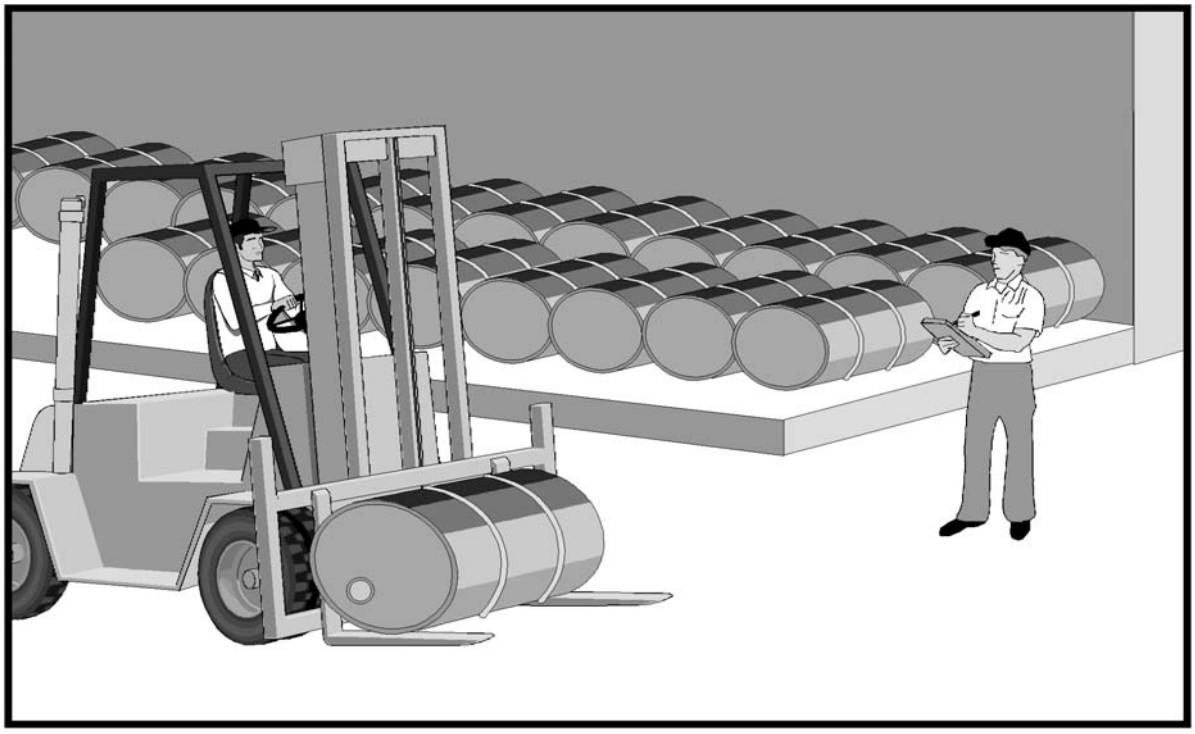
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be trained to regularly inspect for leaks or conditions that could lead to the exposure of significant materials to storm water. Personnel will be trained to routinely inspect equipment before each use. Procedures for notifying the appropriate maintenance personnel if a leak is found will be established.

Effectiveness and Cost: Keeping equipment in good condition is a moderately effective BMP. The cost of repairing or replacing equipment will vary.

Limitations: None

BMP 030 - Implement Qualifying Tests for Equipment and Vehicle Operators



Description of Potential Pollutant and Source: Through misuse or unfamiliarity with operating procedures, accidents may occur that result in leaks or spills that may expose significant materials to storm water.

Description of BMP: Implementation of qualifying tests for personnel operating equipment or vehicles reduced the chances of leaks and spills caused by accidents.

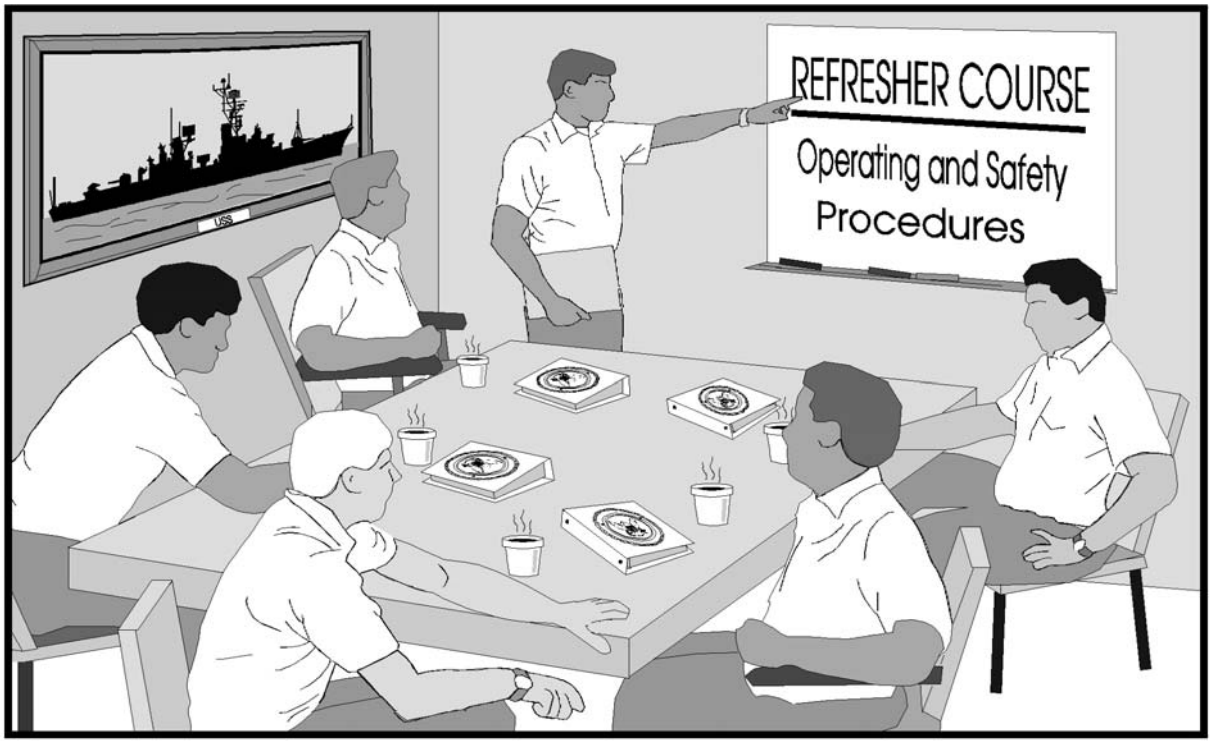
Application Guidance: Qualifying tests will always be used where equipment or vehicles are used.

Training: Personnel will be trained in safe operating procedures, basic maintenance, and spill response procedures associated with the particular equipment or vehicle.

Effectiveness and Cost: Qualifying tests are an effective, variable-cost BMP.

Limitations: None

BMP 031 - Conduct Refresher Courses in Operating and Safety Procedures



Description of Potential Pollutant and Source: Through time, personnel may forget certain correct operating and safety procedures, which may result in storm water pollution. Also, personnel need to be informed of new procedures and policies regarding equipment operation.

Description of BMP: Personnel will be required to have training and refresher courses in operating and safety procedures. This will help to reduce spills and accidents caused by negligence.

Application Guidance: Training and refresher courses will be conducted semi-annually.

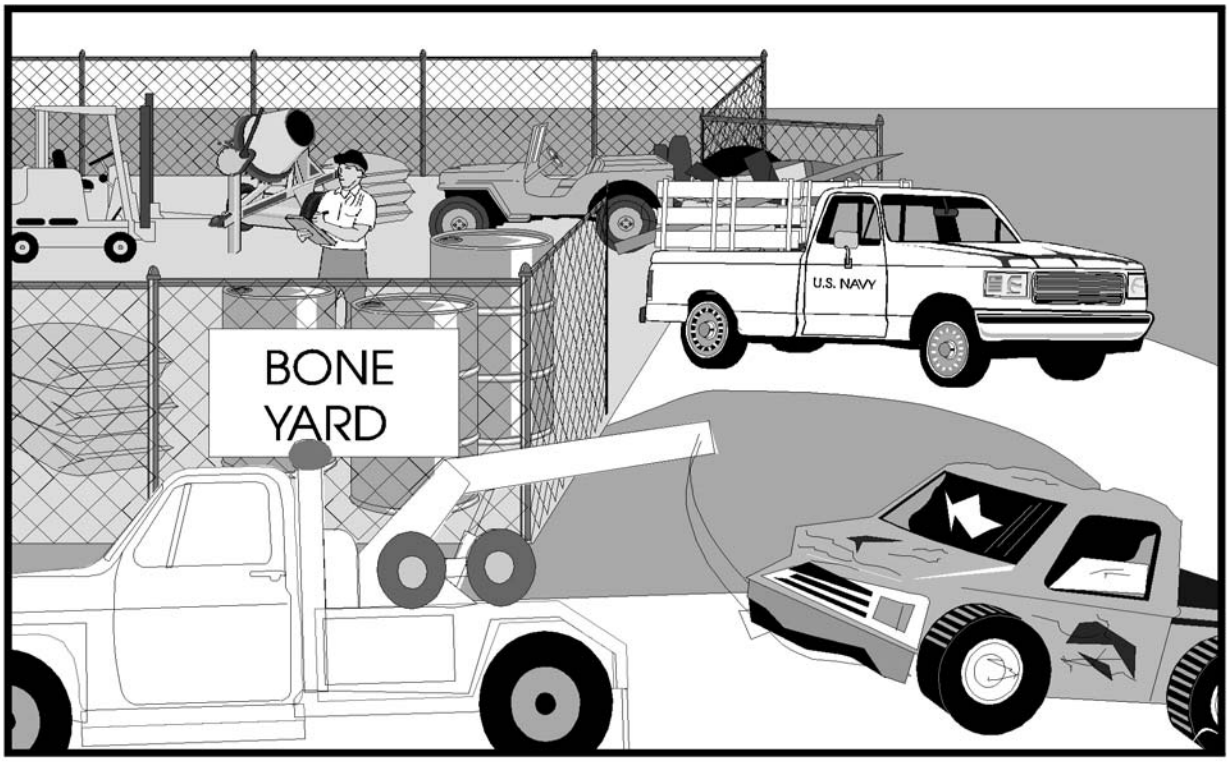
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Instructors will be trained. A course will be prepared that covers both equipment manufacturers' recommendations for safety and operations as well as facility procedures and policies regarding equipment operation.

Effectiveness and Cost: Training is a highly effective, moderate-cost BMP.

Limitations: Cost and logistics could be a problem in implementing this practice.

BMP 032 - Dispose of Obsolete Equipment, Inoperable Vehicles, and Surplus Materials



Description of Potential Pollutant and Source: Obsolete equipment, inoperable vehicles, and surplus materials are often stored in areas not subject to routine inspection. These materials often leak a variety of fluids which can be exposed to storm water.

Description of BMP: Proper off-site disposal of obsolete equipment, inoperable vehicles, and surplus materials reduces the chances of pollutants reaching storm water.

Application Guidance: This practice will be implemented quarterly.

The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: N/A

Effectiveness and Cost: Disposing of unused equipment and supplies is a highly effective, moderate-cost BMP.

Limitations: None

BMP 033 - Check Vehicles and Equipment for Leaks

Description of Potential Pollutant and Source: Vehicles, aircraft, or equipment entering or stored at a maintenance facility may be leaking a variety of fluids (fuel, oil, antifreeze, freon, etc.). These materials can be exposed to storm water.

Description of BMP: All vehicles and equipment at the site, whether incoming, parked, stored, or salvaged, must be inspected for oil and fluid leaks. Drivers of fleet vehicles, such as delivery trucks, will also check under their vehicles each morning for fluid leaks. If leaks are present, drip pans will be placed under the vehicle or equipment. Once the vehicle is removed from the site, the former parking area will be inspected for stains, and these stains will be cleaned using rags or dry solvents.

Application Guidance: Any vehicle or equipment coming in for repairs, painting, or storage will be inspected for leaks. Fleet vehicles will be inspected each morning. Vehicles that are parked, stored, or salvaged will be provided with drip pans, as will tanker rail cars waiting to be unloaded.

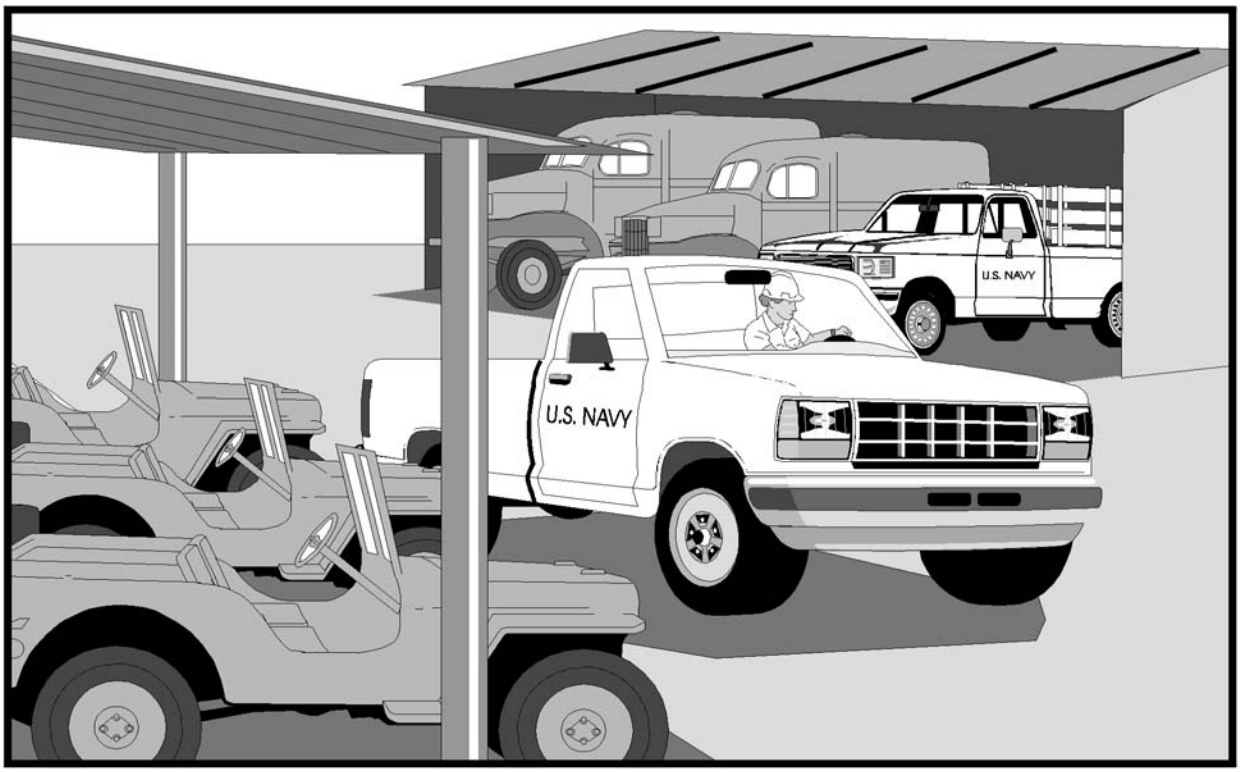
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Signs will be posted to remind personnel of proper procedures.

Effectiveness and Cost: Checking for leaks is a moderately effective, low-cost BMP.

Limitations: None

BMP 034 - Park Vehicles or Equipment Indoors or under a Roof



Description of Potential Pollutant and Source: Vehicles and equipment often leak or may be covered with oil and grease. If exposed to storm water, these pollutants can enter the storm drain system receiving waters.

Description of BMP: By parking vehicles and equipment indoors or under a roof, the exposure of significant materials to storm water from this source will be eliminated or reduced.

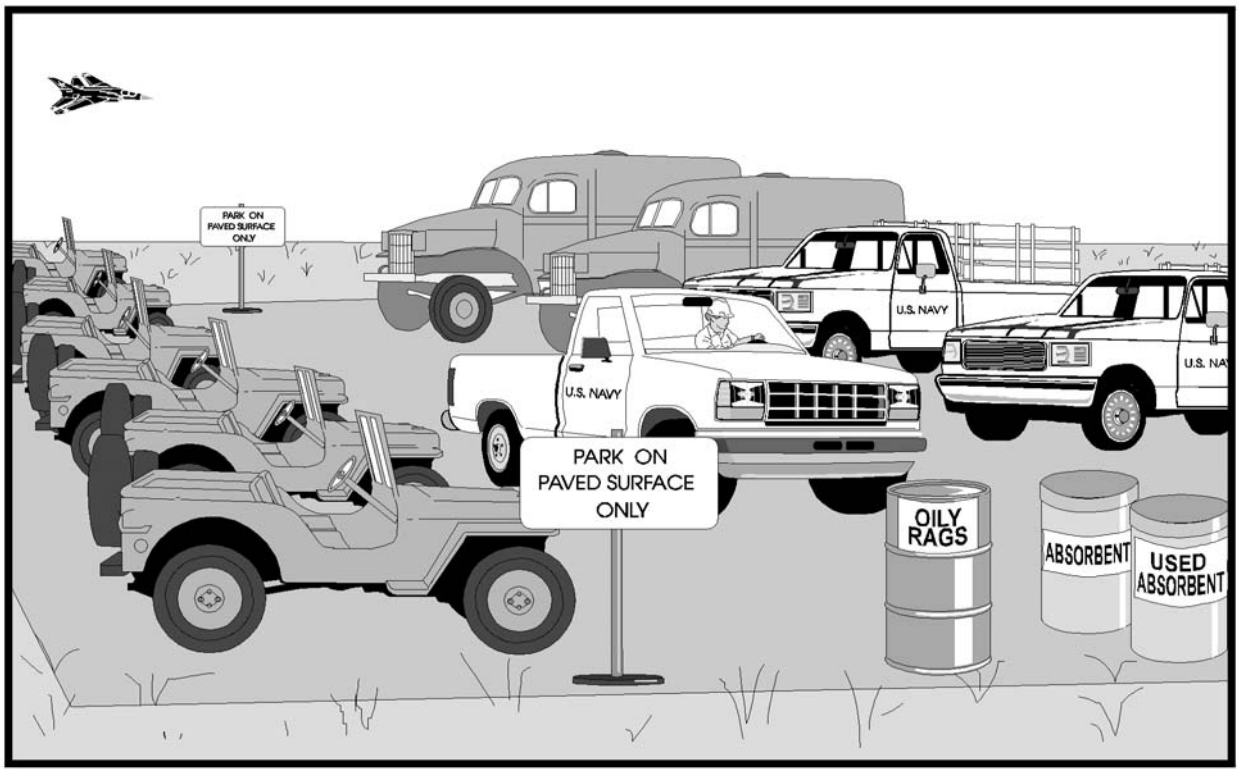
Application Guidance: When available, all vehicles and equipment will be parked indoors or under a roof.

Training: Personnel will be notified of any altered parking locations.

Effectiveness and Cost: Parking vehicles indoors or under cover is a highly effective, low-cost BMP if existing cover is available.

Limitations: The amount of indoor or covered parking available, size of vehicles or equipment and construction costs if cover must be constructed may restrict the use of this practice.

BMP 035 - Park Vehicles on an Impervious Surface



Description: Pollutants leaking or spilled onto the ground surface from vehicles can infiltrate into the soil. These pollutants (i.e., oil, fuel, etc.) may then be exposed to storm water and transported to surface water.

Description of BMP: Vehicles will be parked on an impervious surface. For this BMP, an impervious surface is defined as a surface that cannot be readily penetrated by rainfall, such as concrete and asphalt pavement. Leaks and spills will be cleaned from these surfaces.

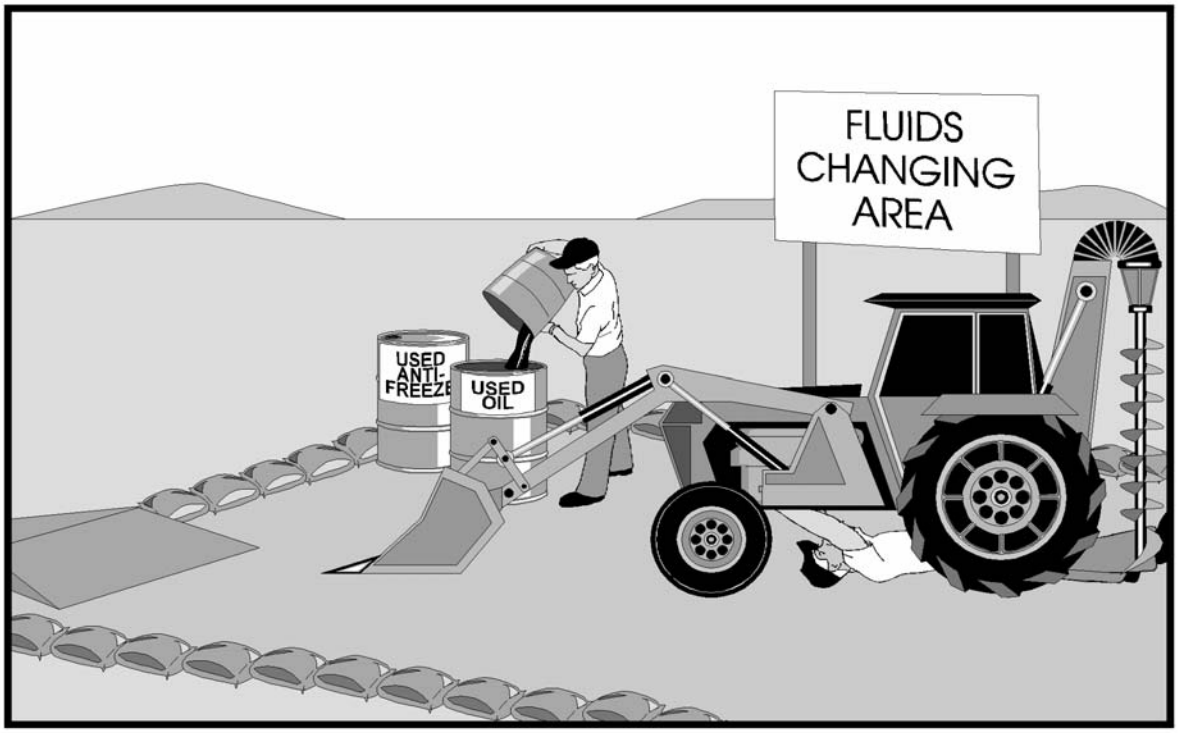
Application Guidance: Vehicles will always be parked on impervious surfaces, especially during the rainy season.

Training: Signs will be posted to remind personnel that all vehicles are to be parked on paved surfaces.

Effectiveness and Cost: Parking vehicles on impervious surfaces is a moderately effective, low-cost BMP.

Limitations: Very large traffic volumes may make implementation of this BMP difficult.

BMP 036 - Designate Special Areas for Draining or Replacing Fluids



Description of Potential Pollutant and Source: Draining and replacing motor oil, coolants, and other fluids in uncontrolled areas of the facility can potentially result in improper handling and disposal of waste and accidental spillage in an unprotected area. These materials can then be exposed to storm water.

Description of BMP: Motor oil, coolants, and other fluids will be drained and replaced at designated maintenance facilities to reduce the potential for improper handling activities. If this is not possible, special areas will be designated for these activities. Consideration will be given to placing these areas indoors or using bermed concrete pads if outdoors.

Application Guidance: This procedure will be followed whenever vehicle or equipment maintenance is being performed.

Training: Personnel will be instructed that vehicle maintenance will only be performed at designated areas.

Effectiveness and Cost: Using designated special areas for draining fluids is an effective, low-cost BMP.

Limitations: Existing facilities may be inadequate; construction cost may be prohibitive.

BMP 037 - Drain All Fluids From Stored or Salvaged Vehicles and Equipment

Description of Potential Pollutant and Source: Vehicles and equipment undergoing long-term storage or salvage often contain a variety of liquids (oil, antifreeze, hydraulic fluid, etc.) that can leak or spill, thereby exposing these materials to storm water.

Description of BMP: All oil and other fluids will be drained, collected, and recycled from vehicles being stored long term or salvaged (i.e., parts vehicles).

Application Guidance: Vehicles or equipment that are to be stored without use for more than three months will be drained of all fluids. Signs will be posted on these vehicles from which fluids have been drained.

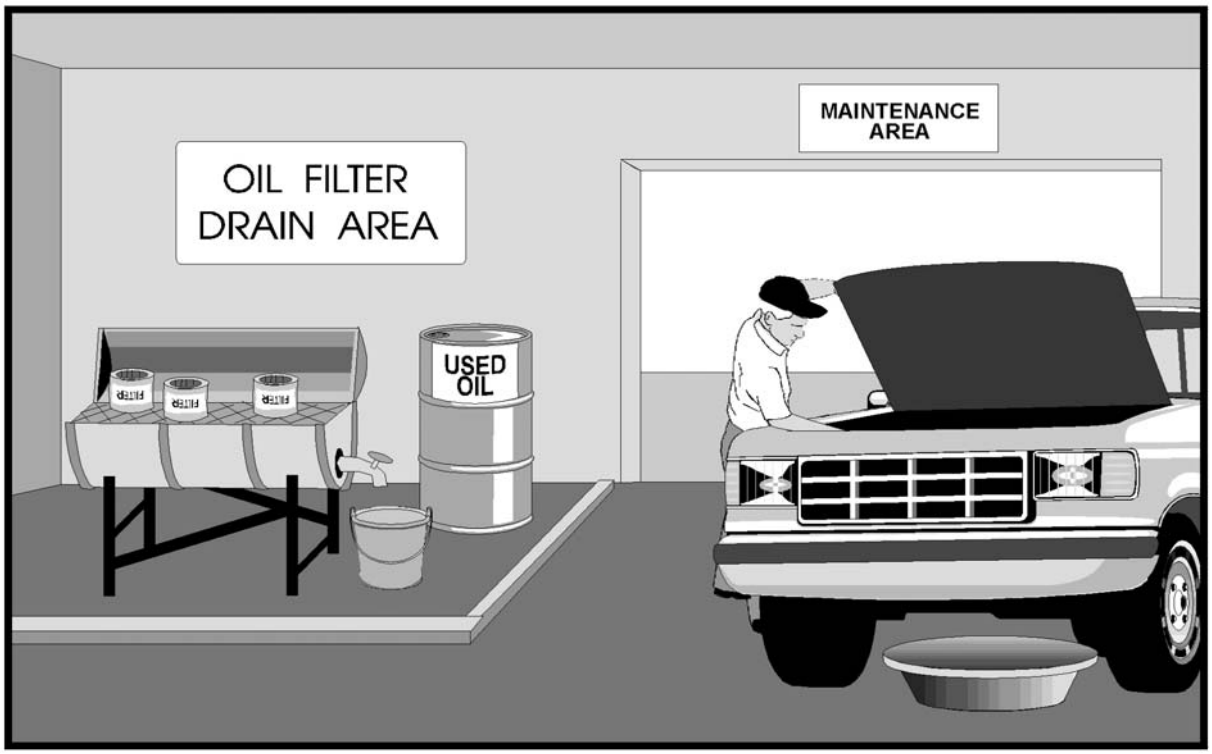
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Signs will be posted as reminders to personnel.

Effectiveness and Cost: Draining oil and fluids is a moderately effective, low-cost BMP.

Limitations: None

BMP 038 - Completely Drain Oil Filters before Disposal



Description of Potential Pollutant and Source: Oil filters that are disposed in trash containers can leak significant materials which can be exposed to storm water.

Description of BMP: Filters will be completely drained into collection drums before recycling or disposal.

Application Guidance: All filters will be completely drained after being changed.

Training: Signs will be posted to remind personnel of requirement to completely drain oil filters before disposal.

Effectiveness and Cost: Completely draining filters is a moderately effective, low-cost BMP.

Limitations: None

BMP 039 - Wash Equipment and Vehicles in Designated Area

Description of Potential Pollutant and Source: Washing equipment and vehicles outdoors or in areas where wash water flows onto the ground can pollute storm water. It is difficult to control the wastewater from washing operations if it is not done in a designated area.

Description of BMP: Facilities will have designated, bermed wash areas that contain wash water and prevent contact with storm water. These areas will drain to the sanitary sewer (BMP 042) or to a sump. If a sump is used, wash water will be recycled.

Application Guidance: This practice will be followed wherever vehicles, equipment and aircraft are washed.

Training: N/A

Effectiveness and Cost: This is a highly effective, variable-cost BMP.

Limitation: Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer. This would greatly increase the cost of this practice. The treatment plant owner will be notified and approval obtained before discharge.

BMP 040 - Discharge Wash Water to a Sanitary Sewer

Description of Potential Pollutant and Source: Wash water from vehicle, equipment, and floor cleaning activities often contains such as grease, oil, and gasoline which can be exposed to storm water. Wash water must not be discharged to the storm drain.

Description of BMP: Wash water will be discharged to a sanitary sewer to ensure that it does not enter a storm drain. (See BMP 041, "Wash Equipment and Vehicles in Designated Areas.") Wash water from mopping floors will also be discharged to the sanitary sewer.

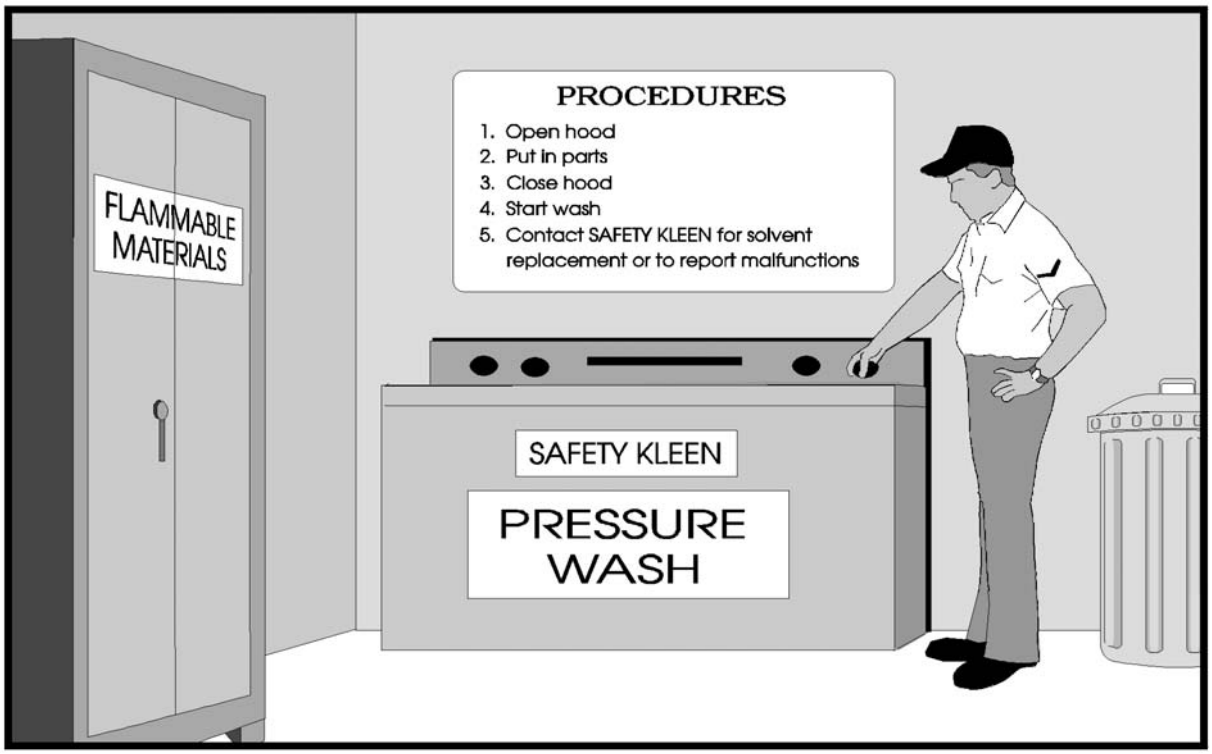
Application Guidance: All wash water from vehicle and equipment cleaning activities will be discharged to a sanitary sewer. In areas where wash water cannot be discharged to a sanitary sewer, wash water will be collected in a dead-end sump, tank, or other device and transported or pumped to the nearest treatment facility for proper disposal.

Training: Personnel will be trained to know where cleaning activities will be performed.

Effectiveness and Cost: Discharging wash water to a sanitary sewer is a highly effective, variable-cost BMP.

Limitations: Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer. This would greatly increase the cost of this practice. The treatment plant owner will be notified and approval obtained before discharge.

BMP 041 - Recycle Pressure Wash Solvents



Description of Potential Pollutants and Source: Pressure wash wastes from cleaning ships, vehicles, and equipment can contain dirt, oils, grease, and paint particles.

Description of BMP: Pressure wash wastes will be recycled by using a closed loop system or a "zero discharge system."

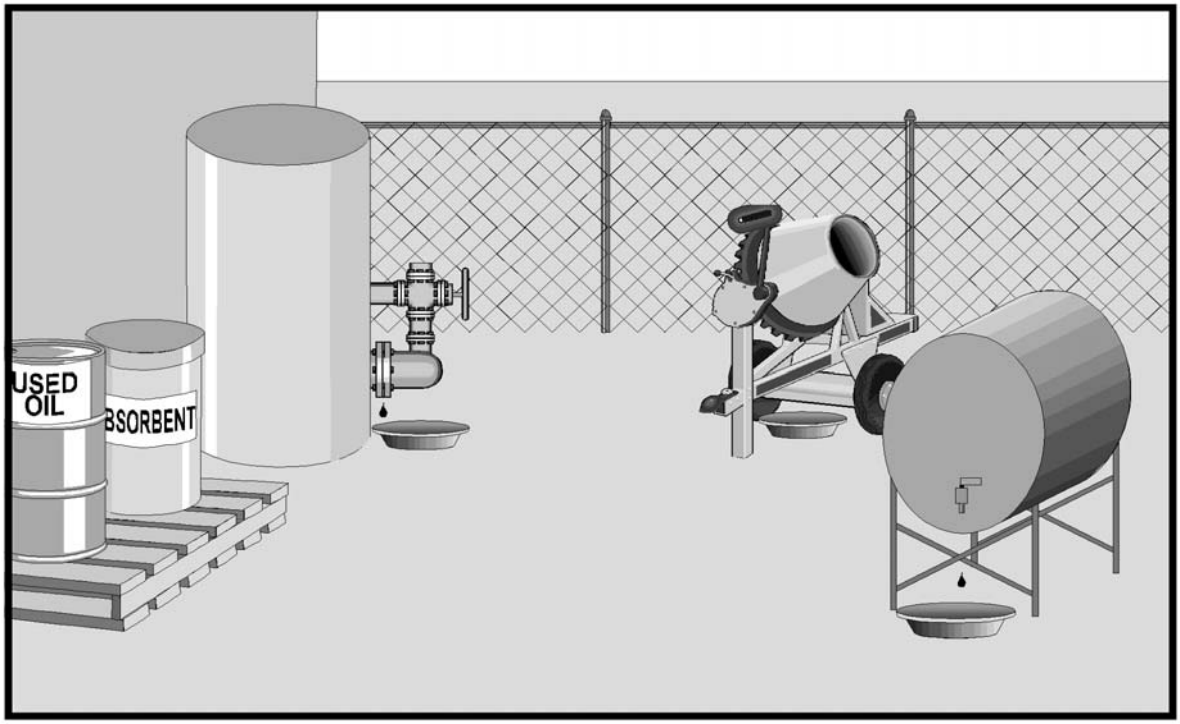
Application Guidance: Pressure wash wastes will be recycled whenever practical.

Training: Personnel will be trained in the proper use of pressure wash systems.

Effectiveness and Cost: This is a highly effective, variable-cost BMP. The cost can vary based on the availability of a local wastewater treatment facility and hauling and disposal costs. Also, the size of the pressure wash facility will affect the cost.

Limitations: None

BMP 042 - Use Drip Pans under Leaking Equipment



Description of Potential Pollutants and Source: Equipment such as pumps, air conditioners, and boilers may leak fluids. These fluids typically contain pollutants that may be exposed to storm water and transported into the storm sewer system if they are not collected.

Description of BMP: Drip pans will be placed under leaking equipment to collect any leaking fluid. This temporary BMP will be used until the equipment is properly repaired or replaced.

Application Guidance: Any equipment which is leaking fluid will be repaired or replaced. However, until the leak is stopped, a drip pan will be used to collect the fluid.

Training: Personnel will be trained to immediately place a drip pan under leaking equipment and notify the appropriate maintenance personnel. The drip pan will be routinely checked and the collected material disposed properly.

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: None

BMP 043 - Designate Areas for Washing Non-Vehicular Air Filters and Other Greasy Equipment

Description of Potential Pollutant and Source: Non-vehicular air filters, such as those used in large kitchens, and other equipment accumulate a large amount of grease. Current maintenance may involve cleaning the filters in an area where the oil can be exposed to storm water and enter the storm drain system.

Description of BMP: Air filters (from mess hall cooking grills or other facilities where air filters can contain significant amounts of grease and soot) will be cleaned in an area where wash water and grease are contained in a sump or discharged to sanitary sewer lines.

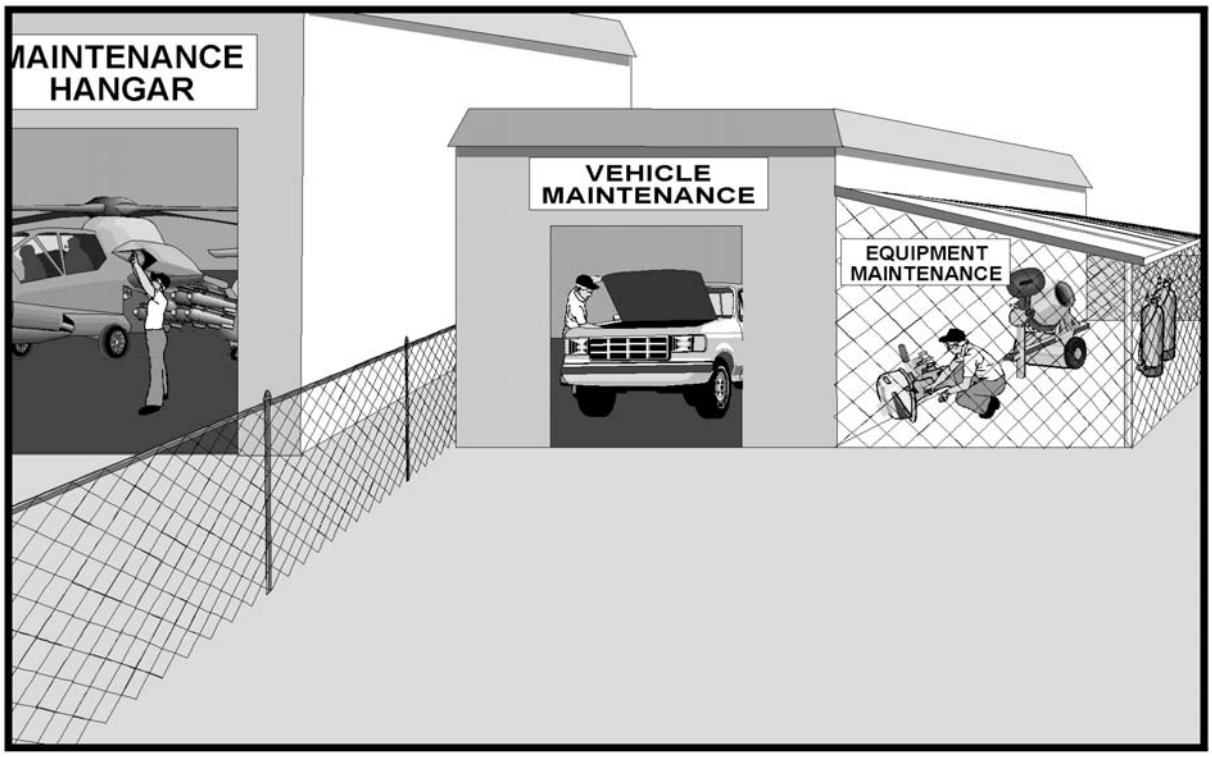
Application Guidance: This practice will be followed whenever greasy filters and other greasy equipment are cleaned.

Training: Personnel will be instructed to clean the air filters and other greasy equipment in areas where the wash water will be discharged to a sanitary sewer. A sign will be posted notifying the user where to clean the filter.

Effectiveness and Cost: Cleaning filters in a controlled area is a highly effective, low-cost BMP.

Limitations: None

BMP 044 - Conduct Maintenance within a Building or Covered Area



Description of Potential Pollutant and Source: Many pollutants such as oil, grease, or solvents may be leaked or spilled during maintenance activities. If maintenance is performed outside, in an uncovered area, storm water may transport the leaked and spilled material into the storm drain system.

Description of BMP: To the extent practical, maintenance will be conducted within a building or covered area. This includes performing aircraft/helicopter maintenance in hangars and vehicle maintenance in garages. If maintenance, including fluid top-offs, is performed outdoors, it will be conducted on an impervious surface, such as a concrete pad. Rainfall runoff from the pad will be directed to a storm water treatment facility. Leaks and spills will be cleaned up as soon as possible using rags or dry absorbents. Used rags and absorbent will be disposed properly. The garage floor will be cleaned regularly and all wash water from cleaning the floor will be disposed in the sanitary sewer.

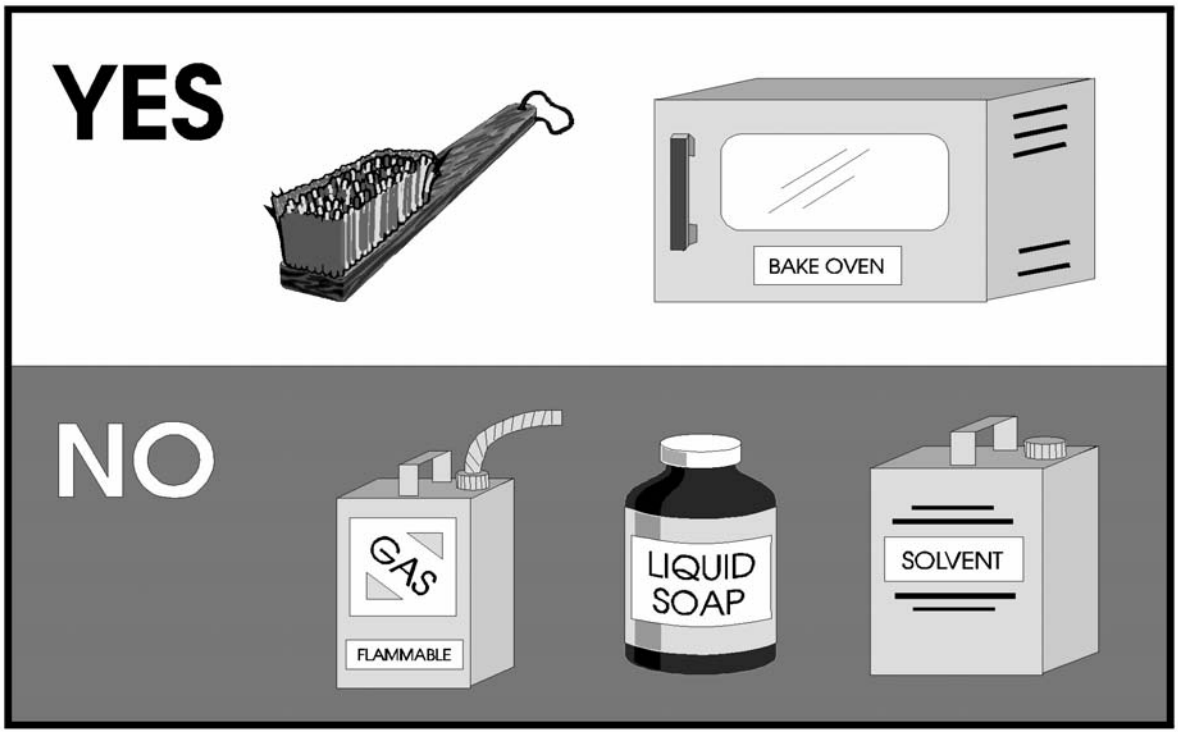
Application Guidance: All maintenance will be conducted within a building or covered area, if possible. If not possible, the maintenance will be done on an impervious surface.

Training: Personnel will be trained to perform all maintenance, including fluid top-offs, only in the designated area. Personnel will be trained in keeping the maintenance area clean.

Effectiveness and Cost: This is a moderately effective BMP. The cost will vary depending upon the availability of a building in which to perform all maintenance.

Limitations: This BMP may not be possible for the maintenance of large equipment and vehicles.

BMP 045 - Reduce the Amount of Liquid Cleaning Agents Used



Description of Potential Pollutant and Source: Liquid cleaners (i.e., soaps, detergents, solvents, gasoline, etc.) are significant materials which must not be exposed to storm water.

Description of BMP: Use of methods other than liquid cleaning agents will reduce the amount of waste produced and the potential for spills of cleaning liquids. Alternative cleaning methods include scraping parts with a wire brush or using a bake oven.

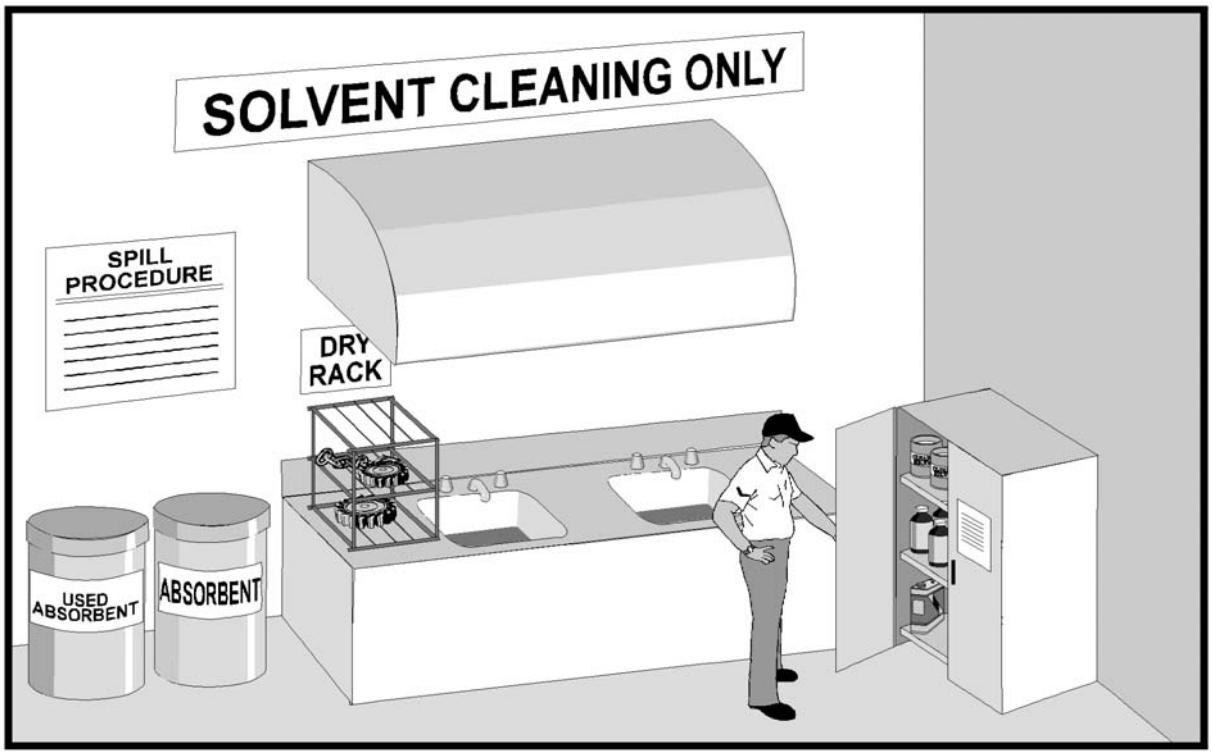
Application Guidance: Substitute cleaning methods will be used in all maintenance operations. These include: vehicle, equipment, aircraft and ship maintenance; metal work; and painting.

Training: Personnel will be trained in selected alternative methods of cleaning. Signs will be posted as reminders.

Effectiveness and Cost: Effectiveness and cost of non-liquid cleaning procedures will be site specific.

Limitations: Substitute cleaning methods may not be adequate for some operations.

BMP 046 - Centralize Liquid Solvent Cleaning to One Location



Description of Potential Pollutant and Source: Widespread use of liquid solvents to clean parts results in a potential for spills, illegal dumping, and improper use of the solvent.

Description of BMP: If cleaning parts with liquid solvents is unavoidable, the cleaning will be conducted in central locations. This practice will reduce the number of personnel using the solvents, promote proper use and disposal, and minimize the potential for spills (assuming that the central locations are properly operated and maintained). Drip pans, drain boards and drying racks will be located adjacent to and oriented such that excess solvent is directed back into a sink or holding tank for recycling. All storage containers will be clearly labeled.

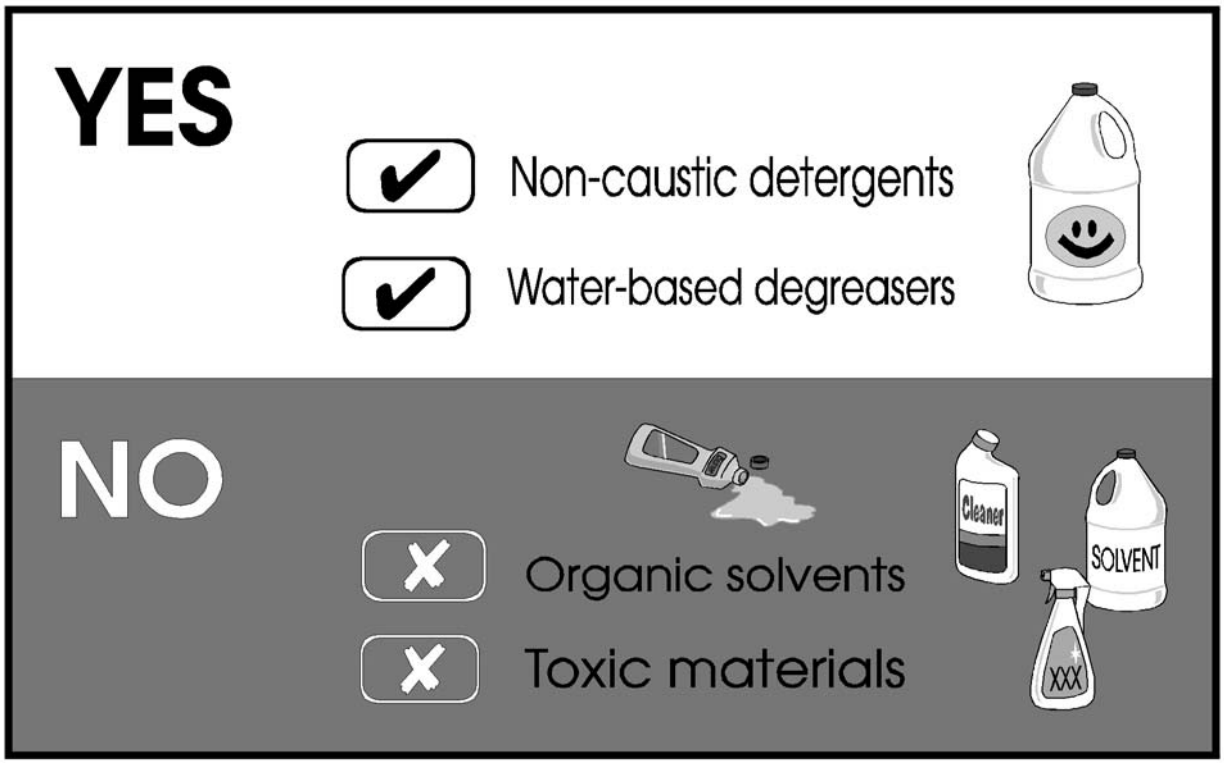
Application Guidance: Central cleaning locations will be used whenever parts are cleaned with liquid solvents in maintenance and salvage operations.

Training: Personnel will be notified of the locations of the cleaning stations. Personnel will be trained in proper procedures, such as removing dipped parts slowly as to avoid spills, and how to recycle used solvent.

Effectiveness and Cost: Central cleaning stations are a moderately effective, moderate-cost BMP.

Limitations: The size of the parts being cleaned may be preclude having it centralized.

BMP 047 - Substitute Non-Toxic or Less-Toxic Cleaning Solvents



Description of Potential Pollutant and Source: Organic solvents, typically used for cleaning equipment and parts, are considered a major pollutant in storm water. Exposure of these materials to storm water can be minimized by using less-toxic substitutes.

Description of BMP: One method to reduce the impact of storm water pollutants is to substitute non-toxic or less-toxic materials. This includes using non-caustic detergents for parts cleaning, detergent or water-based degreasers in place of organic degreasers, replacing chlorinated solvents with non-chlorinated solvents, and using phosphate-free detergents. However, even non-toxic materials are considered storm water pollutants and must be managed properly.

Application Guidance: Less-toxic materials will be substituted whenever possible.

Training: The procurement office will be trained regarding the constituents of cleaning materials and alternative materials. Personnel will be trained to know the differences between new and previously used materials.

Effectiveness and Cost: Effectiveness and cost will vary depending on site conditions.

Limitations: There may be no adequate alternative cleaning solvent available at a reasonable cost.

BMP 048 - Use Solvents Efficiently

Description of Potential Pollutant and Source: Many repair and maintenance operations use a wide variety of solvents. Spills and leaks of solvents can occur, exposing these materials to storm water. By using these materials efficiently, the potential for exposure can be reduced.

Description of BMP: Reusing solvents or using solvents sparingly will reduce the risk of spills and leaks. Pre-soaking parts in "dirty" solvent before placing in fresh solvent reduces the volume of solvent used.

Application Guidance: This practice will be followed as often as is practical.

Training: Personnel will be trained in efficient use of solvents.

Effectiveness and Cost: Efficient use of solvents is a moderately effective, low-cost BMP.

Limitations: None

BMP 049 - Use Outside Contractor for Handling Used Solvents and Other Significant Materials

Description of Potential Pollutants and Source: Improper storage, handling, and disposal of solvents, oils, paint thinners, and other toxic chemicals can occur with untrained personnel. This can result in exposure of these materials to storm water. Use of contractors specializing in handling these materials can minimize this exposure.

Description of BMP: Private contractors handle the disposal and replenishing of solvents, used oil, and other significant materials used in industrial or maintenance operations. An example is "Safety Kleen," a company which handles solvents used for parts washing.

Application Guidance: Private contractors will be used for disposing and replenishing significant materials continually.

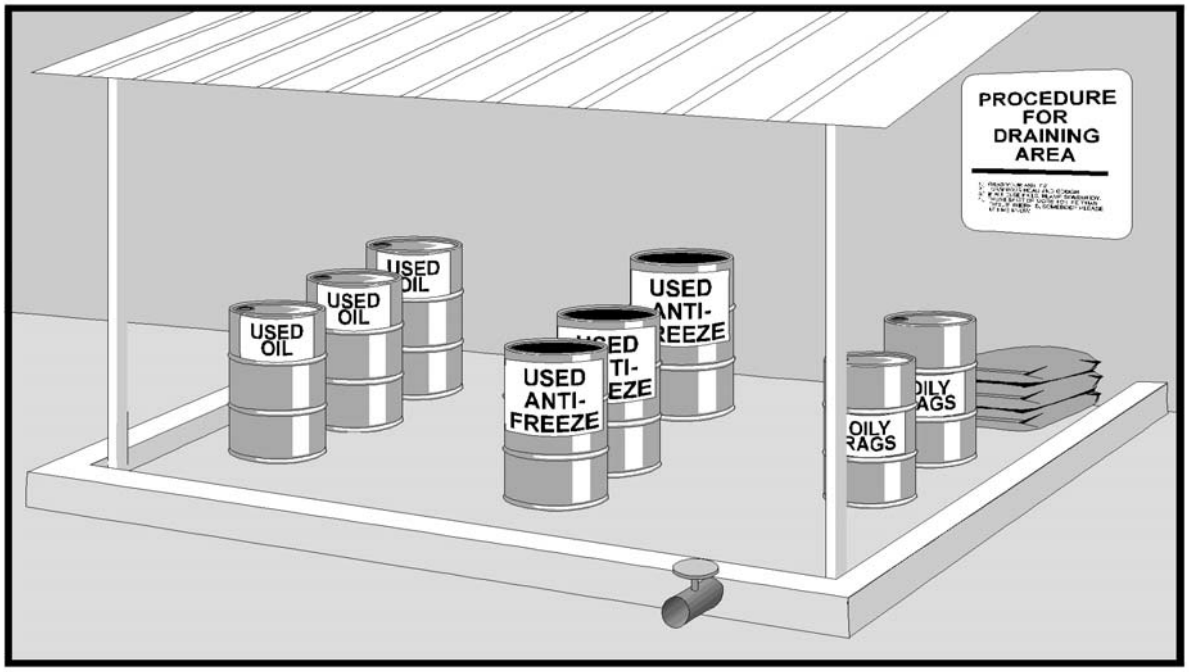
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be trained to contact the private contractors when services are needed and prepare the proper manifests (records of transportation).

Effectiveness and Cost: This is a moderately effective, moderate-cost BMP.

Limitations: Availability of private contractors may be a limitation. Quantities of materials/waste will also limit the application of this BMP.

BMP 050 - Properly Store Containers



Description of Potential Pollutant and Source: Improper storage of containers can result in the exposure of significant materials to storm water.

Description of BMP: Containers will be properly stored. This includes the following:

- Providing adequate aisle space (typically 3 feet) to facilitate material transfer and easy access for inspections.

- Storing containers, drums, and bags away from vehicle traffic routes to reduce the potential for mechanical impact and accidental spills. Do not store bags that are easily punctured near high-traffic areas where they may be hit by moving equipment or personnel.

- Stacking containers according to manufacturer's instructions to avoid damaging the containers from improper weight distribution.

- Storing liquid containers in a bermed area.

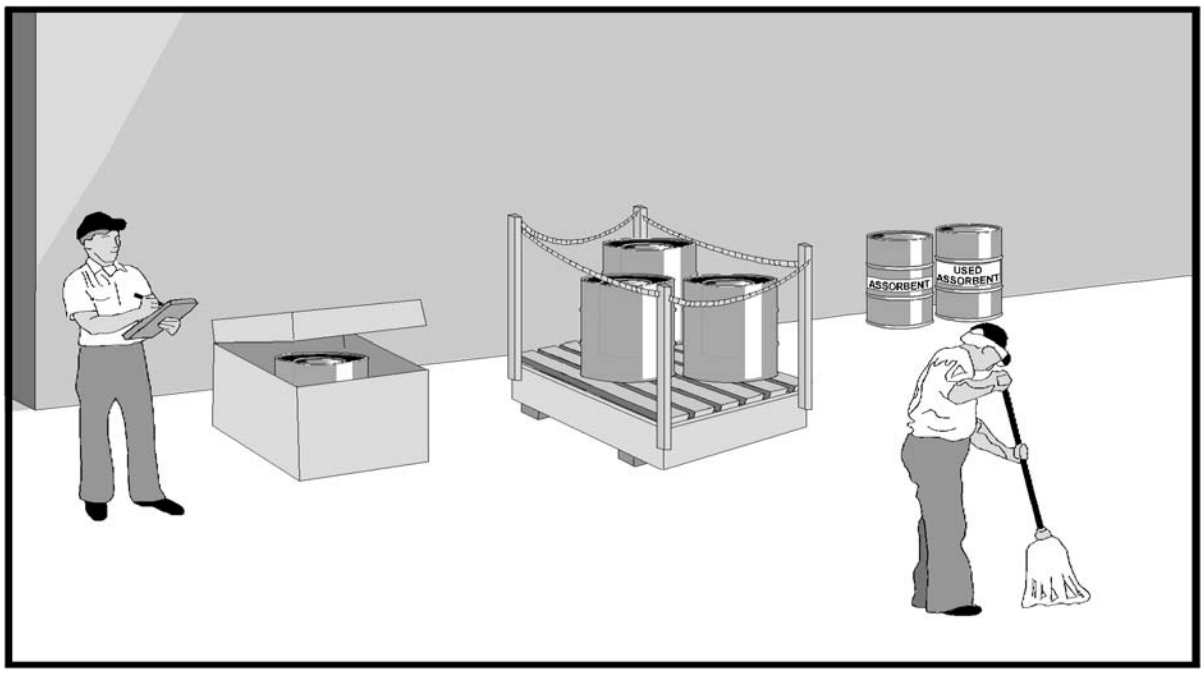
Application Guidance: Containers will be properly stored.

Training: Training on the proper storage of materials will be provided periodically to the appropriate personnel.

Effectiveness and Cost: This is a moderately effective, low-cost BMP.

Limitations: None

BMP 051 - Use Overpack Containers or Containment Pallets to Store 55-Gallon Drums Outside of Storage Areas



Description of Potential Pollutant and Source: Chemicals, oils, solvents or liquid materials stored outside in 55-gallon drums may leak. The leaking material can then be exposed to storm water and transported to the storm drain system receiving waters.

Description of BMP: Overpack containers and containment pallets are secondary containers usually constructed of plastic. They are large enough to hold the contents of the containers stored in them if they should break or leak. Using overpack containers or containment pallets minimizes the amount of pollutants reaching surface waters due to leaks. Overpack containers should be protected against damage from vehicles.

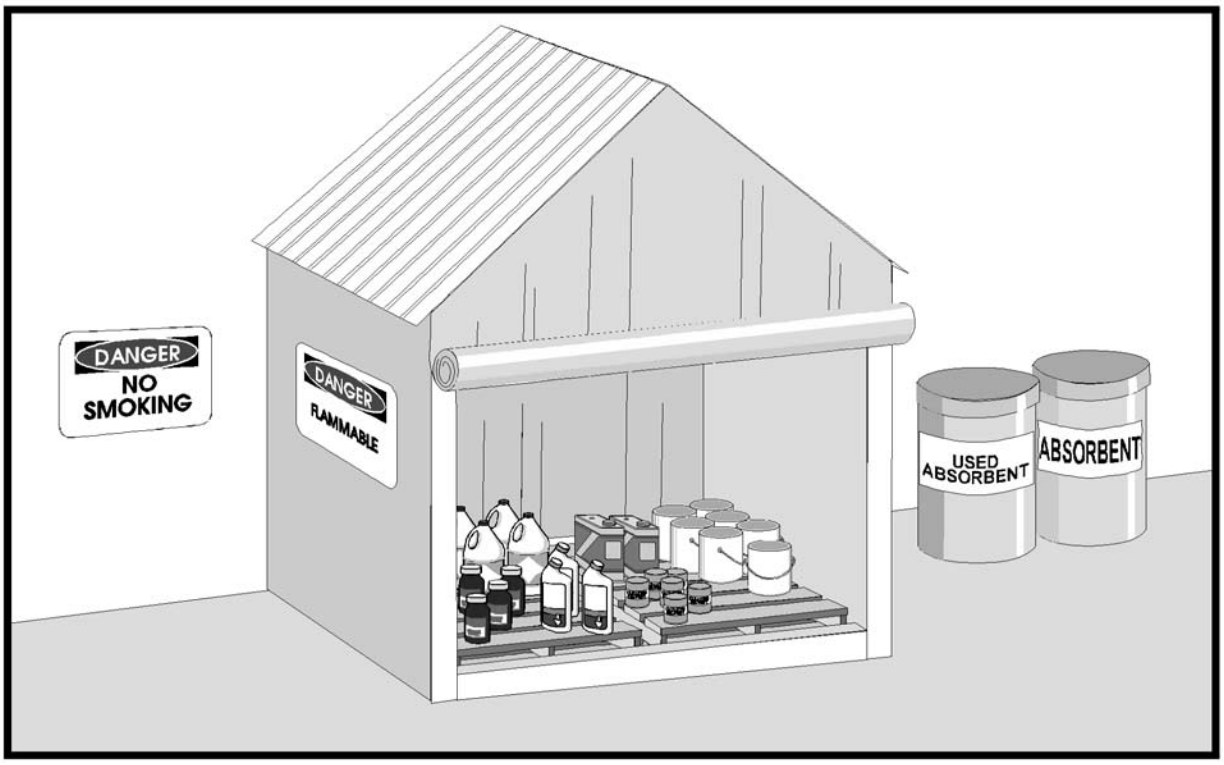
Application Guidance: Overpack containers or containment pallets will be used whenever 55-gallon drums of hazardous materials must be stored outside.

Training: Personnel will be trained to ensure that overpack containers or containment pallets are used.

Effectiveness and Cost: Overpack containers and containment pallets are a highly effective, moderate-cost BMP.

Limitations: Cost could be high if the number of drums needing containment is high.

BMP 052 - Use "Doghouse" Design for Outdoor Storage of Small Liquid Containers



Description of Potential Pollutant and Source: Small containers of liquid materials (i.e., paints, solvents, antifreeze, etc.) are often stacked or stored outside. Leaks and spills from these containers can be exposed to storm water and be transported to the storm drain or receiving waters.

Description of BMP: Small containers of liquid will be stored properly. Containers can either be stored inside buildings or in "doghouses." The roof and flooring of a doghouse design prevents direct contact of significant materials with storm water. A doghouse design is a term used to describe a storage shed that has two solid structural walls, a roof, and two canvas walls. The structural walls support the structure, while the canvas walls provide easy access to the liquid containers in the shed. Secondary containment, such as berms and curbs, will also be used for this type of structure to contain any leaks or spills that may occur. A doghouse design has two benefits:

1. Protection of liquid containers from direct contact with rainfall

2. Storage of numerous containers in a centralized location without occupying too much space

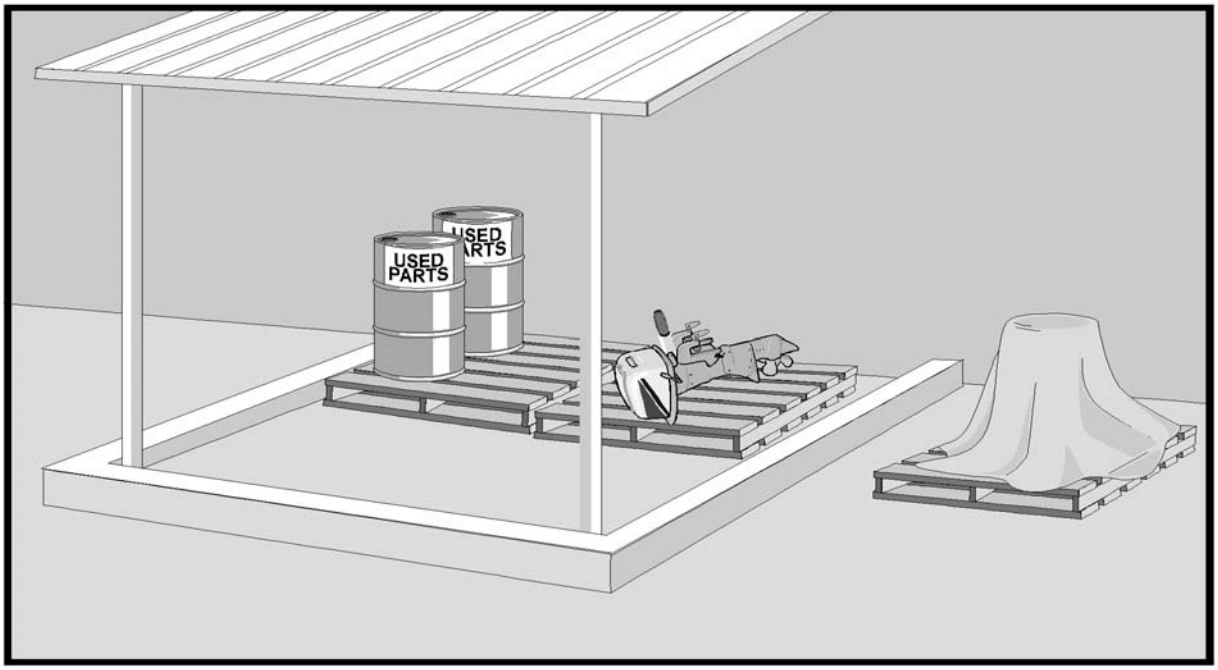
Application Guidance: Liquid containers kept outdoors will be covered at all times.

Training: N/A

Effectiveness and Cost: This is a moderately effective, moderate-cost BMP.

Limitations: Storage sheds often must meet building and fire code requirements, and some fire ordinances may preclude the use of this practice.

BMP 053 - Do Not Store Used Parts or Containers Directly on Ground



Description of Potential Pollutants and Their Source: Used parts are often covered with oil, grease, and other potential pollutants. Containers, such as 55-gallon drums and flammable materials storage lockers, may develop leaks and spill potential pollutants onto the ground or pavement. If the used parts or containers are stored directly on the pavement or ground, significant materials can be exposed to storm water which can transport the pollutants into the storm drain system or receiving waters.

Description of BMP: Used parts and containers will not be stored directly on the pavement or the ground. If possible, used parts and containers will be stored indoors. If outdoor storage is necessary, smaller parts will be placed inside a leak-proof, covered container, such as a labeled 55-gallon drum, and placed on a wooden pallet. Larger parts will be placed on wooden pallets or waterproof tarpaulins and covered with secure tarpaulins. Containers will be placed on wooden pallets to prevent the bottoms from rusting and to facilitate spill and leak detection. Placing used parts and containers in roofed, bermed storage areas is also acceptable.

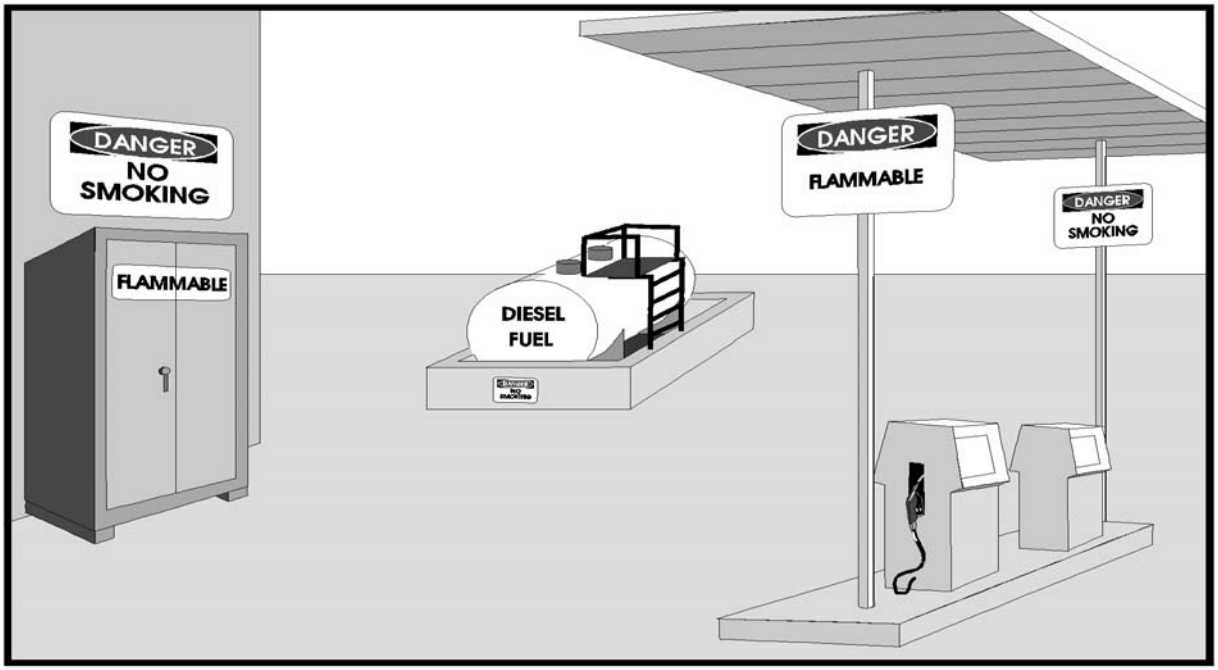
Application Guidance: Used parts and containers will never be stored directly on the pavement or ground.

Training: Personnel will be trained to never store used parts or containers directly on the ground or pavement.

Effectiveness and Cost: This is a moderately effective, low-cost BMP.

Limitations: None

BMP 054 - Do Not Allow Open Flames Near Flammable Material



Description of Potential Pollutant and Source: Water or other material used to extinguish a fire often is washed into the storm drain system. This material could contain pollutants from the item on fire. In addition, an area that has been destroyed by a fire is likely to discharge contaminants into the storm drain system. These materials can be exposed to storm water and transported to receiving waters.

Description of BMP: No open flames of any kind will be permitted within 50 feet of flammable material. Many paints are flammable. Smoking will be forbidden within flammable material areas, and only spark-proof tools will be used. Signs will be posted indicating flammables and no smoking. (Note: 29 CRF 1910.106 requires this BMP for areas where flammables are stored).

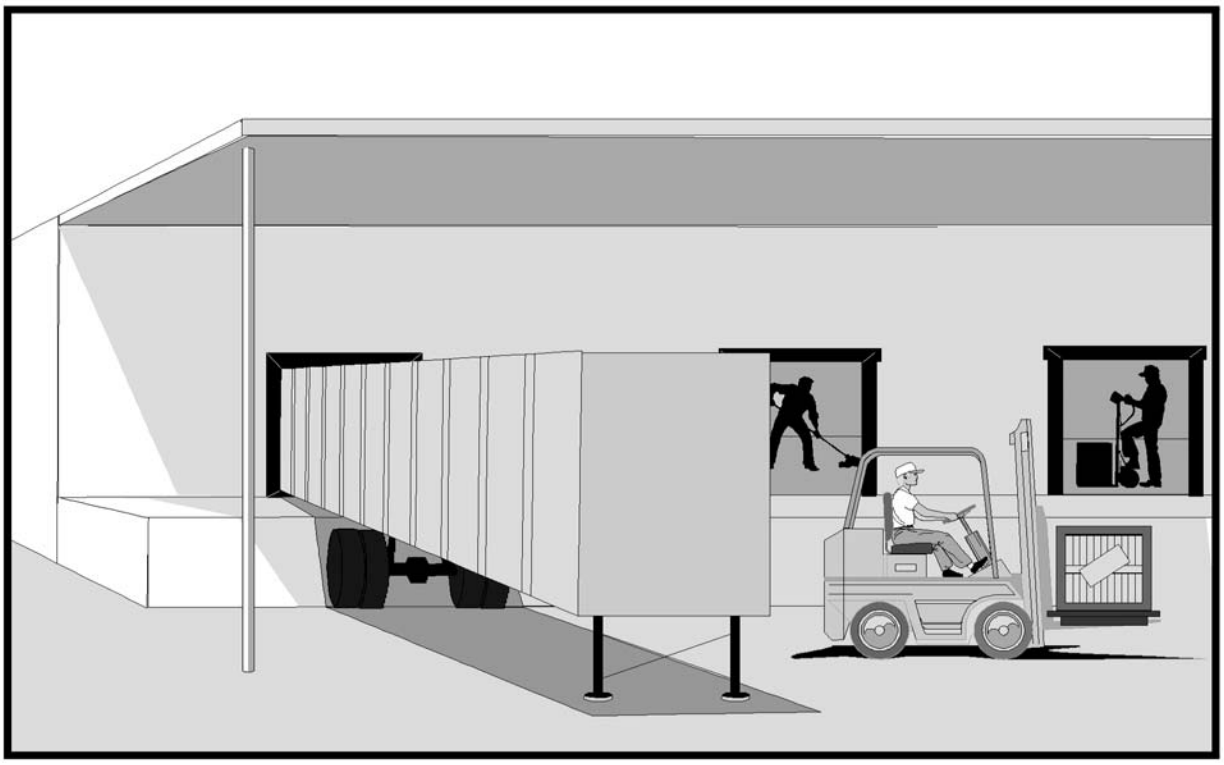
Application Guidance: No open flames or smoking will be allowed near flammable materials that are stored or that are being used. Only spark-proof tools will be used.

Training: Personnel will be trained to routinely check the label on materials to determine if they are flammable. Flammable materials will be properly stored and used.

Effectiveness and Cost: This is an effective, low-cost BMP.

Limitations: None

BMP 055 - Use Door Skirt or Seal



Description of Potential Pollutant and Source: Spills often occur during loading and unloading of liquid wastes and other significant materials from trucks and trailers. These materials can be exposed to storm water and transported to the storm drain system and/or receiving waters.

Description of BMP: A door skirt is a rubber or plastic strip that encloses a trailer end during loading operations. Existing docking facilities will be retrofitted with door skirts or seals where appropriate.

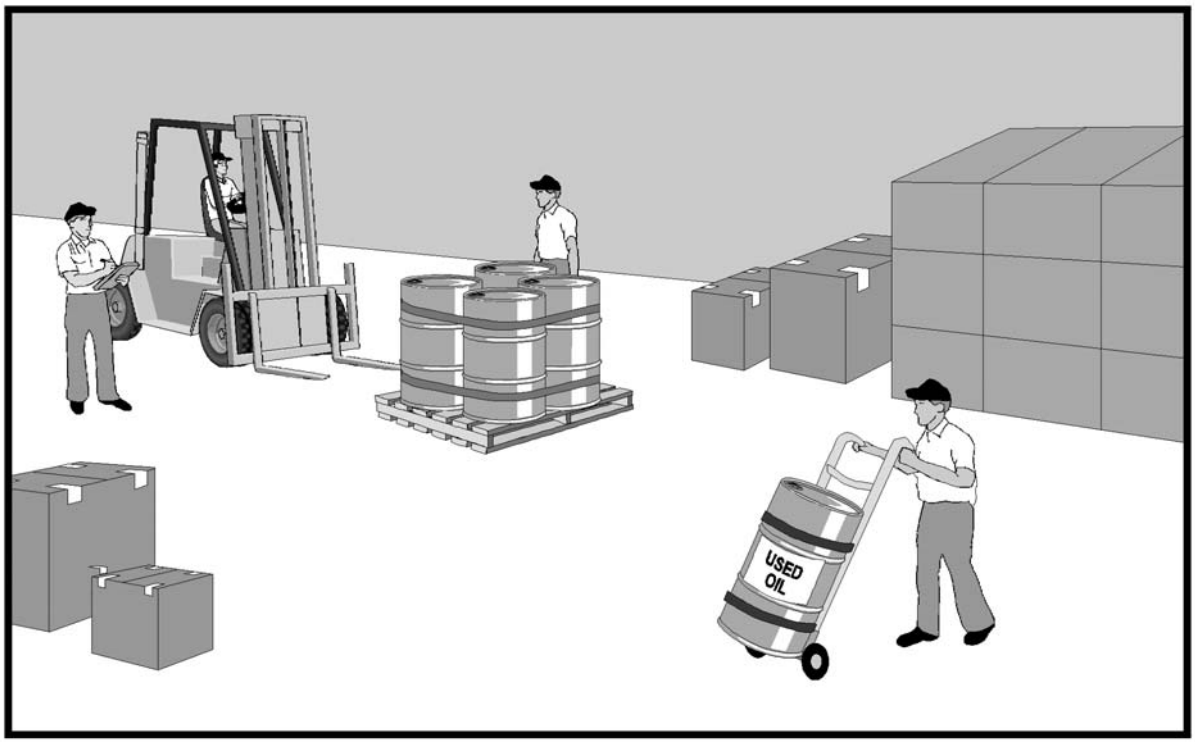
Application Guidance: A door skirt or seal will be installed at docking facilities as appropriate.

Training: N/A

Effectiveness and Cost: The door skirt is a moderately effective, low-cost BMP.

Limitations: None

BMP 056 - Employ Proper Handling Procedures to Transport Materials and Waste



Description of Potential Pollutant and Source: Materials and waste are usually transported using forklifts, trailers, trucks, etc. If these loads are not properly secured or are handled incorrectly, drums can be ruptured and spills can occur. This can expose the materials to storm water, which can transport them to the storm drain system and/or receiving waters.

Description of BMP: Drums will be moved by using a barrel cart or by placing the drum on a pallet and moving it with a forklift. As a minimum, two persons will assist the forklift operator when transferring a drum to or from a pallet. When multiple drums are stacked on a single pallet, the drums will be secured together with metallic strapping to reduce the potential for spillage due to weight shift. Mechanical puncture of a drum with the tines (i.e., the prongs) of the forklift will be avoided.

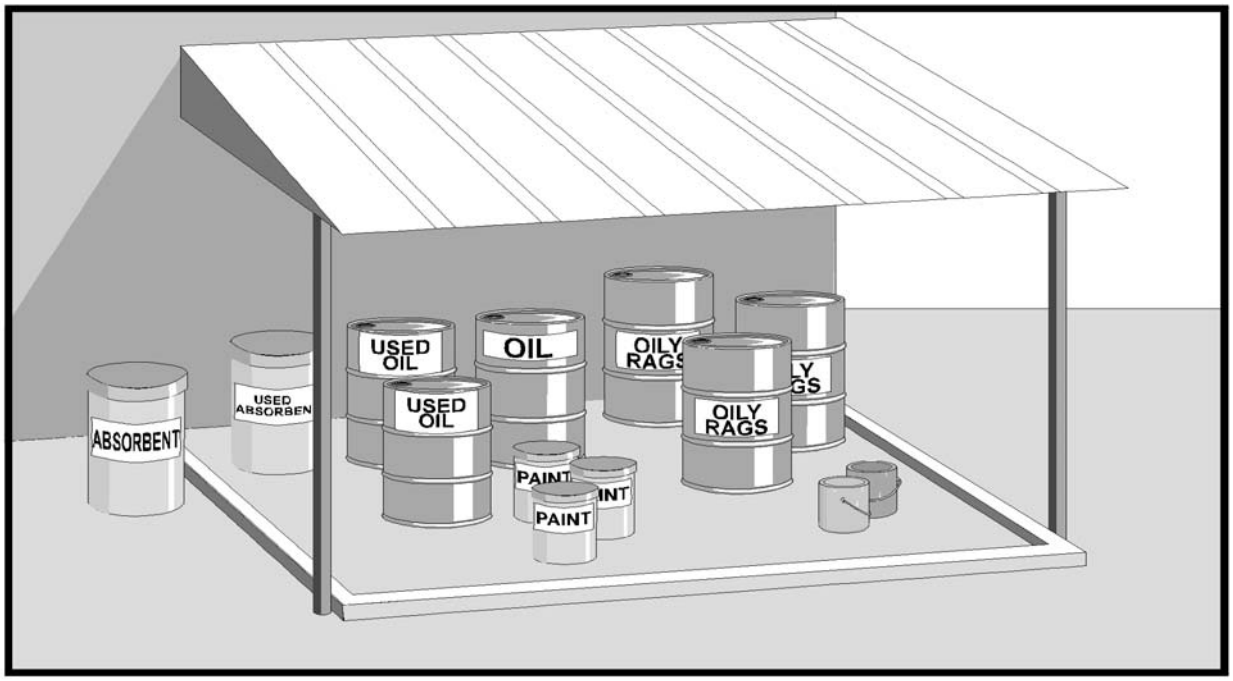
Application Guidance: Significant materials and wastes will be transported according to federal, state, and local regulations at all times.

Training: Personnel will be trained in hazardous material/waste spill prevention procedures.

Effectiveness and Cost: This practice is a highly effective, moderate-cost BMP.

Limitations: None

BMP 057 - Store Liquids and Significant Materials within a Building or Covered Area



Description of Potential Pollutant and Source: Many significant materials may be leaked or spilled during storage, handling, or transport. If significant materials are stored outside, in covered areas, these materials can be exposed to storm water, which can transport the leaked or spilled material into the storm drain system.

Description of BMP: To the extent practical, significant materials will be stored within a building or covered area. The materials will be stored on an impervious surface, such as a concrete pad. Rainfall runoff from the pad will be directed to a storm water treatment facility or contained. Leaks and spills will be cleaned up as soon as possible using rags or dry absorbents. Used rags and absorbents will be disposed of properly. Any wash water from cleaning the floor will be disposed of in the sanitary sewer.

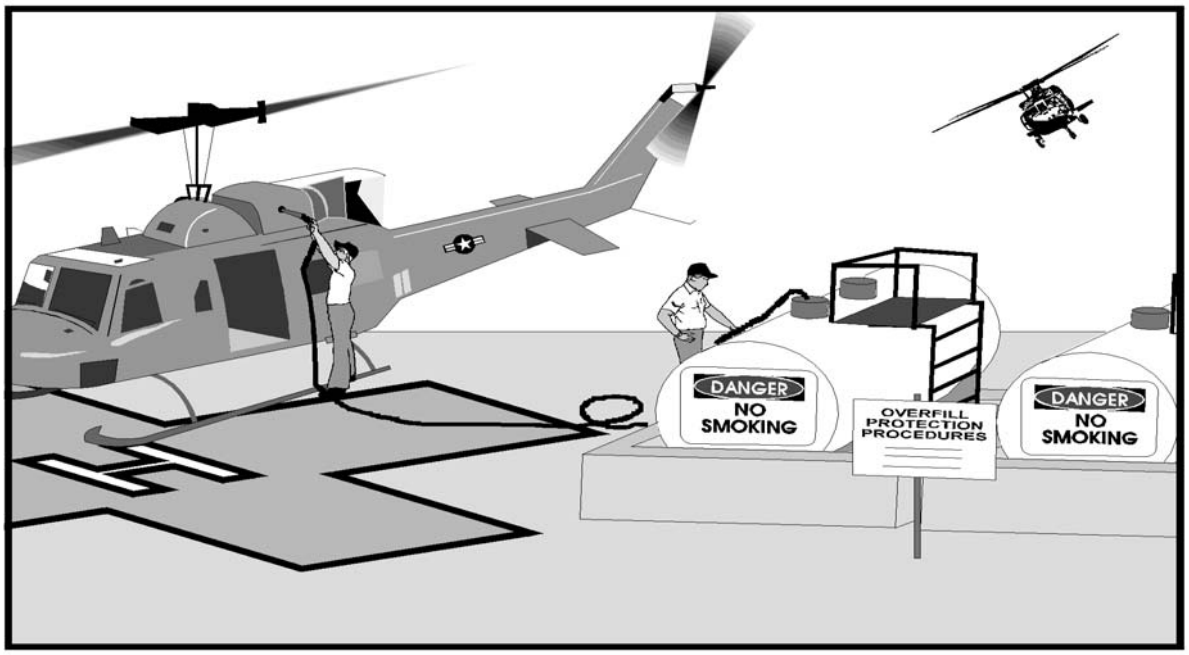
Application Guidance: All significant materials will be stored within a building or covered area.

Training: Personnel will be trained to store significant materials in designated areas.

Effectiveness and Cost: This is a moderately effective BMP. The cost will vary based on whether a building for storing the substances is available.

Limitations: None

BMP 058 - Provide Overfill Protection



Description of Potential Pollutant and Source: Overflows during fueling or transfer of fuels or liquids to the storage tanks can expose significant materials to storm water, which can transport them to the storm drain system and/or receiving waters.

Description of BMP: Adequate control of overflows will be achieved by installing overfill prevention equipment that automatically shuts off flow, restricts flow, or sounds an alarm when the tank is almost full. Existing tanks will be retrofitted with this equipment.

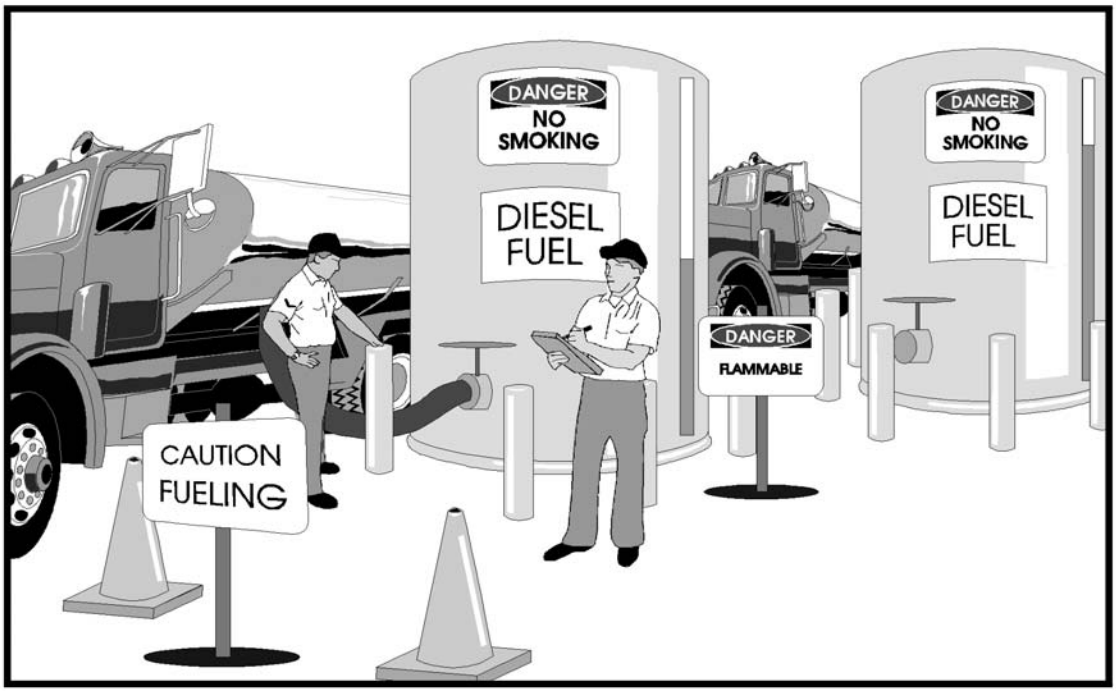
Application Guidance: Overfill protection will be used during any fuel or liquid handling operation. This includes vehicles, equipment, aircraft and ships. Overfill protection will be included in initial construction and retrofitting of existing installations.

Training: Personnel will be trained in the use of the overfill protection devices at their facilities. Overfill protection procedures will be posted in fueling areas and other liquid material transfer areas.

Effectiveness and Cost: Overfill protection is a highly effective, low-cost BMP.

Limitations: None

BMP 059 - Monitor Major Fueling Operations



Description of Potential Pollutant and Source: Overflows during fueling or transfer of fuels or liquids to the storage tanks can expose significant materials to storm water. These materials can then be transported to the storm drain or receiving waters.

Description of BMP: Careful monitoring of fuel transfer operations will reduce overfilling. A policy mandating second party monitoring of fuel transfers will be adopted.

Application Guidance: Fuel transfer operations will be observed during all high-volume transfers. High-volume transfers typically involve a fuel tanker truck.

Training: Personnel will be trained in appropriate emergency spill response actions and proper fueling procedures. Fueling procedures will include the following items:

- Determine that sufficient space is available in the storage tank or drum to receive the entire trailer compartment's capacity by gaging the tank or drum immediately before discharging additional product into the storage tank. Gaging can be accomplished by using stick readings, sight gages, or sensor readouts.

- Ensure that the tank trailer is accurately spotted at the proper unloading spot.

- Ensure that the tank trailer brakes are set; the driver remains with the vehicle and observes the transfer lines during the entire unloading procedure.

- Place caution signs in the proximity of the tank trailer to give necessary warning to approaching vehicles and personnel. These signs must remain posted until after the tank trailer is unloaded and disconnected from the discharge connection.

- Ensure that no open flames of any kind are permitted within 100 feet of the tank trailer. Smoking is strictly forbidden within this area. Only spark-proof tools are to be used.

- Limit performance of unloading operations only to reliable persons properly instructed and made responsible for careful compliance with applicable regulations.

- Attach ground strap at the facility to bumper of tank trailer unless the transfer hose provides the proper ground, once the products in the tank and trailer compartments have been verified as being the same.

- Ensure that the facility storage tank is vented before connecting the unloading line unless unloading uses a vapor recovery system. Connect vapor recovery system(s) if applicable.

- Attach unloading line to the proper connection on the outlet leg of the tank truck.

- Open bottom outlet valve and proper valves in the unloading lines.

- Start product unloading, checking to ensure that there is no leakage at any of the connections. Should leakage appear, immediately stop the unloading process by closing the necessary outlet valves. The driver must continuously observe the connections to ensure that they are secure throughout the fluid transfer process.

- After liquid has been removed, close all valves, disconnect facility unloading from tank trailer, replace cap to outlet, and tighten all other closures.

- Gage the tank after delivery to ensure that the product amount delivered agrees with the manifest or bill of lading. Be certain that any discrepancies noted at the time of delivery are noted on the manifest or bill of lading and are initialed by the driver.

- Remove all portable signs and release the tank trailer.

Effectiveness and Cost: Observing major fueling operations is a moderately effective, low-cost BMP.

Limitations: None

BMP 060 - Provide Absorbent Booms in Unbermed Fueling Areas

Description of Potential Pollutant and Source: Spills during major fueling operations may expose potential pollutants to storm water. These materials can be transported to the storm drain system and/or receiving waters.

Description of BMP: Absorbent booms will be stored at fueling areas which are not bermed. The absorbent booms are portable and are used if a spill occurs during the fueling operations.

Application Guidance: Absorbent booms will be kept at all fueling areas.

Training: Personnel will be trained regarding the proper use and placement of the absorbent booms to contain spills. This information will be obtained from the manufacturer of the absorbent booms.

Effectiveness and Cost: This is a moderately effective BMP. The cost will vary based on the size of the fueling area.

Limitations: None

BMP 061 - Eliminate Topping Off Tanks

Description of Potential Pollutant and Source: Trying to completely fill tanks after the pumps automatically shut off, or "topping off," often results in fuel spills and exposure of significant materials to storm water.

Description of BMP: A policy will be developed to discourage "topping off" tanks. The policy will include incentives, posting signs stating the policy, or penalties.

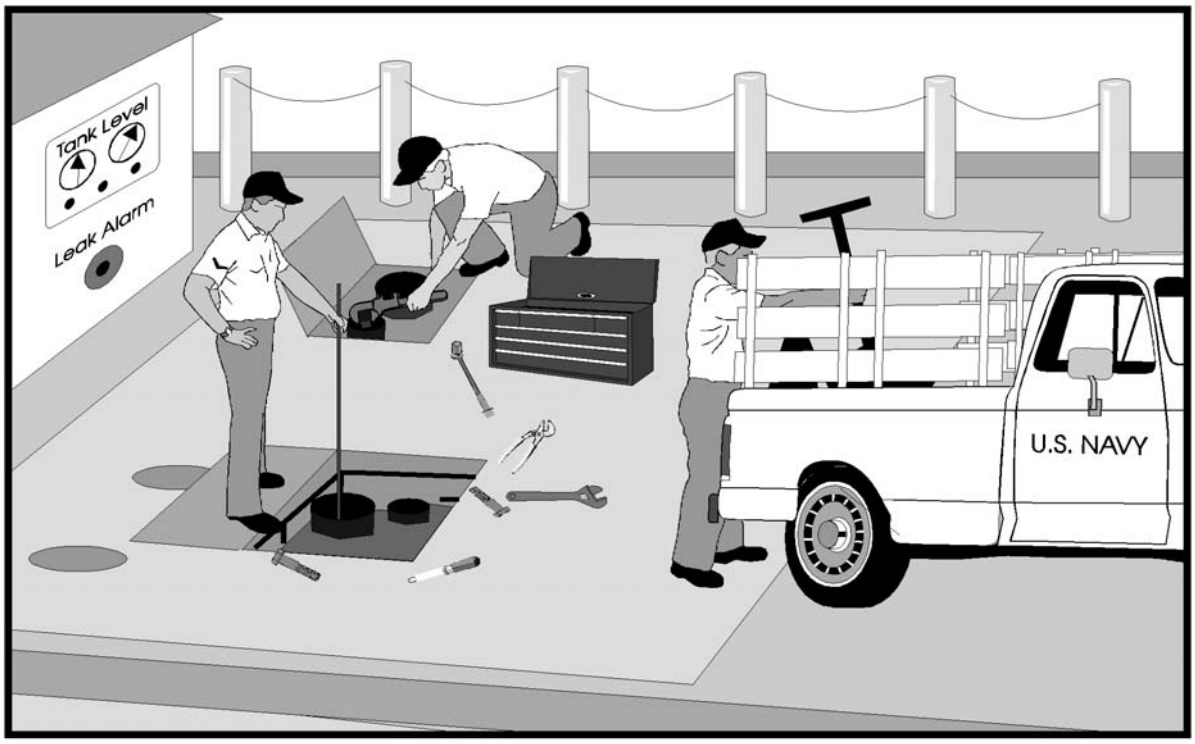
Application Guidance: This BMP will be applied to all fuel or liquid handling operations.

Training: New personnel will be informed of policy and signs should be posted as a reminder.

Effectiveness and Cost: Eliminating "topping off" is a highly effective, low-cost BMP.

Limitations: None

BMP 062 - Install Leak Detection System



Description of Potential Pollutant and Source: An underground storage tank may leak fuel which may subsequently become exposed to storm water. These materials can be transported to storm drains and/or receiving waters.

Description of BMP: A leak detection system will be installed on USTs. There are numerous methods of leak detection systems. The more effective and costly methods include tank automatic gaging, vapor monitoring, groundwater monitoring, and interstitial monitoring. A low-cost, but less effective leak detection method involves using inventory control to keep track of the amount of fuel dispensed into the tank versus the amount pumped out. (Note: This BMP is a requirement of 40 CFR 280.43.)

Application Guidance: Tanks will be monitored for leaks every 30 days.

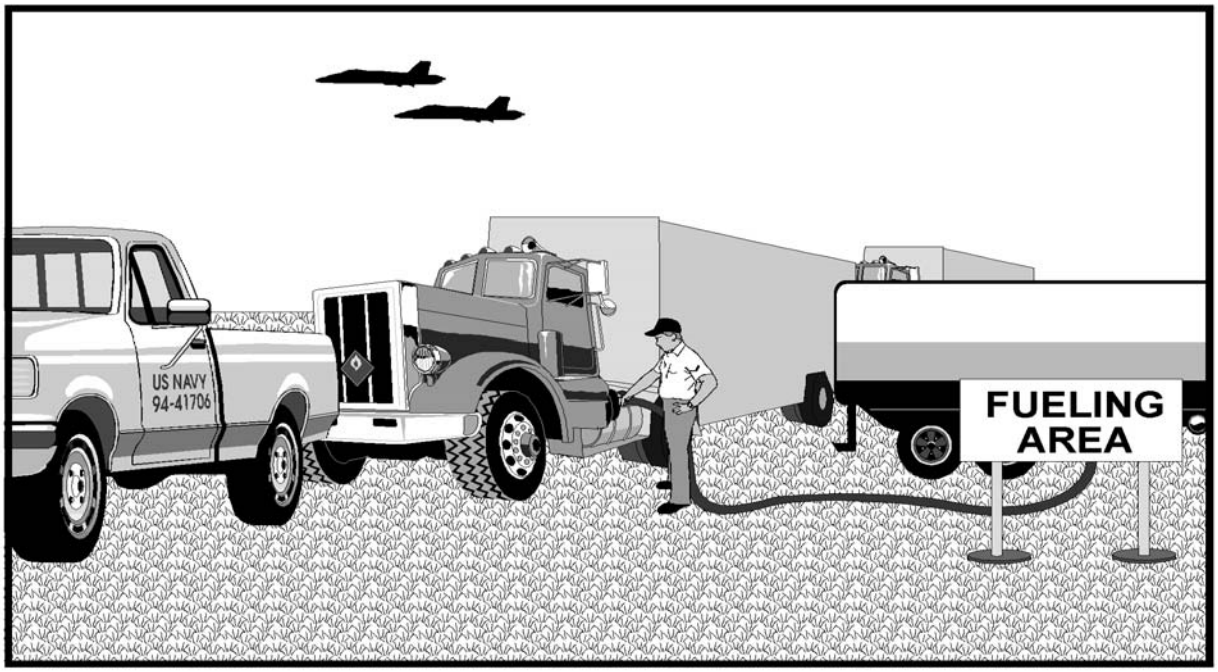
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Designated personnel will be trained on the operation and maintenance of the leak detection system in use at their facilities.

Effectiveness and Cost: The effectiveness and cost of the leak detection system depends on the method used. Inventory control is a less effective, low-cost BMP. The other methods are highly effective and have higher costs.

Limitations: For previously installed tanks, inventory control may be the most economically feasible option.

BMP 063 - Designate Areas for Fueling from Mobile Fuel Tankers



Description of Potential Pollutant and Source: Overflows during fueling can expose significant materials to storm water. These materials can be transported to the storm drain and/or receiving waters.

Description of BMP: Minimize the use of mobile fuel tankers. Designating areas for fueling will reduce the chances of fuel spills reaching storm water. Most vehicles, with the exception of tracked vehicles such as tanks and bulldozers, should be able to travel to designated areas with minimal lost time.

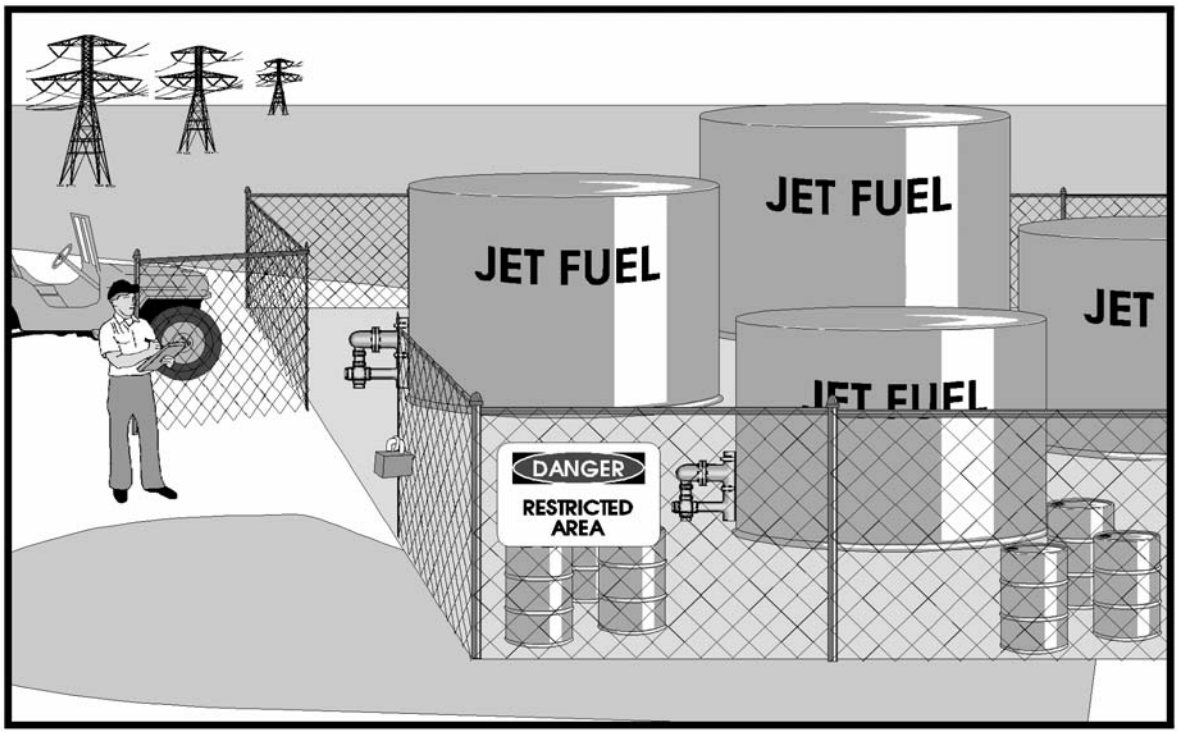
Application Guidance: Fueling areas will be designated whenever a large number of mobile equipment are being used.

Training; Personnel will be notified of the locations of designated fueling areas.

Effectiveness and Cost: Designated fueling areas are a highly effective, low-cost BMP.

Limitations: None

BMP 064 - Restrict Access to Tanks



Description of Potential Pollutant and Source: Improper use or vandalism of fuel tanks may result in discharge of fuel to the ground. This fuel may then be exposed to storm water and transported to the storm drain and/or receiving waters.

Description of BMP: Access to the tank and valves will be restricted to properly trained personnel. The area can be restricted by a locked gate. This BMP is recommended for fuel tank farms.

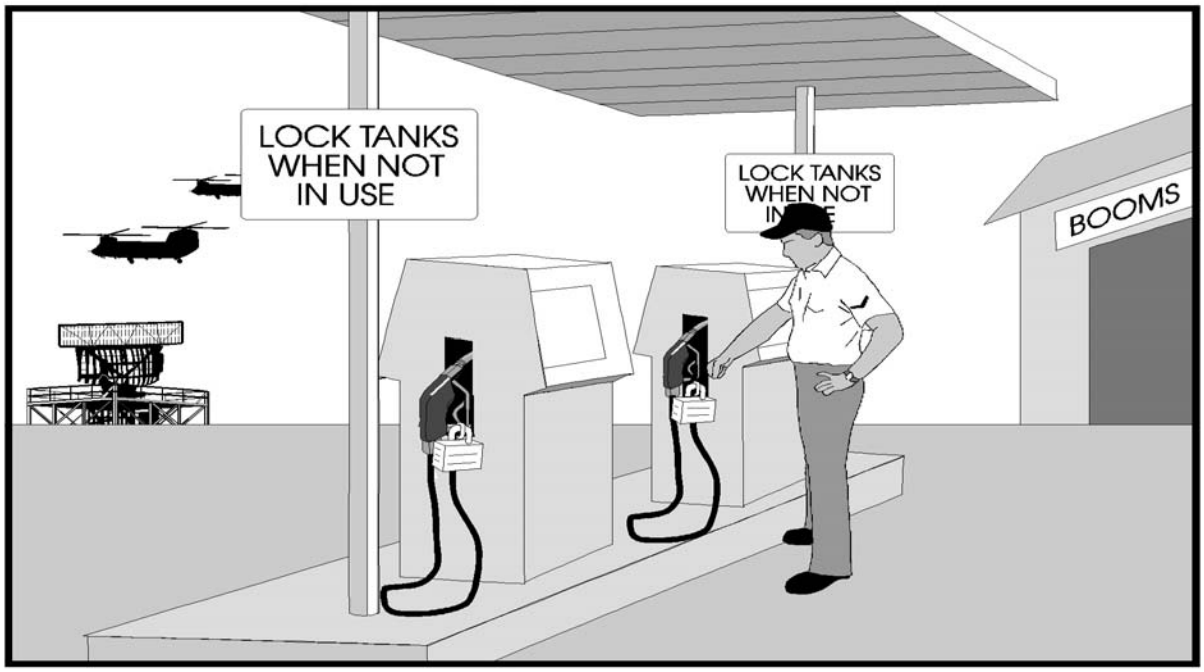
Application Guidance: Access to valves will be restricted at all times to properly trained personnel.

Training: Personnel who use fuel tanks will be trained in the proper operation of the system. Non-trained personnel who need fuel will be informed how to contact trained personnel for fuel dispensing.

Effectiveness and Cost: This is an effective, low-cost BMP.

Limitations: The placement of some tanks may make it difficult to restrict access them.

BMP 065 - Lock Fuel Tanks When Not in Use or on Standby



Description of Potential Pollutant and Source: Unauthorized use of fuel tanks increases the possibility of accidental fuel spills and exposure to storm water. Unauthorized use after normal hours of operation could potentially result in a large spill of fuel.

Description of BMP: Fuel tank valves and fill pipes will be locked when idle to ensure that accidental user error does not occur.

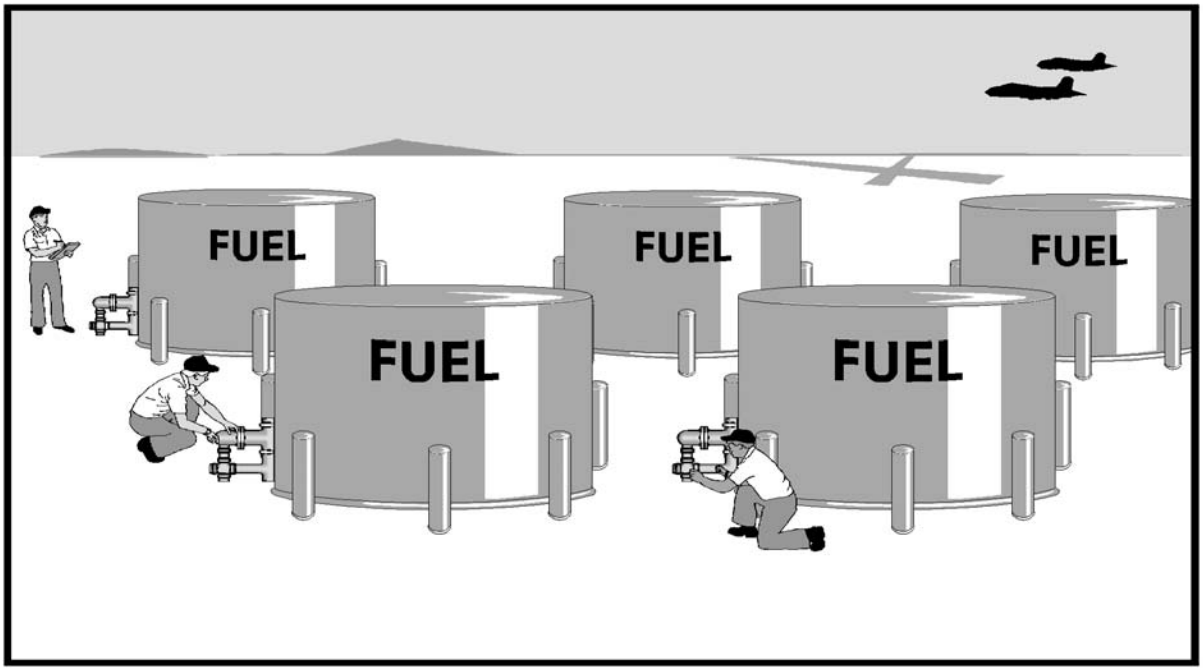
Application Guidance: Idle fuel tanks will be locked at all times.

Training: Personnel operating fuel tanks will be trained to know when tanks should be locked. Tanks which are frequently used will be locked at the end of the normal operating day.

Effectiveness and Cost: Locking tank valves is a highly effective, low-cost BMP.

Limitations: None

BMP 066 - Keep Tanks, Piping, and Valves in Good Condition



Description of Potential Pollutant and Source: Tanks, piping, and valves may leak fuel or other significant materials due to corrosion, loose fittings, poor welding, or improperly or poorly fitted gaskets. This can expose these materials to storm water, which can transport them to storm drains and/or receiving waters.

Description of BMP: Tanks, piping, and valves will be kept in good working condition. Tanks, piping, or valves which are leaking will be repaired or replaced.

Application Guidance: Tanks, piping, and valves will be inspected monthly and kept in good condition at all times. If applicable, preventive maintenance will be performed.

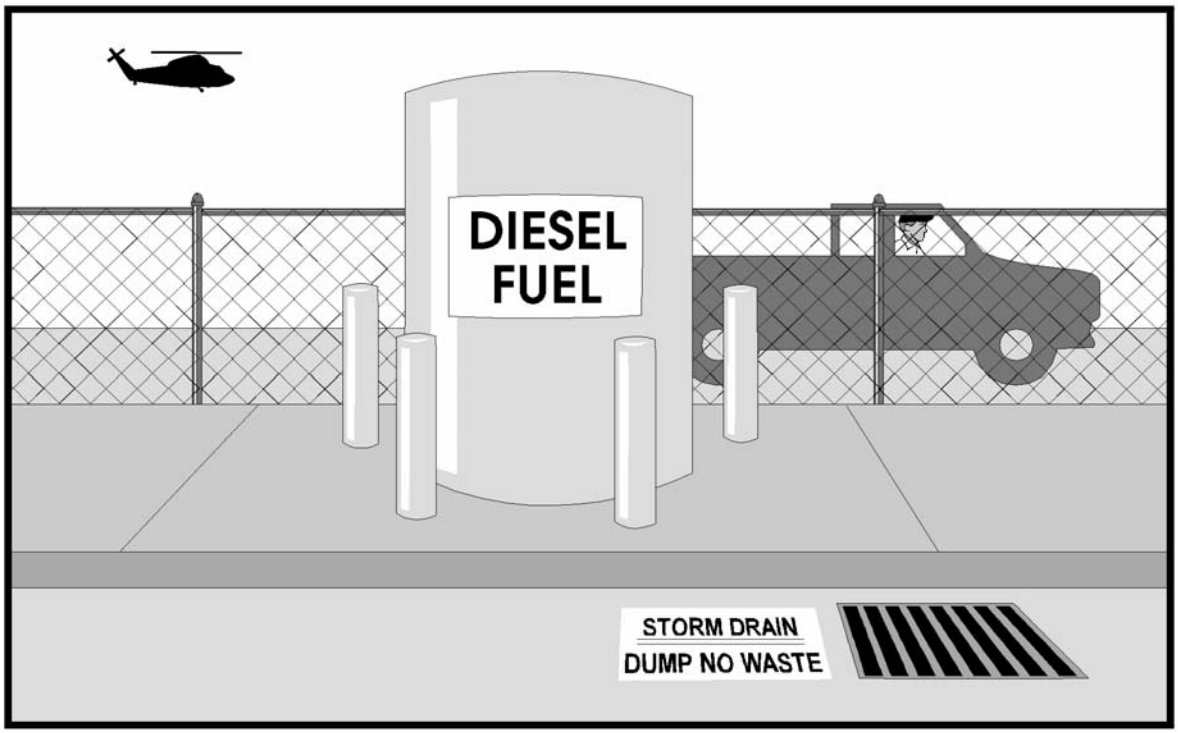
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: Personnel will be trained to regularly inspect for leaks or conditions that could lead to the discharge of chemicals, or storm water contact with waste materials. Personnel will be trained to routinely inspect equipment before each use. Tanks, piping and valves which are not frequently used, will be inspected weekly. Procedures for notifying the appropriate maintenance personnel if a leak is found, will be established.

Effectiveness and Cost: Keeping tanks, piping, and valves in good condition is a highly effective BMP. The cost of repairing or replacing piping and valves is typically low. The cost of repairing or replacing tanks will vary based on the size of the tank and its present condition.

Limitations: None

BMP 067 - Protect Tanks from Being Damaged by Vehicles



Description of Potential Pollutant and Source: If a tank is damaged by a vehicle, fuel, or other significant materials may be leaked from the tank and become exposed to storm water. The materials can then be transported to the storm drain and/or receiving waters.

Description of BMP: Protect tanks from being damaged by vehicles. Bollards or traffic barriers may be used if the tank location is accessible to vehicles. Fences and curbs may also protect the tanks.

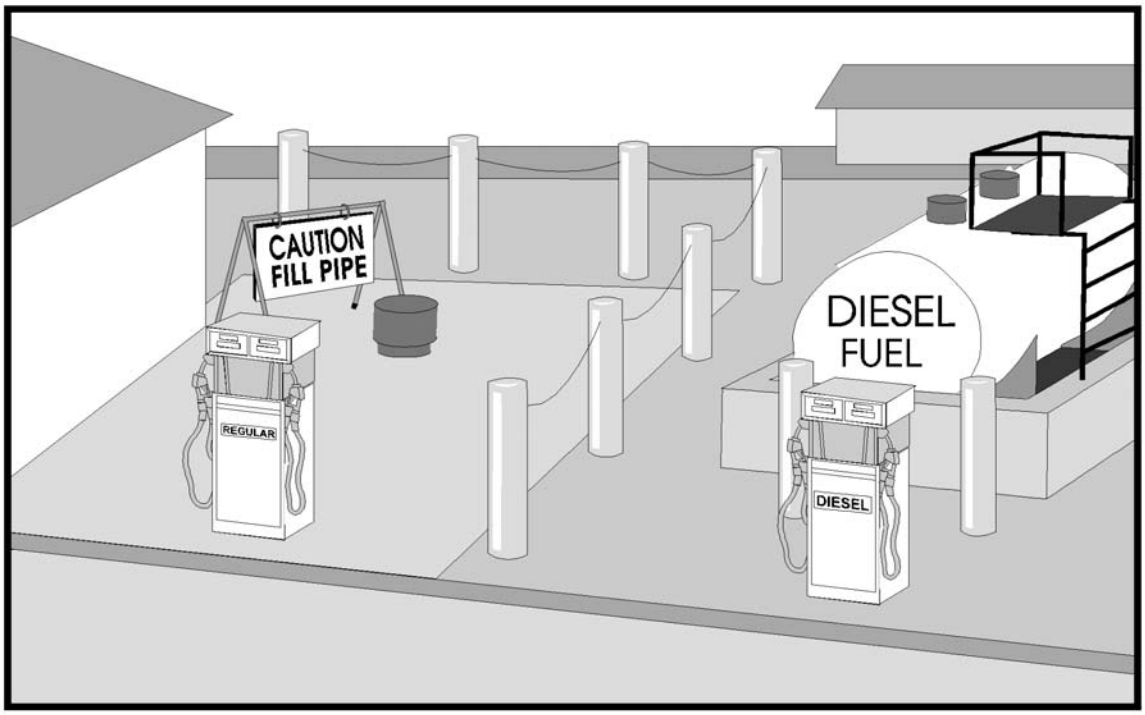
Application Guidance: Tanks will be guarded from being damaged by vehicles.

Training: N/A

Effectiveness and Cost: This is an effective, low-cost BMP.

Limitations: None

BMP 068 - Protect Fill Pipe from Being Damaged by Vehicles



Description of Potential Pollutant and Source: If a fill pipe is damaged by a vehicle, fuel may leak from the tank and become exposed to storm water. These materials or other significant materials can then be transported to the storm drain and/or receiving waters.

Description of BMP: Protect fill pipes from being damaged by vehicles. Bollards or traffic barriers will be used if the tank location is accessible to vehicles.

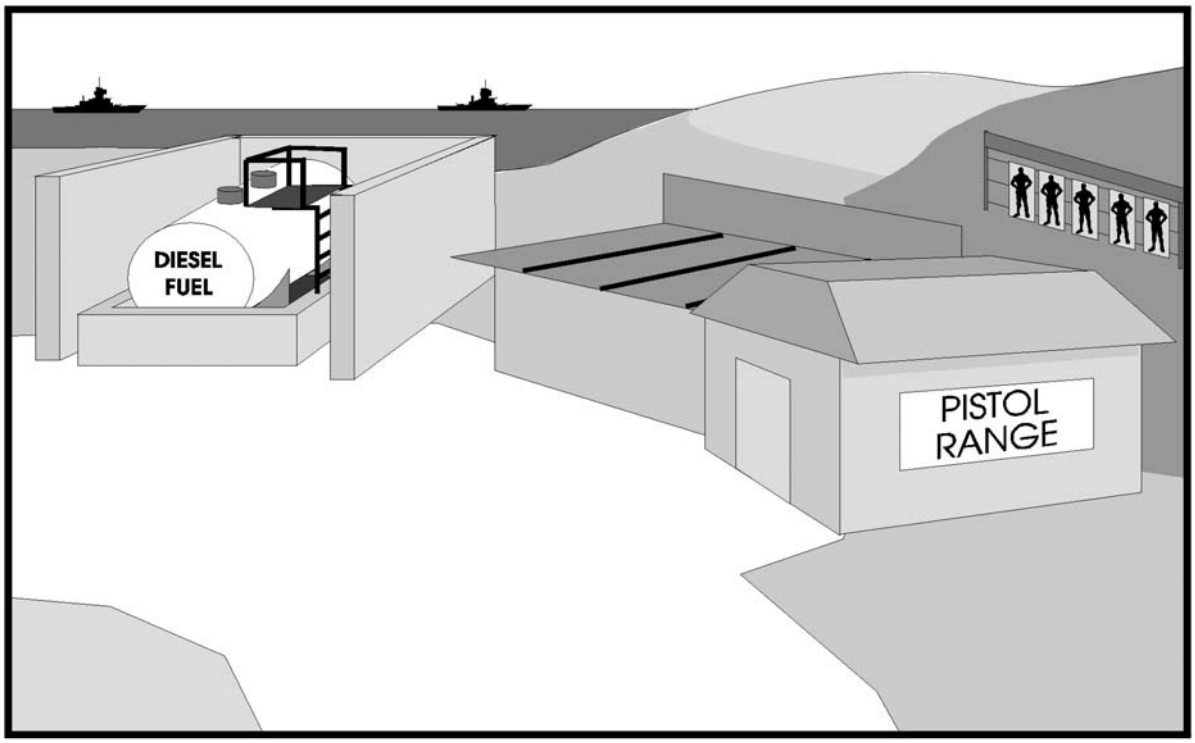
Application Guidance: Fill pipes will be guarded from damage by vehicles.

Training: N/A

Effectiveness and Cost: This is an effective, low-cost BMP.

Limitations: None

BMP 069 - Provide Protection for Permanent Aboveground Tanks from Discharge of Firearms



Description of Potential Pollutant and Source: Stray munitions may penetrate aboveground storage tanks, causing spills and leaks of fuel or other significant materials. These materials can be exposed to storm water and transported to the storm drain and/or receiving waters.

Description of BMP: When aboveground storage tanks are located in areas where firearms are discharged, concrete barriers will be used to protect the inner tank. The concrete will protect against damage from stray fire.

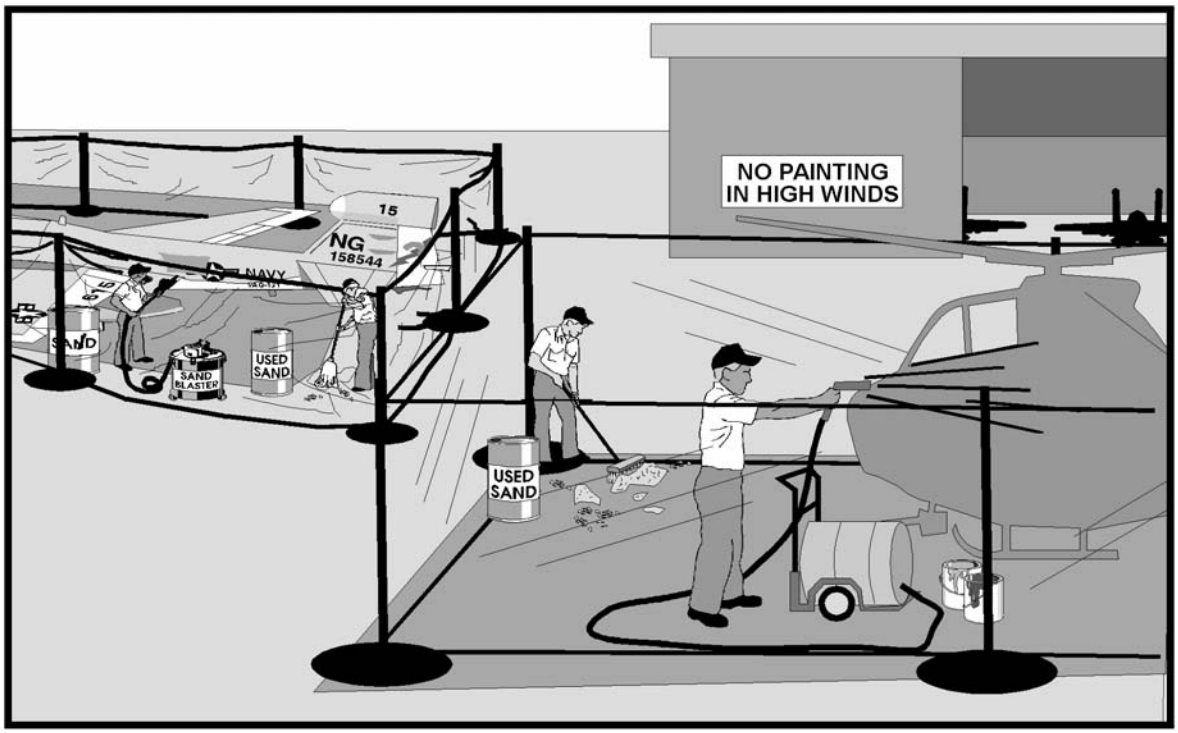
Application Guidance: This practice will be followed wherever there is any chance of firearms being discharged in the vicinity of aboveground storage tanks.

Training: N/A

Effectiveness and Cost: Concrete encapsulation is a highly effective, moderate-cost BMP.

Limitations: N/A

BMP 070 - Enclose Outdoor Sanding and Painting Operations and Use Tarps to Contain and Collect Solid Wastes



Description of Potential Pollutant and Source: Sanding, in preparation for painting, and painting itself creates wastes including glass, metal, stone and other wastes that may become exposed to storm water if not properly collected and disposed. These materials can then be transported to storm drains and/or receiving waters.

Description of BMP: Containment of paint-related wastes can be accomplished by covering all sanding and painting activities with tarps or plastic sheeting and by placing a tarp under and/or around all sanding and painting operations. These wastes will be collected in labeled drums and disposed of appropriately.

Application Guidance: This practice will be used in all sanding and painting operations performed outside of sanding or painting booths.

Training: Personnel will be instructed in procedures for the containment, collection and disposal for the control of particulates from sanding and painting; tarps will be monitored for holes. The waste will be recycled or disposed in a landfill if it is not a hazardous waste. Signs will be posted where sandblasting activities take place to remind personnel about proper disposal practices.

Effectiveness and Cost: Containment, collection and disposal of sandblasting wastes is a highly effective, usually moderate-cost BMP. However, costs for large-scale painting and sanding activities (e.g., ships and large equipment) could be high.

Limitations: The size of some operations may make implementation of this practice difficult. Some municipalities may also require that sandblasting wastes be disposed of as a hazardous material.

BMP 071 - Vacuum Particulate Wastes from Sanding or Painting Operations

Description of Potential Pollutant and Source: Sanding, in preparation for painting, and painting itself creates wastes that may become exposed to storm water and transported to storm drains and/or receiving waters.

Description of BMP: Containment of paint-related wastes can be accomplished by performing painting and sanding activities in facilities equipped with a vacuum and filters.

Application Guidance: This practice will be used in all sanding and painting operations.

Training: Personnel will be instructed in procedures for proper operation of vacuum and filters.

Effectiveness and Cost: Performing sanding and painting operations under vacuum is a highly effective, usually moderate-cost BMP. However, costs for large-scale sanding and painting activities (e.g., ships and large equipment) could be high.

Limitations: The size of some operations may make implementation of this practice difficult.

BMP 072 - Conduct Indoor Sanding and Painting in an Enclosed Area

Description of Potential Pollutant and Source: Paint, sand, glass, metal, or stone particles from painting, sanding, and sandblasting operations can become exposed to storm water if not properly contained. These materials may then be transported to storm drains and/or receiving waters.

Description of BMP: Conduct painting, sanding, and sandblasting in an enclosed area to prevent contaminated particles from being exposed to storm water. Wastes from these operations will be disposed of appropriately.

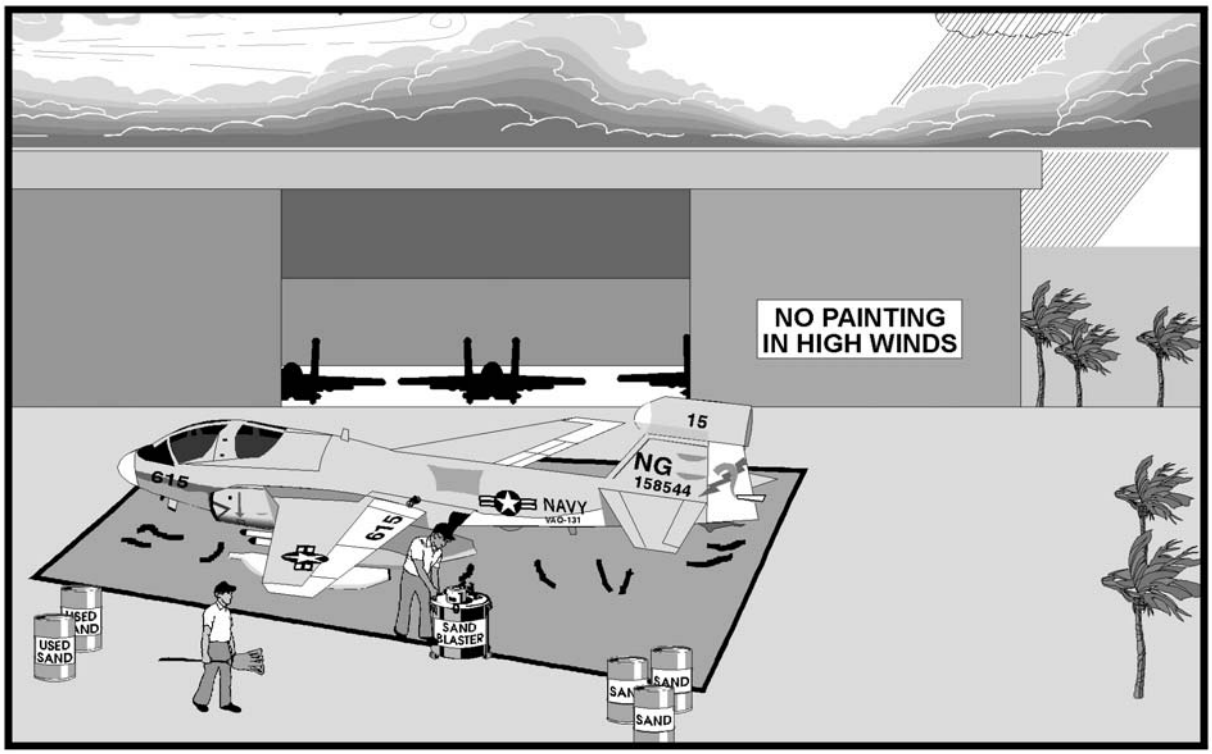
Application Guidance: If possible, all painting, sanding, and sandblasting activities will be performed indoors and preferably in an enclosed covered area.

Training: Signs will also be posted to remind personnel about proper locations.

Effectiveness and Cost: Conducting painting, sanding, and sandblasting in an enclosed area is an effective, variable-cost BMP.

Limitations: The size of some activities may make implementation of this BMP difficult.

BMP 073 - Avoid Sanding or Painting in Windy Weather



Description of Potential Pollutant and Source: Sanding or painting in windy weather will cause dispersal of particulates which can expose them to storm water. These materials can then be transported to storm drains and/or receiving waters.

Description of BMP: If sanding or painting cannot be performed in an enclosed, covered area, avoid performing either operation in windy weather.

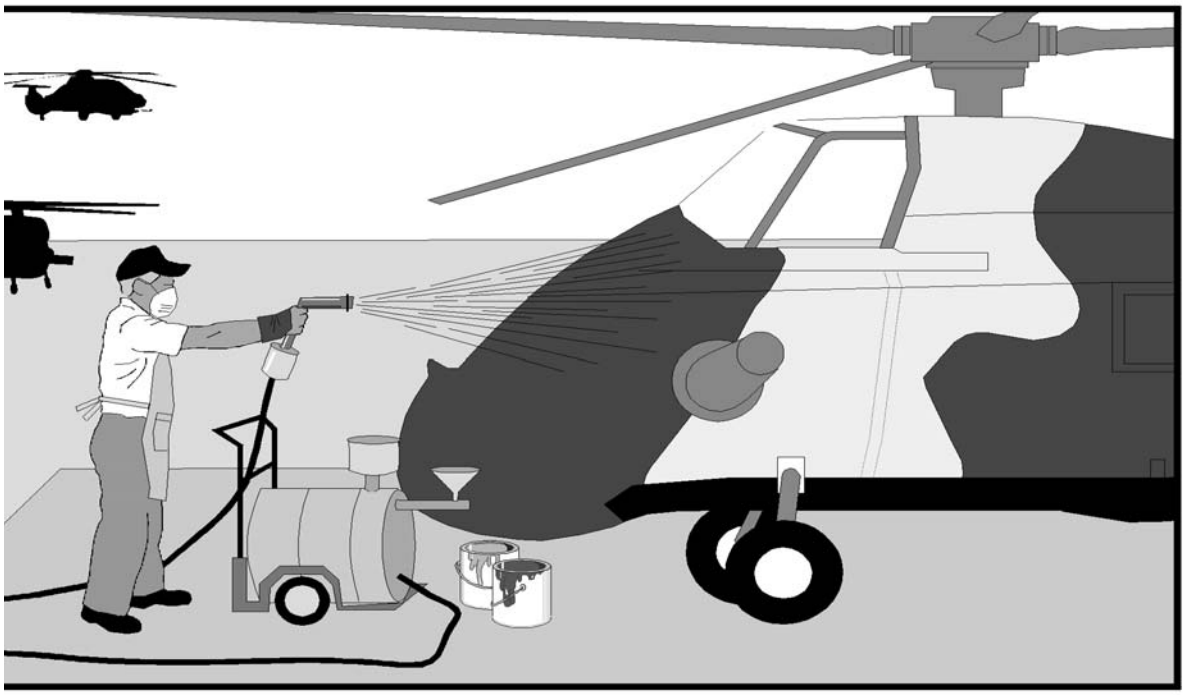
Application Guidance: This practice will be followed at all times.

Training: Personnel will be given instruction as to when it is too windy to perform sanding or painting. This information may be obtained from the equipment manufacturer.

Effectiveness and Cost: Avoiding windy weather is a moderately effective, low-cost BMP.

Limitations: May cause inconvenience.

BMP 074 - Use Efficient Painting Equipment



Description of Potential Pollutant and Source: Traditional painting methods often result in loss of particulate matter to air and ground (paint chips, paint spray) and exposure to storm water. These materials can then be transported to storm drains and/or receiving waters.

Description of BMP: Highly efficient painting equipment is now available that reduces overspraying. This reduces the amount of solid pollutants that can reach storm water. More efficient equipment includes electrostatic spray guns, air-atomized spray guns, high volume/low pressure spray guns and gravity feed spray guns.

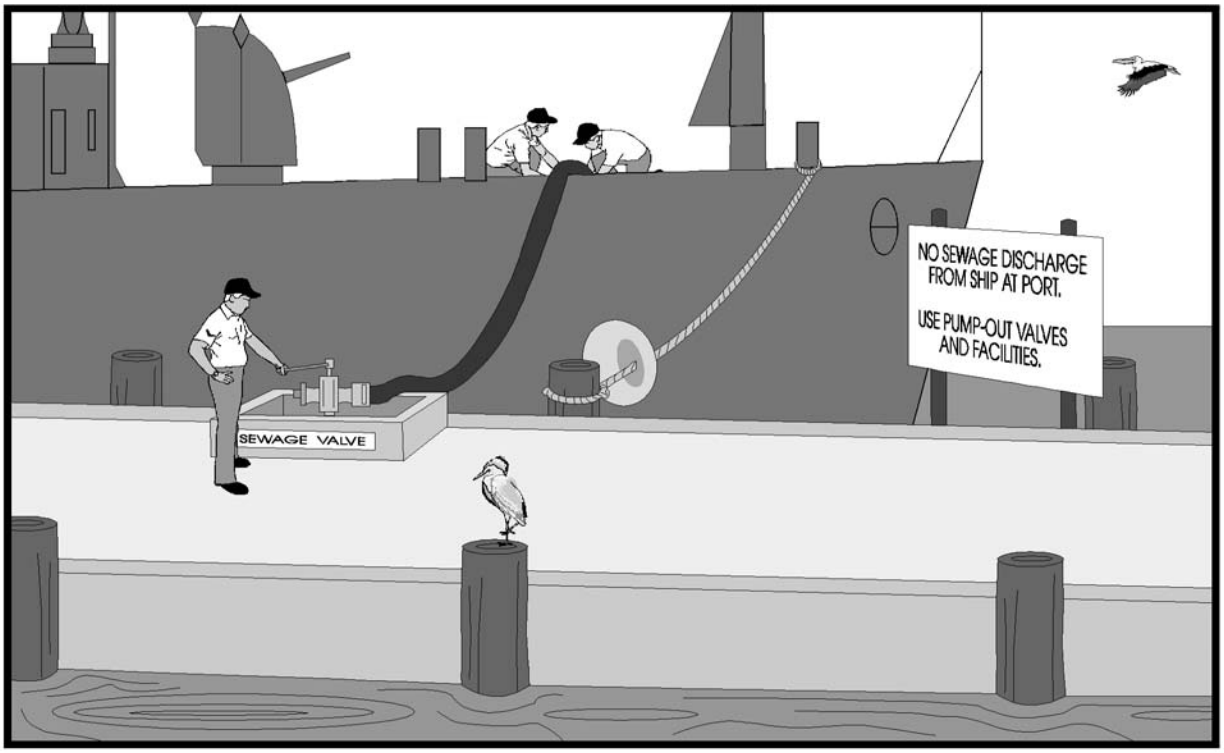
Application Guidance: All spray painting equipment will be replaced with more efficient equipment when economically feasible.

Training: Personnel will be trained on new equipment. A qualification test may be appropriate.

Effectiveness and Cost: New spray equipment is a moderately effective, variable-cost BMP.

Limitations: Cost may be high to retrofit/replace existing equipment.

BMP 075 - Do Not Empty Toilet Tanks During Transit or in the Port



Description of Potential Pollutant and Source: Toilet holding tanks in trains, aircraft, boats, and ships are often emptied directly to the environment during transport or at the port, resulting in potential viral and bacterial contamination of storm water.

Description of BMP: Toilet holding tanks should never be emptied during transit or into storm drains at the port. Sanitary sewage from ships or boats can be disposed using pump-out stations, portable on-site pump-outs, or commercial mobile pump-out facilities.

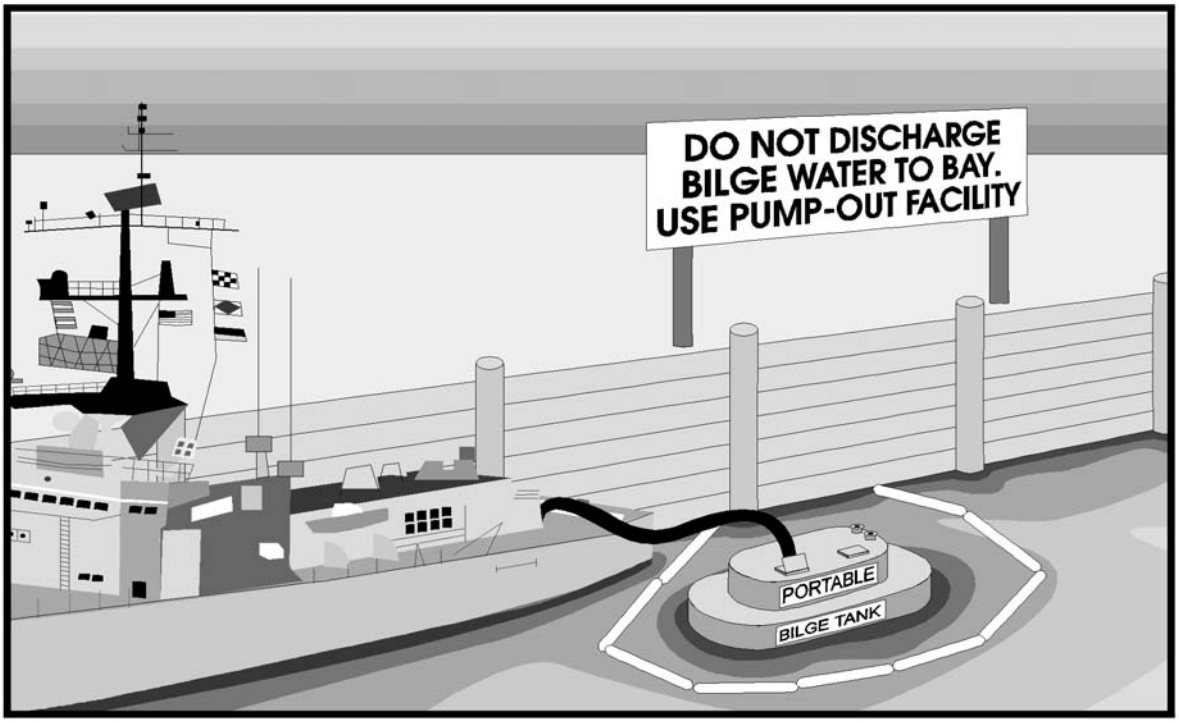
Application Guidance: This practice will be implemented for all aircraft, rail cars, boats, and ships.

Training: Signs will be posted as reminders.

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: None

BMP 076 - Do Not Discharge Bilge Water in Harbor



Description of Potential Pollutant and Source: Bilge water (sump water collected in the ship bottom) can contain a variety of pollutants, especially oil and grease. Water from throughout the ship, including the engine room, collects in the bilge.

Description of BMP: Eliminating the discharge of bilge water reduces the chances of oil and fuel reaching storm water. This wastewater will be pumped to wastewater treatment facilities whenever this service is available.

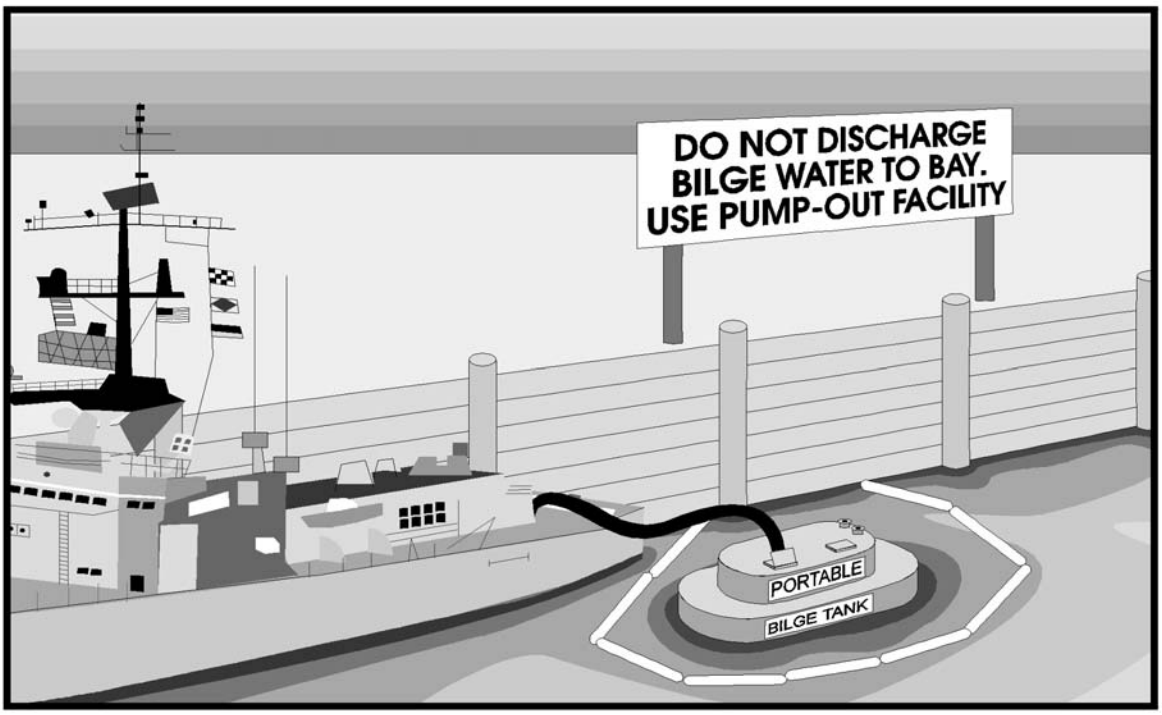
Application Guidance: This practice will be followed for all watercraft.

Training: Signs will be posted as reminders.

Effectiveness and Cost: This is a highly effective, variable-cost BMP.

Limitations: Sometimes discharge of bilge water in the harbor may be necessary for proper use of the ship.

BMP 077 - Do Not Discharge Bilge Water in Harbor



Description of Potential Pollutant and Source: Bilge water (sump water collected in the ship bottom) can contain a variety of pollutants, especially oil and grease. Water from throughout the ship, including the engine room, collects in the bilge.

Description of BMP: Eliminating the discharge of bilge water reduces the chances of oil and fuel reaching storm water. This wastewater will be pumped to wastewater treatment facilities whenever this service is available.

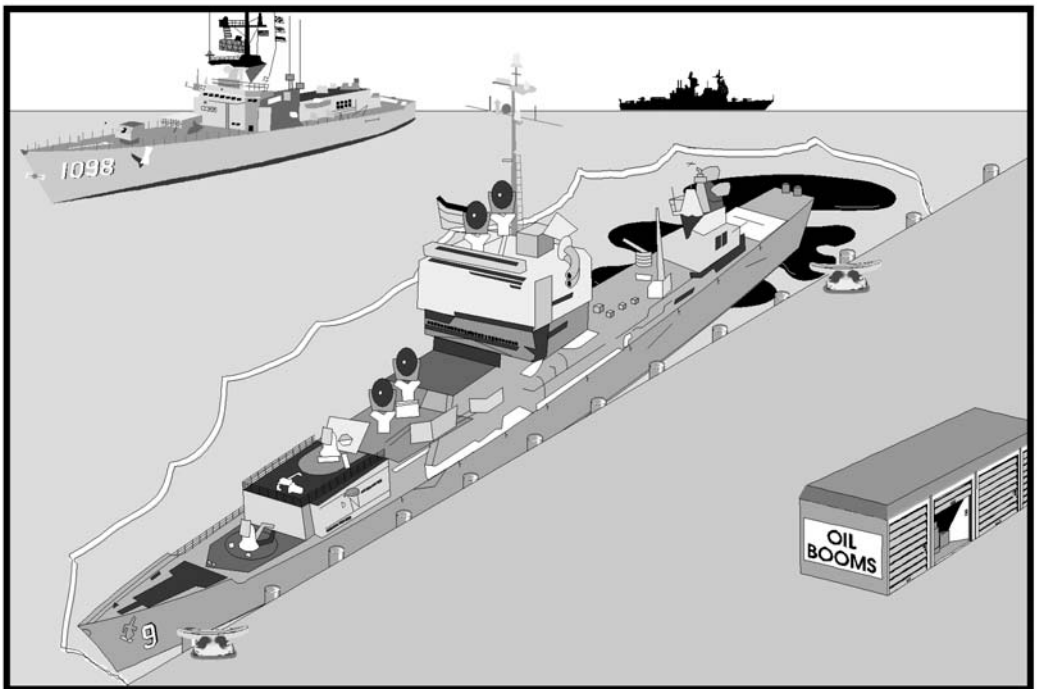
Application Guidance: This practice will be followed for all watercraft.

Training: Signs will be posted as reminders.

Effectiveness and Cost: This is a highly effective, variable-cost BMP.

Limitations: Sometimes discharge of bilge water in the harbor may be necessary for proper use of the ship.

BMP 078 - Use Oil Containment Booms



Description of Potential Pollutant and Source: Maintenance of ships occurs in wet dock; maintenance may include painting, refueling, and scrubbing, all of which generate potential pollutants which may become exposed to storm water and transported to receiving waters.

Description of BMP: Oil containment booms are designed to contain hydrocarbons that may be exposed to storm water during a ship's stay at a shipyard. Booms enable efficient cleanup of hydrocarbons. An oil containment boom is a barrier composed of a chain of floatable logs, which repel water and absorb oil and fuel.

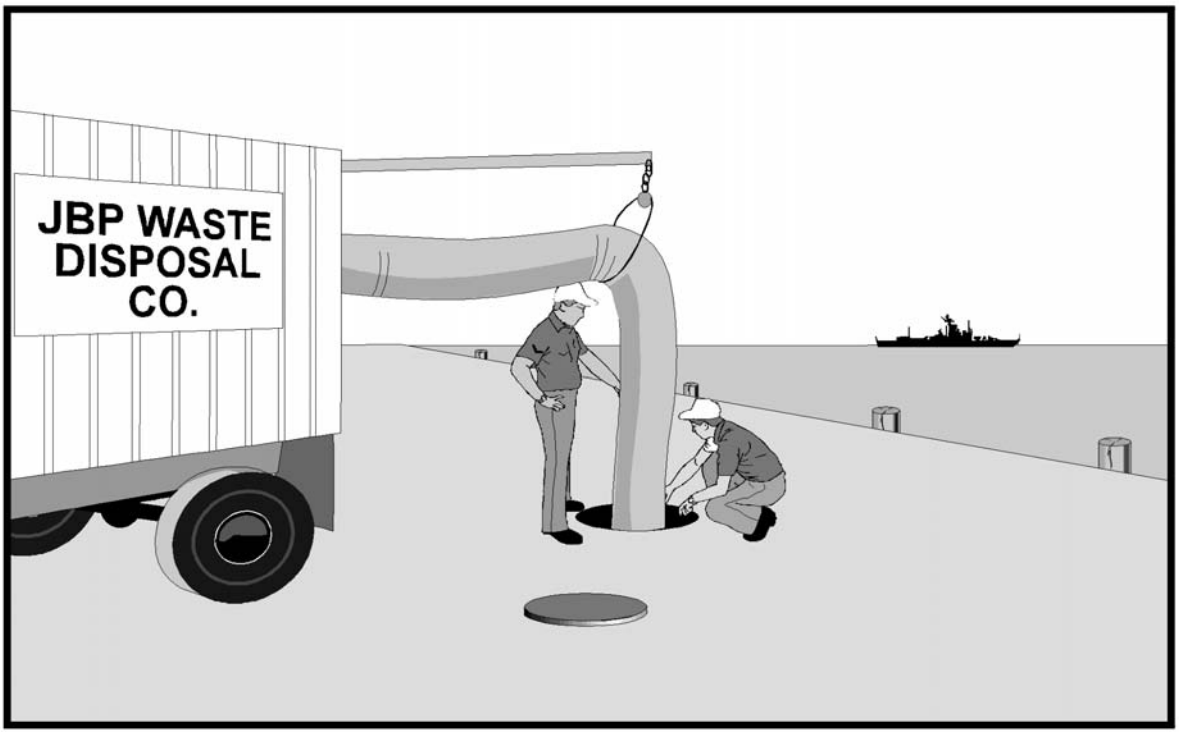
Application Guidance: Oil containment booms will be placed around ships under repair, prior to storms, while they are berthed at the shipyard.

Training: Personnel who deploy the booms will be properly trained in the use of oil containment berms.

Effectiveness and Cost: Oil containment booms are a moderately effective, moderate-cost BMP.

Limitations: None

BMP 079 - Properly Dispose of Sediment Generated by Cleaning Sanitary Sewer Lines



Description of Potential Pollutant and Source: The cleaning of sewer lines and manholes generates sediments. These sediments contain both inorganic and organic materials, are odorous, and are contaminated with microorganisms and heavy metals which, if improperly managed, can become exposed to storm water. These materials can then be transported to storm drains and/or receiving waters.

Description of BMP: Sediments generated during the cleaning of sewer lines and manholes will be disposed properly. This will often require disposal in permitted landfills.

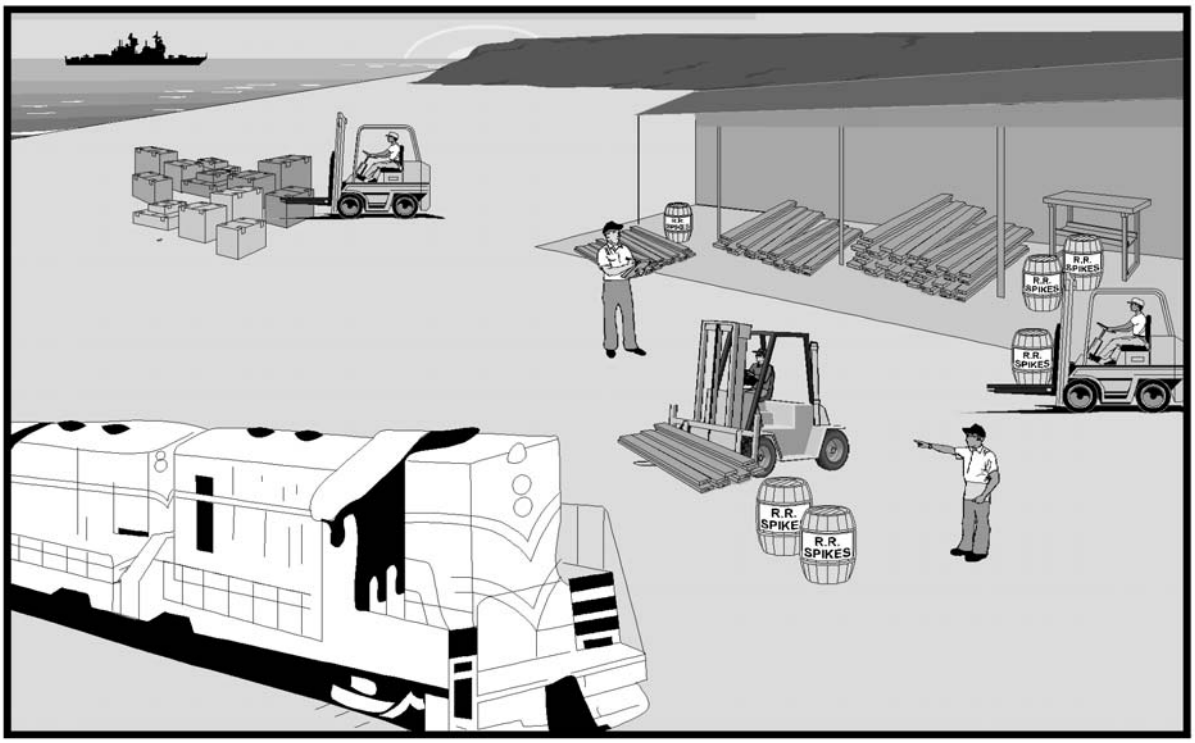
Application Guidance: This BMP will be used whenever cleaning the sewer line.

Training: Personnel will be trained regarding the proper disposal of the sediments.

Effectiveness and Cost: Properly disposing of sediments is a moderately effective, low-cost BMP.

Limitations: None

BMP 080 - Eliminate Treated Wood Products or Use Wood Treated with Less-Toxic Chemicals



Description of Potential Pollutant and Source: Wood products intended for outdoor use are generally coated with toxic chemicals such as creosote or pentachlorophenol, which can leach out of the wood and become exposed to storm water. These materials can then be transported to storm drains and/or receiving waters.

Description of BMP: Consideration will be given to substituting alternate materials for wood products that are preserved with creosote or pentachlorophenol.

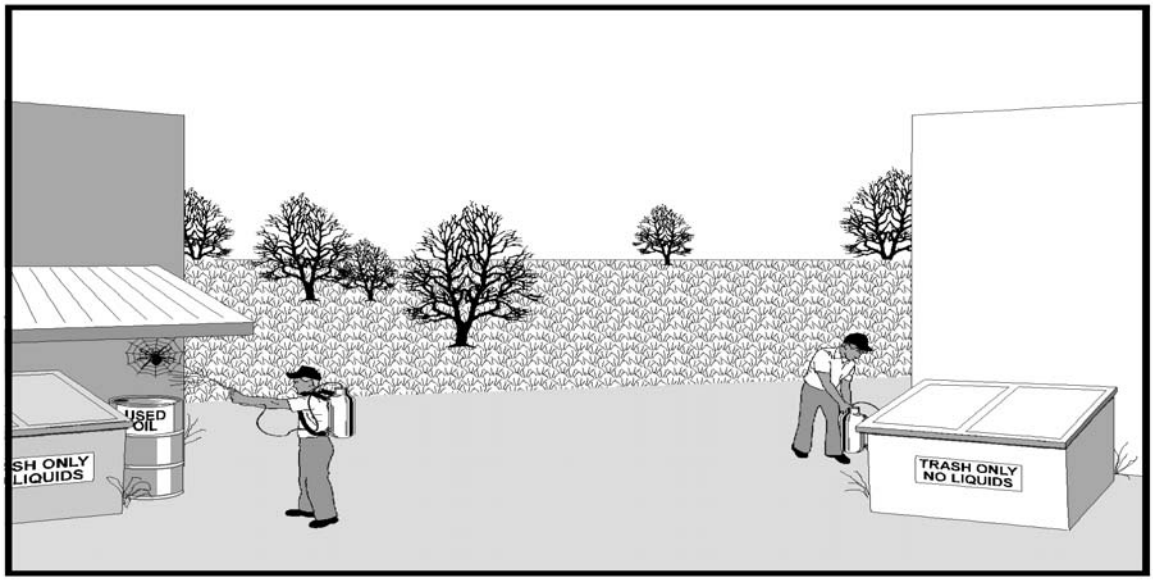
Application Guidance: This practice will be used when installing or replacing piers, railroad ties or utility poles, and other facilities using treated wood products.

Training: N/A

Effectiveness and Cost: This is a moderately effective, variable-cost BMP.

Limitations: Cost may be prohibitive and acceptable alternatives may not be available.

BMP 081 - Establish Integrated Pest Control



Description of Potential Pollutant and Source: Pesticides and herbicides may be spilled, over-applied, and/or incorrectly applied, resulting in exposure of storm water. These materials can then be transported to the storm drain and/or receiving waters.

Description of BMP: Integrated pest management control involves eliminating excessive pesticide use by proper application procedures and/or the use of alternatives. This reduces the amount of pesticides which can potentially enter the storm water. Pesticides include insecticides, herbicide, fungicides, and rodenticides.

The use of pesticides for insect and weed control will be minimized by the following:

- Mechanical removal of weeds, eggs, larvae, cocoons, and insects
- Habitat changes to minimize pest insect breeding
- Timing of application to the most vulnerable phase of the pest insect breeding
- Concentration of effort on the most affected areas
- Use of natural predators and pathogens specific to pests
- Use of degradable and non-carcinogenic pesticides

Additionally, no pesticides will be applied within 3 days prior to any predicted rain event. During the wet season, pesticide application will be kept to a minimum.

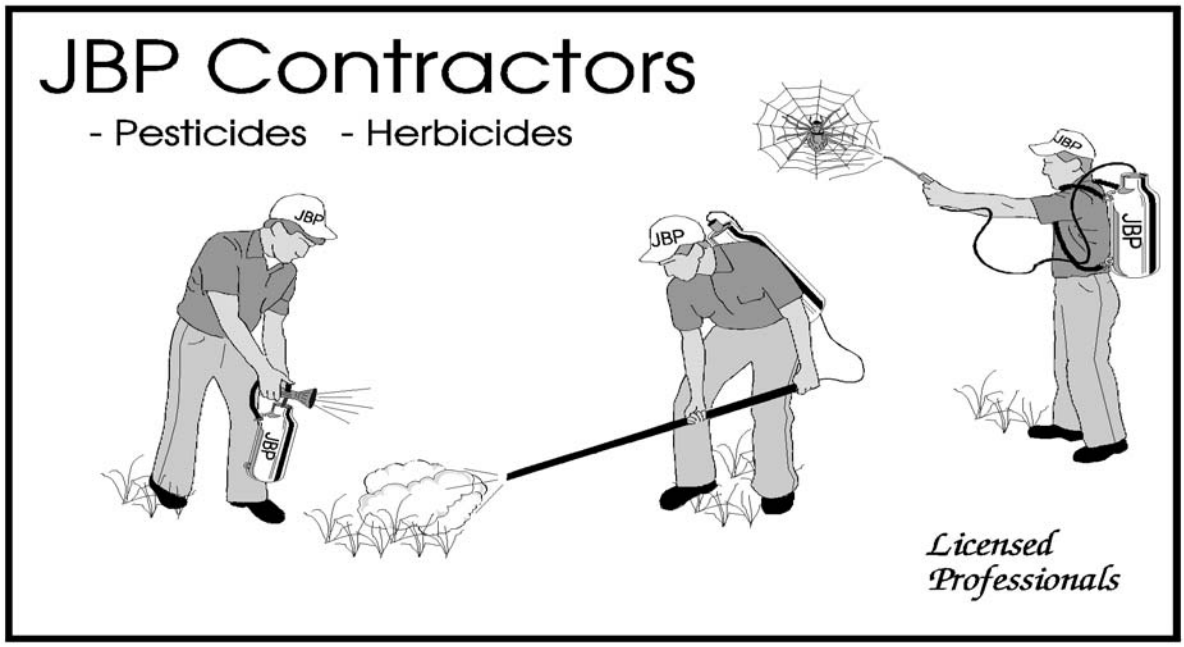
Application Guidance: Injury and tolerance levels will be used to determine if the pest problem is serious enough to justify some kind of treatment. Whenever pest control is necessary, an integrated management plan will be developed.

Training: All persons applying pesticides will be required to understand the pertinent provisions of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and state laws and regulations and be certified, if required.

Effectiveness and Cost: Effectiveness and cost will depend on whether natural or pesticide controls are used. This BMP can be highly effective and low cost when properly developed.

Limitations: None

BMP 082 - Conduct Pesticide Operations under the Supervision of Licensed Applicator



Description of Potential Pollutant and Source: Pesticides and herbicides may be spilled, over applied, or incorrectly applied, which would result in their exposure to storm water. These materials can then be transported to the storm drain and/or receiving waters.

Description of BMP: A licensed pesticide handler will be used to conduct or supervise all activities related to pesticide handling.

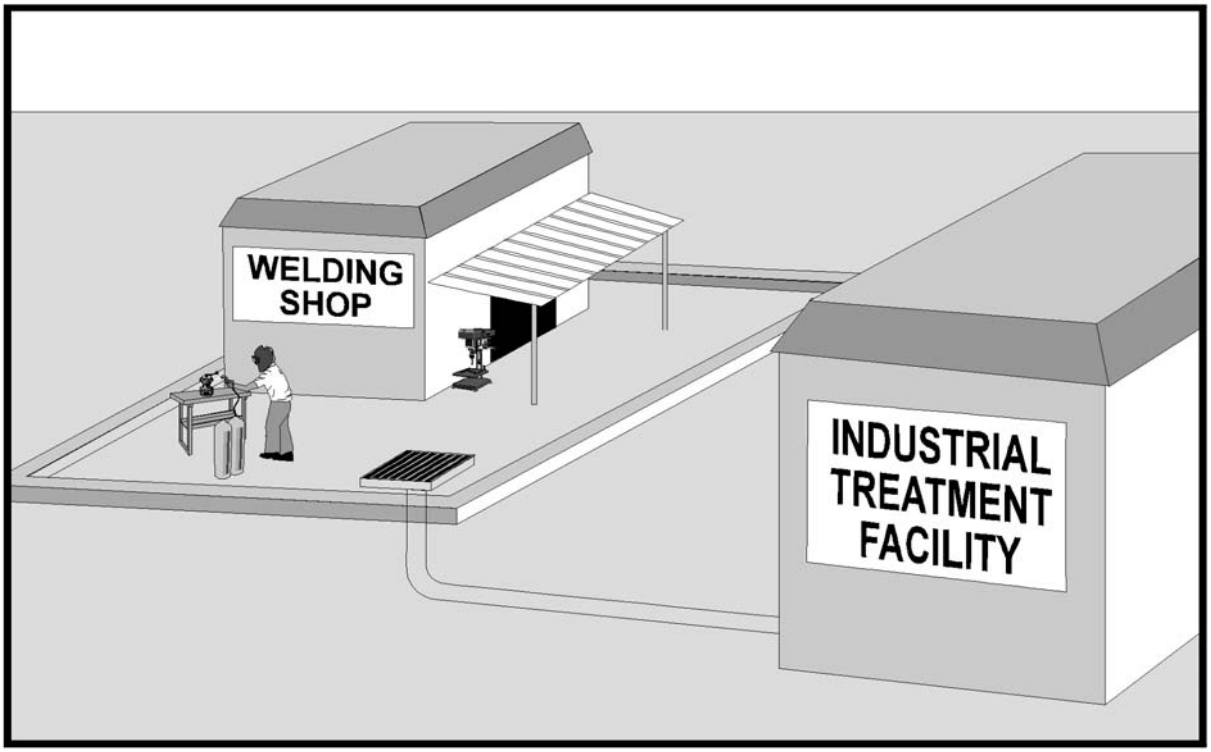
Application Guidance: This BMP will be applied whenever pesticides are used or stored.

Training: Personnel will be trained and certified in the application, mixing, and storage of pesticides.

Effectiveness and Cost: This is a moderately effective, moderate-cost BMP.

Limitations: None

BMP 083 - Divert Drainage to Treatment Facility/Sanitary Sewer



Description of Potential Pollutant and Source: Diverting drainage to treatment facilities prevents significant materials from entering the storm drain system.

Description of BMP: Using pipes, ditches, swales, and other types of conveyance systems, drainage from industrial areas which may be exposed to significant materials can be diverted to a wastewater treatment facility or sanitary sewer.

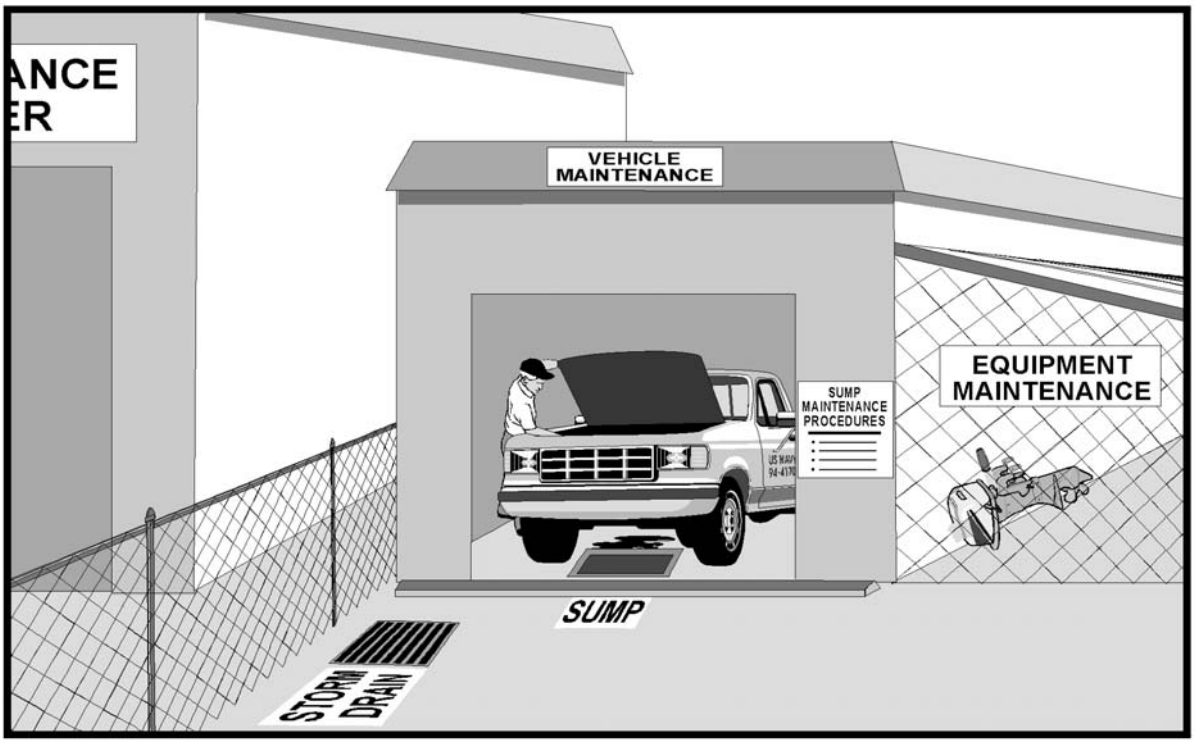
Application Guidance: If source controls cannot be used to keep pollutants from entering the storm water runoff, diverting drainage to treatment facilities/sanitary sewers is the most effective method of reducing pollutants to receiving waters.

It is not practical or allowed by most municipalities to discharge large quantities of storm water to treatment facilities. This BMP will only be used for small quantities of highly polluted water. This may include equipment or vehicle wash water, boiler blowdown, or runoff from maintenance areas (with no off-site drainage onto area).

Effectiveness and Cost: Diverting drainage from industrial areas is a highly effective, high-cost BMP. The initial construction cost of a connection to a sanitary sewer may not be high, if a sewer is located nearby. However, the continuing operating cost of the treatment facility which will treat the diverted drainage makes this a high-cost BMP.

Limitations: Permission must be granted by the wastewater treatment facility to divert the drainage to the facility. In addition, certain pollutants in the runoff may not be removed at a traditional treatment facility. This BMP is not feasible if there is a large quantity of runoff that must be controlled.

BMP 084 - Divert Drainage to a Low-Flow Sump



Description of Potential Pollutants and Source: Often spills flow directly into the storm drain system. Once the spilled material combines with the runoff in the storm drain, the pollutant concentrations can only be reduced with a structural control such as an oil/water separator, wet pond, or filtration basin.

Description of BMP: A low-flow sump collects small spills so that the spilled material is not discharged into the rest of the storm drain system.

Application Guidance: Low-flow sumps will be used in areas where discharge into the storm drain system and spills are likely to occur. This may occur at refueling locations, material loading/unloading areas, and maintenance areas.

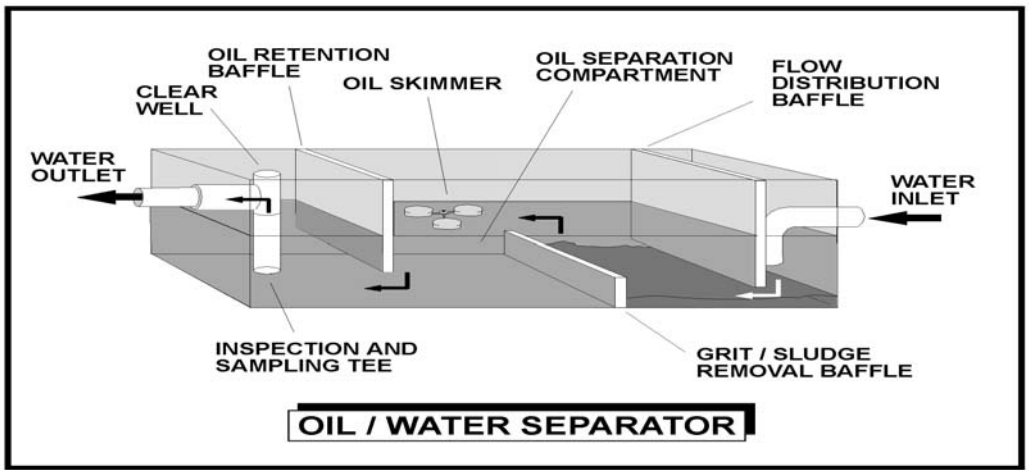
Operation and Maintenance: Low-flow sumps will be cleaned at least four times a year and after any major spill. Materials trapped in the sump will be properly disposed.

The frequency of implementation of this BMP has been suggested as general guidance. However, a facility operator may wish to establish a frequency more suitable to the facility. This will require a level of judgment on behalf of the SWPPP implementers.

Effectiveness and Cost: This BMP is highly effective for small leaks and spills. It is not effective for large spills or leaks. This is a moderate-cost BMP.

Limitations: The sediment removed during maintenance must be tested and may be a hazardous waste and must be disposed of properly.

BMP 085 - Construct Oil/Water Separator



Description of Potential Pollutants and Source: Oil/water separators are designed to remove petroleum compounds and grease from storm water. They will also remove floatable debris and settleable solids.

Description of BMP: Oil/water separators are underground vaults where storm water is piped in and out of the separator. Oil/water separators come in many configurations. A common configuration is the three-chamber oil/water separator. The first chamber is the sedimentation chamber that allows for sedimentation of coarse materials and screening of debris. The second chamber provides separation of oil, grease, and gasoline. The third chamber is provided to prevent any possibility of a surcharge pressure from occurring and as a safety relief for the structure if a blockage occurs.

Application Guidance: Oil/water separators are applicable to situations where the concentrations of oil-and-grease-related compounds will be usually high, and source control cannot provide effective control. This generally occurs at equipment maintenance and washing facilities, gas stations, and loading areas. Separators may also be used in areas heavily used by mobile equipment, such as loading wharfs at marine ports.

Operation and Maintenance: The degree and frequency of maintenance significantly affects the performance of the oil/water separator. Cleaning the oil/water separator will prevent the accumulated debris and oil to be discharged from the structure during intense storms.

Oil/water separators will be checked monthly during the wet season and will be cleaned at least four times a year. They will always be cleaned in October, before the start of the wet season. The accumulated oil will be properly disposed.

The frequency for implementing of this BMP has been provided as general guidance. A facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations.

Effectiveness and Cost: This is a moderately effective, high-cost BMP.

Limitations: Oil/water separators are less effective when storm water runoff has high sediment concentrations or detergent levels which disperse oil.

Oil/water separators are only effective for highly pervious drainage areas. Oil/water separators cannot effectively treat large volumes of runoff. The max drainage area to oil/water separators is typically 1 acre.

The sediment removed during maintenance will be tested. If it is a hazardous waste, it will be disposed of accordingly.

BMP 086 – Deleted

BMP 087 - Deleted

BMP 088 - Deleted

BMP 089 - Deleted

BMP 090 - Deleted

BMP 091 - Deleted

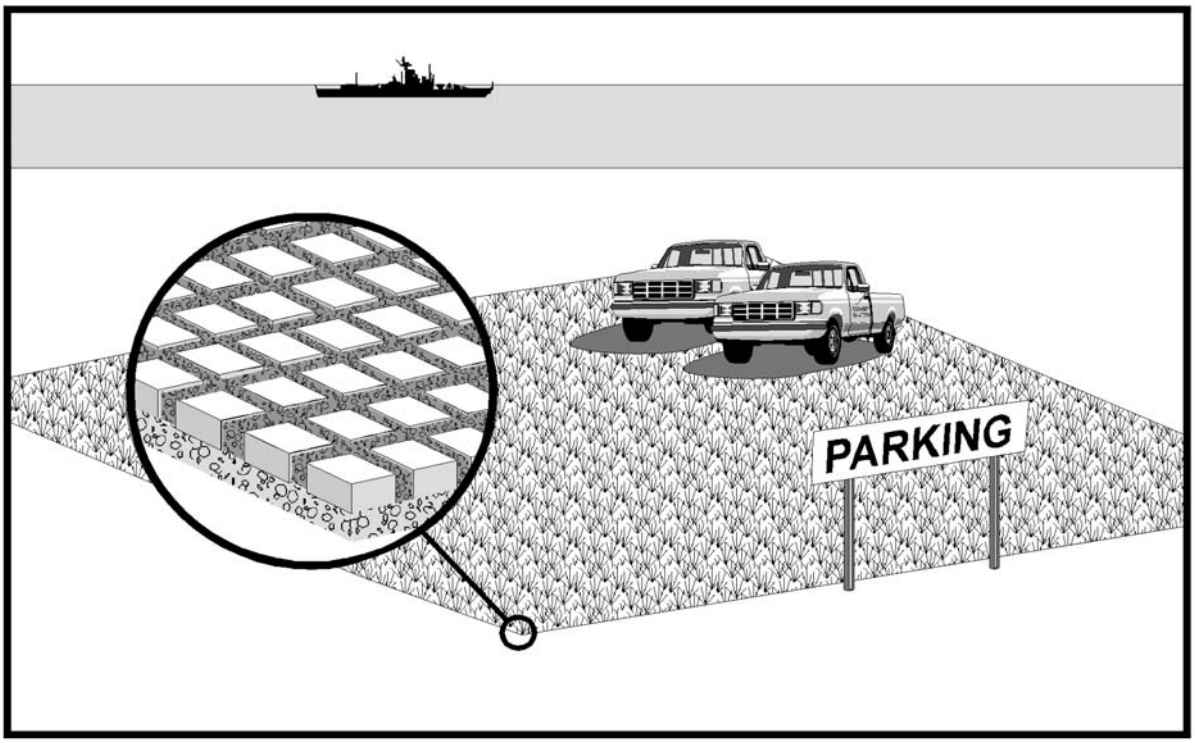
BMP 092 - Deleted

BMP 093 - Deleted

BMP 094 - Deleted

BMP 095 - Deleted

BMP 096 - Construct Concrete Grid Pavement



Description of Potential Pollutant and Source: Concrete grid pavement can be used to treat rainfall runoff from parking areas with low-volume traffic.

Description of BMP: Concrete grid pavement consists of concrete blocks with regularly interspersed void areas which are filled with pervious materials such as gravel, sand, or grass. The blocks are typically placed on a sand and gravel base and designed to provide a load-bearing surface that is adequate to support vehicles, while allowing infiltration of surface water into the underlying soil.

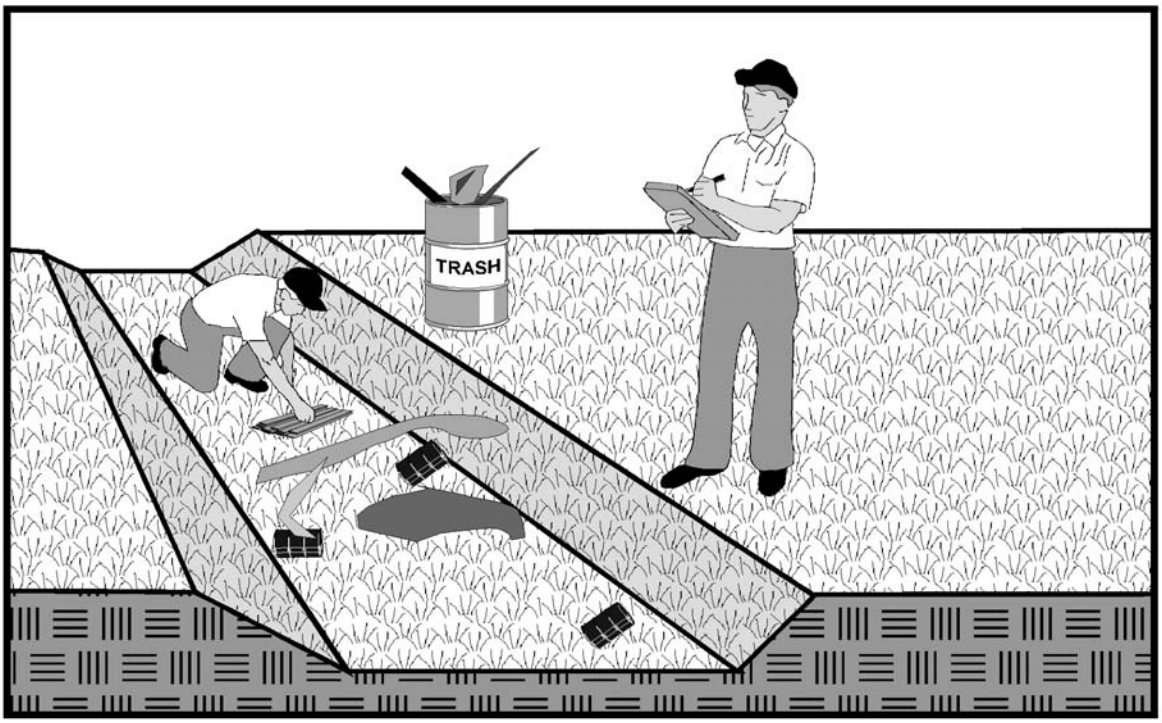
Application Guidance: Concrete grid pavement can be used in areas with low traffic volume. Suggested uses are low volume parking spaces, multi-use open space, fire lanes, and stream banks/lakeside erosion protection. Concrete grid pavement is only used to treat the runoff from the rainfall falling directly on it.

Operation and Maintenance: Concrete grid pavement offers an alternative means to providing a load-bearing surface without greatly increasing the impervious areas. Like all infiltration practices, they require maintenance to prevent clogging of the system. In addition, concrete grid pavement with grass requires additional "normal" grass maintenance, such as mowing, watering, and fertilizing. However, extra care should be taken when applying fertilizers and pesticides that may have an adverse effect on concrete products.

Effectiveness and Cost: Concrete grid pavements provide moderately effective removal of fine particle pollutants. This is a relatively high-cost BMP.

Limitations: Concrete grid pavement can cause groundwater contamination and is not suitable for areas with high-volume traffic.

BMP 097 - Regularly Inspect and Maintain Storm Water Conveyance Systems



Description of Potential Pollutant and Source: Over time, storm water conveyance systems may fill up with sediments and clog. Also, drainage swales may erode and be a source of sediment pollution to storm water.

Description of BMP: Storm water conveyance systems will be regularly inspected and maintained. This will include inspection of drainage swales and outfall pipes to ensure that the area is not eroding.

Other storm water conveyance systems, such as oil/water separators, catch basins, and detention ponds, will be inspected and properly maintained.

Application Guidance: Storm water conveyance systems will be inspected monthly.

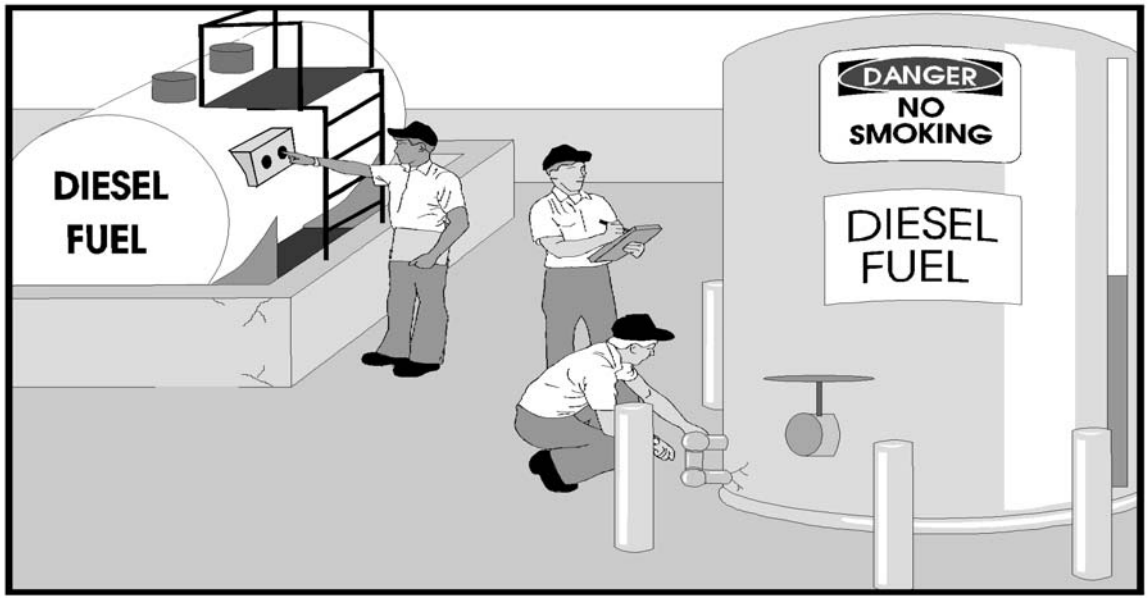
The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

Training: The Storm Water Pollution Prevention Personnel will assign personnel responsible for inspections. Personnel will be provided a copy of a site plan showing the location of all storm water conveyance systems which need to be inspected.

Effectiveness and Cost: This is a moderately effective, low-cost BMP.

Limitations: None

BMP 098 - Regularly Inspect and Test Equipment



Description of Potential Pollutant and Source: Regular inspection and testing of equipment should prevent breakdowns and failures, which can result in the exposure of significant materials to storm water.

Description of BMP: Equipment will be regularly inspected and tested. These inspections will uncover conditions such as cracks or slow leaks which could cause breakdowns or failures that result in discharges of chemicals to storm sewers or surface waters.

The following is a list of some of the equipment that will be included in the inspection and testing program:

- Aboveground storage tanks
- Machinery
- Material storage areas
- Pressure release valves
- Process and material handling equipment
- Pumps and piping
- Sumps
- Wastewater treatment plants

Application Guidance: Equipment will be inspected and tested monthly.

The frequency for implementing of this BMP has been provided as general guidance. However, a facility operator may wish to establish a more suitable frequency. This will require SWPPP implementers to make judgments based on facility operations and conditions.

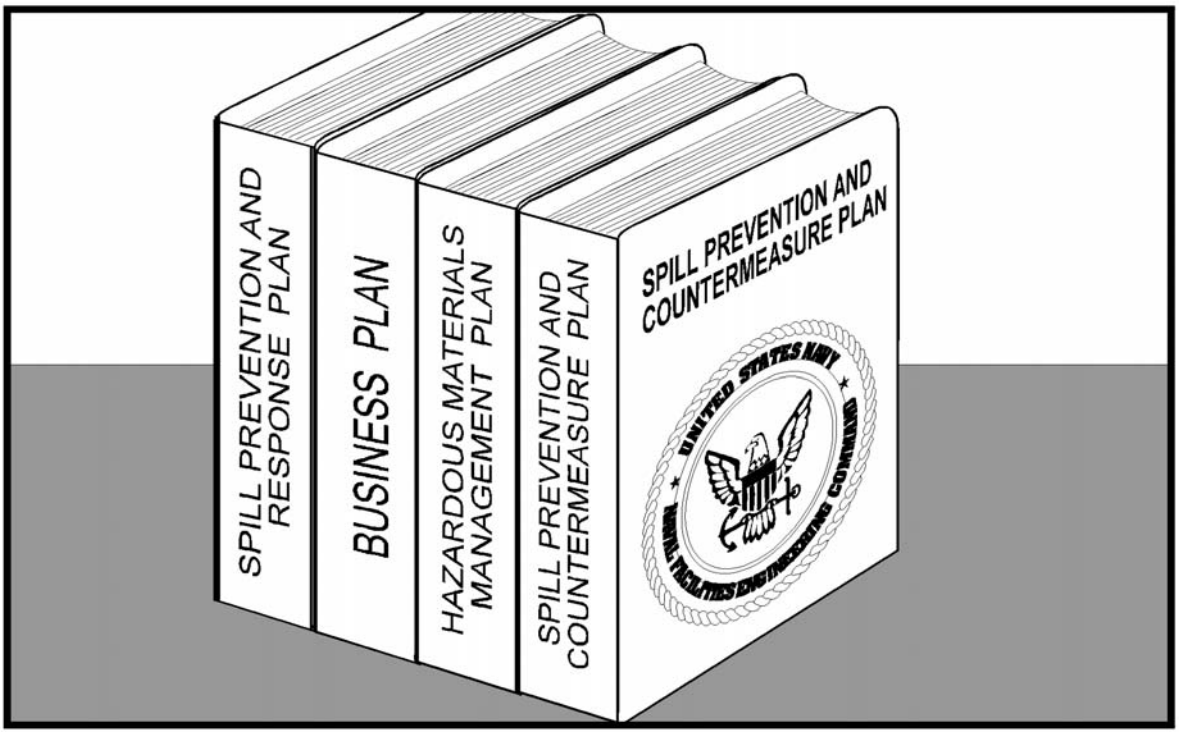
Training: An effective preventive maintenance program will include the following:

- Identification of equipment, systems, and facility areas that will be inspected.
- Schedules for periodic inspections or tests of these equipment and systems.
- Appropriate and timely adjustment, repair, or replacement of equipment and systems.
- Maintenance of complete records on inspections, equipment and systems.

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: None

BMP 099 - Prepare Appropriate Spill Prevention and Response Plans



Description of Potential Pollutant and Source: Spills of significant materials may be exposed to storm water and transported to storm drains and/or receiving waters.

Description of BMP: Prepare the appropriate plans to comply with all local, state, and federal regulations related to spill prevention and response. The plans may include a Spill Prevention, Control, and Countermeasure (SPCC) Plan, Business Plan, Hazardous Materials Management Plan, and others. The plans should cover all industrial activities involving material handling and storage. (40 CFR 300 requires that sites which store or dispense petroleum products have an SPCC plan.)

The plans address actions that should be taken in the event of a spill of hazardous materials. The plans should include the location of necessary equipment (e.g., absorbent material, fire extinguishers), and internal and external reporting procedures including the names and phone numbers of the appropriate people to notify in the event of a spill. In addition, the plans should describe specific material handling procedures and storage requirements.

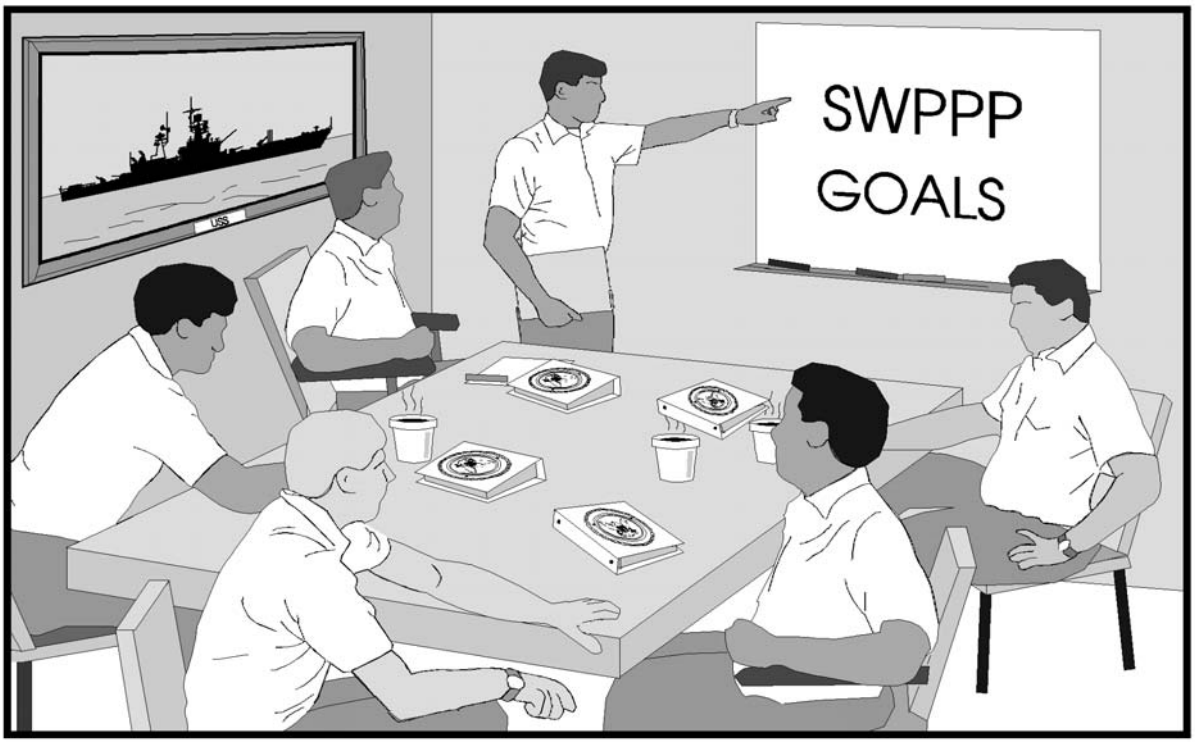
Application Guidance: N/A

Training: Personnel will be trained in the appropriate procedures for all spill prevention and response.

Effectiveness and Cost: This is an effective, low-cost BMP.

Limitations: None

BMP 100 - Conduct Personnel Training Regarding the SWPPP



Description of Pollutant Source: When properly trained, personnel are more capable of preventing spills, responding safely and effectively to an accident when it occurs, and recognizing situations that could lead to storm water contamination.

Description of BMP: Personnel at all levels of responsibility will be trained in the components and goals of the SWPPP.

Application Guidance: Training will be conducted quarterly and at new personnel orientations.

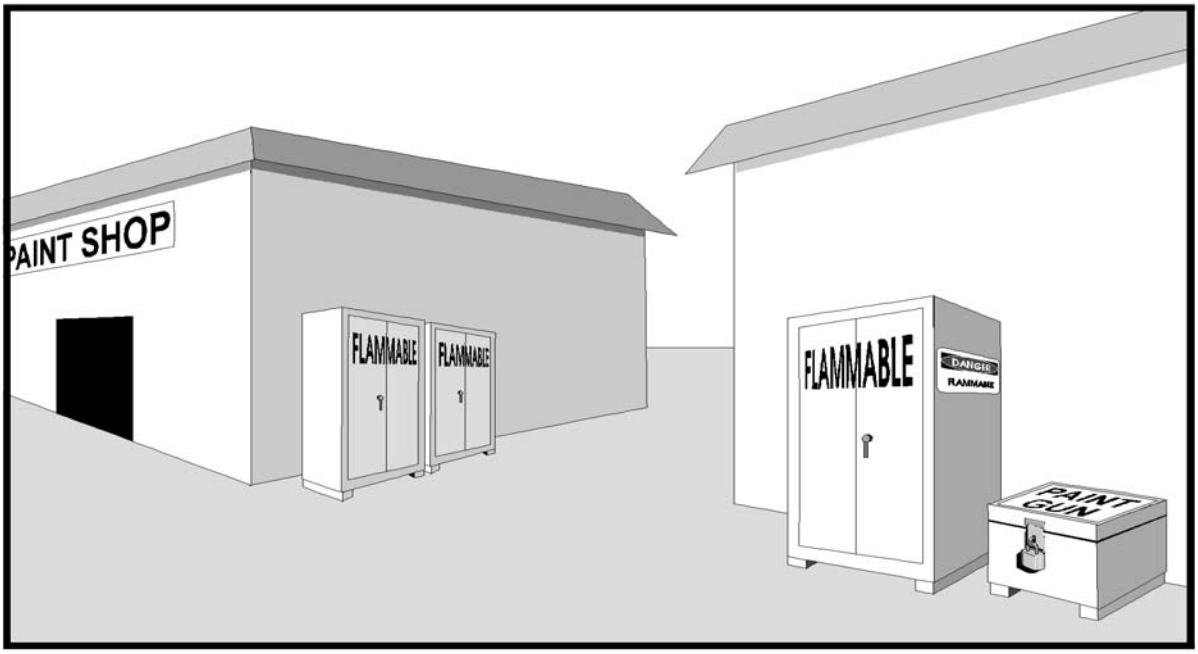
Training: Training will address each component of the SWPPP, including how and why tasks are to be implemented. Topics will include:

- Good housekeeping
- Material management practices
- Spill prevention and response

Effectiveness and Cost: This is a highly effective, moderate-cost BMP.

Limitations: None

BMP 101 - Store Containers Inside Secondary Containment



Description of Potential Pollutant and Source: Improper storage of containers of significant materials can result in the release of materials and chemicals that can cause storm water runoff pollution. Secondary containment can prevent storm water runoff pollution.

Description of BMP: Containers will be properly stored. Containers of significant materials will be stored inside secondary containment cabinets appropriate to the size and quantity of the substances stored. Cabinets will have covered shelves and provide secondary containment for spills of the substances that spill inside the cabinets. In many instances the cabinets will be locked to restrict access to the substances. Metal lockers typically used to store flammable substances are usually appropriate for preventing contact between significant materials and storm water.

The secondary containment will be placed away from vehicle traffic routes to reduce the potential for mechanical impact and accidental spills.

A manifest list of the materials stored inside the locker should be posted on or inside the locker.

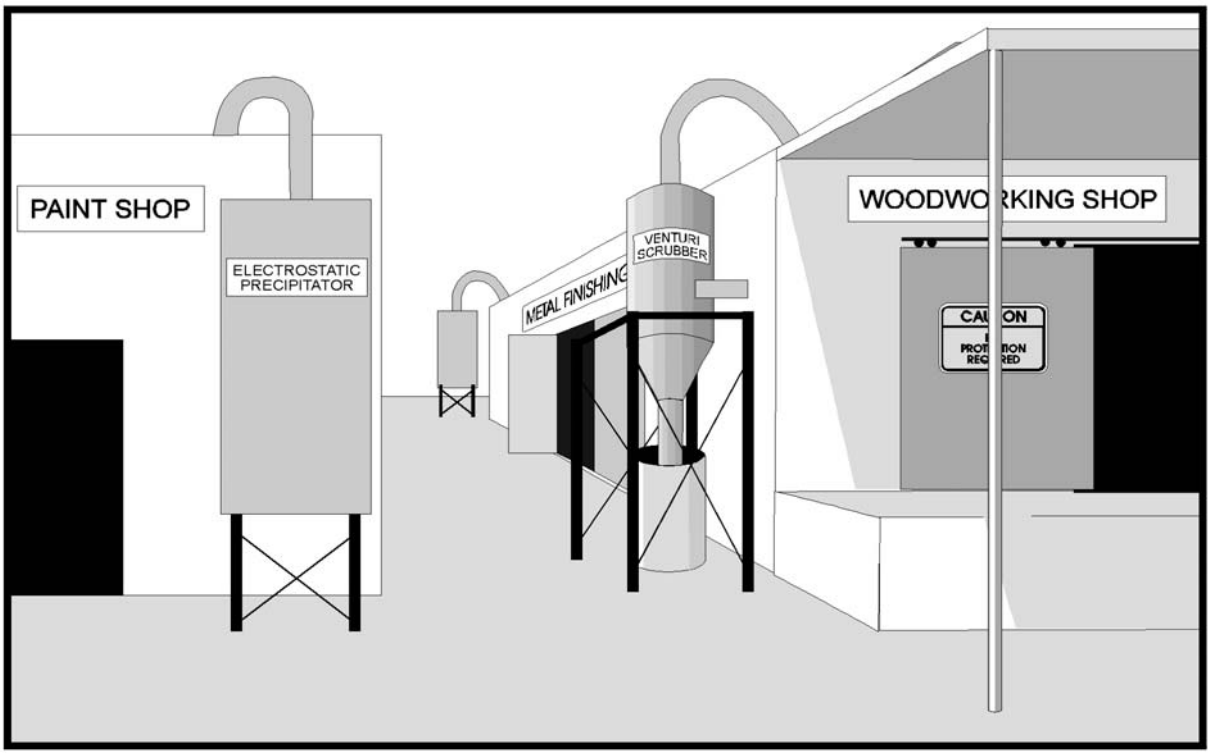
Application Guidance: Containers will always be properly stored.

Training: Personnel will be trained in preventing substances stored outside from entering the storm water and storing substance effectively.

Effectiveness and Cost: This is a moderately effective, low-cost BMP.

Limitations: None

BMP 102 - Control Dust and Particulates



Description of Potential Pollutant and Source: Many indoor and outdoor industrial processes can generate significant quantities of dust and particulates. These materials contain pollutants that can be exposed to storm water if uncontrolled. Examples of industrial processes which generate significant quantities of dust and particulates include metal finishing, painting, sanding, grinding, sawing, milling, sandblasting, welding and cement manufacture.

Description of BMP: The emission of dust and particulates from indoor and outdoor industrial processes will be controlled. Control measures include the use of filters, baghouses, electrostatic precipitators, cyclone concentrators, waterwalls and other measures.

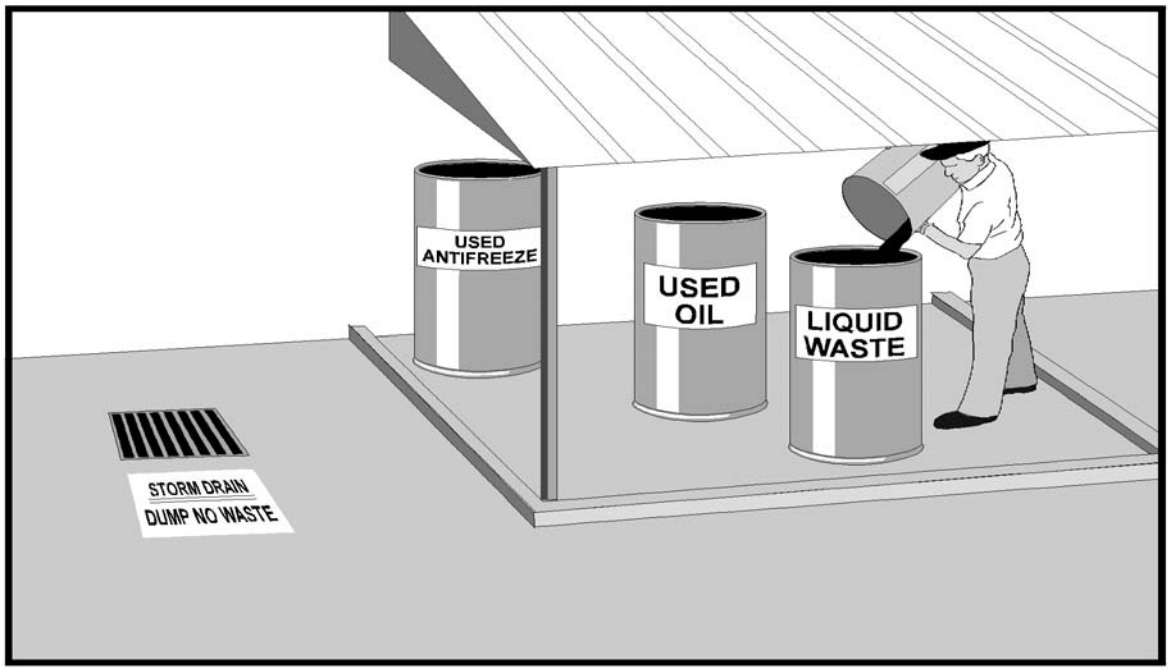
Application Guidance: All industrial processes which generate dust and particulates will be fitted with dust control devices.

Training: Personnel will be trained to properly use and maintain dust and particulate control equipment.

Effectiveness and Cost: This is an effective, moderate-cost BMP.

Limitations: It may not be possible to control outdoor processes.

BMP 103 - Do Not Pour or Deposit Waste into Storm Drains



Description of Potential Pollutant and Source: Waste poured or deposited into storm drains contains pollutants that can enter the storm drain system and receiving waters without treatment.

Description of BMP: Waste will not be poured or deposited into storm drains or storm drain connections. All wastes will be disposed properly or recycled. Refer also to BMP 027, "Stencil Signs On Storm Drain Inlets."

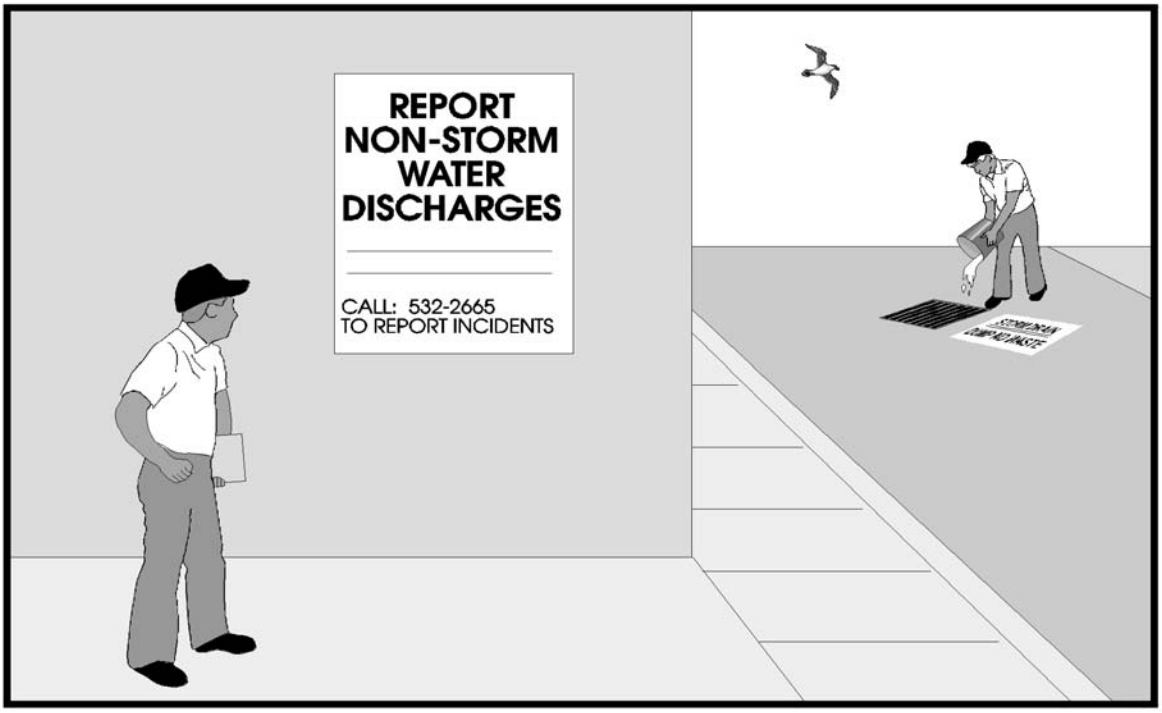
Application Guidance: Wastes will always be properly disposed.

Training: Personnel will be trained in proper disposal procedures. Signs will be posted at storm drain inlets.

Effectiveness and Cost: This is a highly effective, low-cost BMP.

Limitations: None

BMP 104 - Routinely Report Any Observed Non-Storm Water Discharges



Description of Potential Pollutant and Source: Unknown significant materials may be present in non-storm water discharges resulting from improper disposal of wastes or illicit connections to the storm drain system. These non-storm water discharges drain to receiving waters without treatment.

Description of BMP: Adequate routine reporting procedures will be developed and made available to all personnel who may observe either an act of illegal dumping or an unexplained non-storm water discharge. Information regarding reporting procedures will be posted in all industrial facilities. A member of the pollution prevention team will be designated to respond to reports.

Application Guidance: Reporting forms will be made available at all times.

Training: Training will be performed as part of BMP 008 training.

Effectiveness and Cost: This is an effective BMP, and the costs are low.

Limitations: None

BMP 105 - Deleted

BMP 106 - Deleted

BMP 107 - Deleted

BMP 108 - Deleted

BMP 109 - Deleted

BMP #110 - Timing of Construction

DESCRIPTION

Schedule and sequence construction work and erosion control applications so that they occur under optimal conditions--that is, during periods when the potential for erosion is lowest. Proper timing will minimize erosion and also maximize the effectiveness of control methods.

Targeted Pollutants

- ◒ Sediment
- ○ Nutrients
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	unlimited
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	Good
Drainage/flood control	no

APPLICATIONS

This measure applies to almost any ground-disturbing activity, but it is especially relevant to large construction projects and any areas where work activities can be planned to coincide with periods of low erosion potential, such as during dry weather.

When construction during the wet season is unavoidable, use other BMPs described in this Catalog to control erosion, such as any of the slope protection techniques.

LIMITATIONS

None.

DESIGN PARAMETERS

- Construction work involving soil disturbance or exposure should be scheduled during seasonal low-runoff periods under favorable soil moisture conditions whenever possible.
- Erosion controls should be installed in stages to protect completed work and minimize exposed soils.
- Sediment collection systems should be installed prior to activities expected to produce sediment.
- Slope stabilization measures should be initiated within 14 calendar days after construction activities in that portion of the site where earthmoving activities have temporarily or permanently ceased.
- Consider site characteristics and permit conditions when deciding what kind of erosion control devices to incorporate into a construction project. Select measures that can be installed without disrupting critical timing or sequencing of other construction or erosion control activities.

- Identify the locations and dimensions for all erosion control and storm water management measures as clearly as possible on the site plans. This will help ensure effectiveness and proper timing of installation or implementation.

CONSTRUCTION GUIDELINES

Develop a scheduling/sequencing plan that addresses the following timing considerations. If using a Critical Path Method (CPM) for scheduling, incorporate the erosion control and storm water management practices into the CPM.

- Work activities that leave a site most susceptible to erosion should be scheduled for periods when the potential for erosion is lowest.
- Allow time to install sediment collection systems, drainage systems, and runoff diversion devices before beginning ground-disturbing work in a given area.
- Plan to install and maintain effective soil stabilization measures as work progresses, not just at the completion of all construction.
- Conduct work in units or stages so that some portions of the project site are final-graded and ready for seeding each time an approved season of seeding arrives. (See BMP # 111-Staging Areas).

MAINTENANCE

- Continually monitor site conditions and progress of work. Update the project work schedule to maintain appropriate timing and sequencing of construction and control applications.

BMP #111 - Staging Areas

DESCRIPTION

Targeted Pollutants

- ◒ Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	15 %
Min bedrock depth	NA
Min water table	NA
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	yes

This BMP includes measures for collecting runoff from a staging area, materials storage site, or industrial activity area or for diverting water flow away from such areas so that pollutants do not mix with clean stormwater runoff. Various flow diversion structures, called stormwater conveyances, can be used to contain runoff on site, to channel it around the industrial area, or to carry pollutant-laden water directly to a treatment device or facility. Several options are available:

Stormwater Conveyances: This term includes many kinds of channels, gutters, drains, and sewers. Stormwater conveyances can be either temporary or permanent. They are constructed or lined with many different materials, including concrete, clay tiles, asphalt, plastics, metals, riprap, compacted soils, and vegetation. The type of material used depends on the use of the conveyance.

Dikes or Berms: Diversion dikes or berms are ridges built to block runoff from passing beyond a certain point. Temporary dikes are usually made with compacted soil. More permanent ones are constructed out of concrete, asphalt, or other durable materials.

Graded Areas and Pavement: Land surfaces can be graded, or graded and paved, so that stormwater runoff is directed away from construction activity areas. The slope of the grade allows the runoff to flow, but keeps it from washing over areas that may be contaminated with pollutants. Like conveyances and dikes, grading can prevent runoff from entering construction areas and becoming contaminated with pollutants from these areas. Grading can be a permanent or temporary control measure.

APPLICATIONS

Stormwater Conveyances: Stormwater conveyances can be used for two different purposes. The first is to keep uncontaminated stormwater from getting into areas of a construction site where it may become contaminated. This can be accomplished by collecting the stormwater in a conveyance and directing the flow away from those areas. Secondly, conveyances can be used to collect stormwater downhill from construction areas and keep it separate from runoff that has not been in contact with those areas. When potentially contaminated stormwater is collected in a conveyance like this, it can be directed to a treatment device or another facility on the site if desired.

Other beneficial aspects of stormwater conveyances include:

- Prevention of temporary flooding at industrial sites.

- Low maintenance.
- Erosion-resistant conveyance of stormwater runoff.
- Long-term control of stormwater flows.

Dikes or Berms: Diversion dikes are used to prevent the flow of stormwater runoff onto construction or staging/storage areas. Limiting the flow across these areas reduces the volume of stormwater that may carry pollutants from the area and which may require treatment. This method is suitable for sites where significant volumes of stormwater runoff tend to flow onto active materials handling or equipment staging sites and other construction areas. Typically, dikes are built on slopes just uphill from an active construction area together with some sort of a conveyance, such as a swale. The conveyance is necessary to keep the water away from the dike so that the water will not pool and seep through the dike. See BMP #140-Earth Dike.

Some advantages of diversion dikes are that they:

- Effectively limit stormwater flows over industrial site areas.
- Can be installed at any time.
- Are economical, temporary structures when built from soil on site.
- Can be converted from temporary to permanent at any time.

Graded Areas and Pavement: Grading is appropriate for any construction site where outdoor activities may pollute stormwater runoff--parking lots or outdoor storage areas, for example. Grading is often used in conjunction with coverings, buffer zones, and other practices to reduce the runoff velocity, increase infiltration of uncontaminated runoff, or direct pollutant-laden runoff to stormwater treatment facilities. Grading and paving are relatively inexpensive and easy to implement.

LIMITATIONS

Stormwater Conveyances

- Once the stormwater is concentrated in conveyances, it must be routed through stabilized structures all the way to its discharge to a receiving water or other stormwater BMP.
- May increase flow rates.
- May be impractical if there are space limitations.
- May be expensive to install, especially for small facilities or after a site has already been constructed.

Dikes and Berms

- Are not suitable for large drainage areas unless there is a gentle slope.
- May require maintenance after heavy rains.

Graded Areas and Pavement

- May be uneconomical to regrade and resurface large areas.
- May not be effective during heavy precipitation.

DESIGN PARAMETERS

Stormwater Conveyances: In planning for stormwater conveyances, consider the amount and speed of the typical stormwater runoff. Also, consider the stormwater drainage patterns, so that channels may be located to collect the most flow and can be built to handle the amount of water they will receive. When deciding on the type of material for the conveyance, consider the resistance of the material, its durability, and its compatibility with any pollutants it may carry.

Conveyance systems are most easily installed when a facility is first being constructed. Where possible, use existing grades to decrease costs. Grades should be positive to allow for the continued movement of the runoff through the conveyance system; however, grades should not create an increase in velocity that causes an increase in erosion. Consider the materials used for lining the conveyance and the types of outlet controls provided.

Dikes and Berms: In planning for the installation of dikes, consider the slope of the drainage area, the height of the dike, the amount of runoff it will need to divert, and the type of conveyance that will be used with the dike. Steeper slopes result in higher volumes of runoff and higher velocities which the dike must be capable of handling. Remember that dikes are limited in their ability to manage large volumes of runoff. See BMPs #140-Earth Dike for additional parameters.

Graded Areas and Pavement: When designing graded and paved areas, be sure to consider both control and containment of runoff flows. The grading should control the uncontaminated flow by diverting it around areas that may have pollutants. The grading should also contain the contaminated flows or divert them to treatment facilities.

CONSTRUCTION GUIDELINES

Stormwater Conveyances: Specific construction methods apply to the type of conveyance being used.

Dikes and Berms: Ideally, dikes are installed before construction activity begins. However, dikes can be easily constructed at any time. Temporary dikes (usually made of dirt) generally only last for 18 months or less, but they can be made into permanent structures by stabilizing them with vegetation. Slope protection such as vegetation is crucial for preventing the erosion of the dike.

Graded Areas and Pavement: Staging/storage areas should be designated prior to the start of construction.

MAINTENANCE

It is best to inspect stormwater conveyances within 24 hours of a rainstorm and remove debris promptly. Make daily inspections during periods of prolonged rainfall, since heavy storms may clog or damage the conveyances. It is important to repair damage to these structures as soon as possible.

Dikes should be inspected regularly for damage. This is especially important after storm events since a heavy rain may wash parts of a temporary dike away. Any necessary repairs should be made immediately to make sure the structure continues to function effectively.

Inspect unpaved, graded areas to check for gullies and other signs of erosion. Inspect paving regularly for cracks that may allow contaminants to seep into the ground. Also, check to make sure that the drains receiving the discharge from the paved area remain free of clogged sediment or other debris so that the water does not back up into areas where pollutants may be.

BMP #112 - Preservation of Existing Vegetation

DESCRIPTION

Protect existing vegetation (including trees, grasses, and other plants) by preventing disturbance or damage to specified areas of a construction site or right-of-way. Preserving natural vegetation provides buffer zones and stabilized areas which help control erosion, protect water quality, and enhance aesthetic benefits. This practice minimizes the amount of bare soil exposed to erosive forces.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	unlimited
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

APPLICATIONS

This technique is applicable to all types of sites. Areas where preserving vegetation can be particularly beneficial are floodplains, wetlands, stream banks, steep slopes, and other areas where other structural erosion controls would be difficult to establish, install, or maintain. Compared to newly planted or seeded areas, preserving natural vegetation has many advantages:

- It can handle higher quantities of storm water runoff than newly seeded areas.
- It does not require time to establish (it is effective immediately).
- It has greater filtering capacity because the vegetation and root structure are usually denser in preserved natural vegetation than in newly seeded or base areas.
- It usually requires less maintenance, watering, and chemical application (e.g., fertilizer, pesticides) than planting new vegetation.

It also:

- Enhances aesthetics.
- Provides areas for infiltration, thus reducing the quantity and velocity of storm water runoff.
- Allows areas where wildlife can remain undisturbed.
- Provides noise buffers and screens for on-site operations.

LIMITATIONS

Preservation of natural vegetation may be impractical in some situations because:

- It may constrict the area available for construction activities.

- It may not be cost-effective in areas with high land values.

DESIGN PARAMETERS

- Successful preservation of vegetation requires good planning and site management to minimize the impact of construction activities on existing vegetation. The areas to be preserved should be identified in the plans and clearly marked in the field before any site disturbance begins. Clearly

  mark all trees to be preserved, and protect against ground disturbance within the dripline of each marked tree as shown on the attached figure. The dripline marks the edge of the tree's foliage where drips from rainfall would drop. Most of the tree's roots lie within the dripline and are vulnerable to damage.

- Preserving natural vegetation may affect some aspects of staging, work sequencing, and construction cost. In addition, control measures may be needed around the perimeter of the preserved area to maintain adequate water flow and drainage and to prevent damage from excessive erosion or sedimentation. Be sure to consider these and related factors when preparing the project site plan and project cost estimates.

- Consider the use of design exceptions to enable preservation of natural vegetation in certain areas where it would typically be removed and where its preservation would not pose safety problems.

CONSTRUCTION GUIDELINES

- Check the project plans for areas designated for preservation of natural vegetation. Keep all construction equipment, materials, and waste out of the designated areas.

- Do not modify existing drainage patterns through or into any preservation area unless specifically directed by the plans or approved by the local permitting authority.

- Perform maintenance activities as needed to ensure that the vegetation remains healthy and able to aid in erosion control and sediment collection.

MAINTENANCE

Inspect at regular intervals to make sure the preserved vegetated areas remain undisturbed and are not being overwhelmed by sediment. Implement maintenance or restorative actions as needed. Proper maintenance is important to ensure healthy vegetation that can control erosion. Different species, soil types, and climatic conditions will require different maintenance activities such as mowing. Maintenance should be performed regularly, especially during construction.

BMP #113 - Clearing Limits

DESCRIPTION

Minimize the total amount of bare soil exposed to erosive forces by (1) controlling the amount of ground that is cleared and grubbed at one time in preparation for construction, and (2) limiting the amount of time that bare ground may remain exposed before slope protection or stabilization measures are put into place. This measure, in conjunction with appropriate timing (avoiding the rainy season) , can reduce erosion and sedimentation.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	unlimited
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

APPLICATIONS

Any areas where vegetation must be removed to facilitate construction. This practice should be a design consideration of all projects. It may be necessary to carefully coordinate land clearing, grading, and erosion control measures--see BMP #110-Timing of Construction.

LIMITATIONS

None.

DESIGN PARAMETERS

- Evaluate the erosion potential of the project site (based on slope, soil type, intended season of work, use of heavy equipment).
- Based on the above analysis, establish the maximum allowable area that may be exposed at one time. The project site plan should clearly specify the maximum allowable exposure area.
- Initiate slope protection and reclamation as work progresses to help minimize the amount of disturbed soil.
- In all cases, stabilization measures should be initiated within 14 days after ceasing work in a given area or as soon as practicable during seasonally arid periods.

CONSTRUCTION GUIDELINES

- Do not disturb any areas that are not actually needed for the specified construction or related staging activities. See BMP #112-Preservation of Existing Vegetation.

- Conduct work in units or stages so that construction and stabilization take place promptly after clearing and grubbing and as much of the site as possible is ready for seeding each time the specified seeding season arrives.
- Implement soil stabilization measures concurrently with the progress of clearing and grading work to minimize the length of time that bare ground lies exposed to erosion.
- At the approach of a designated seeding season, be prepared to seed all portions of the project that are ready for seeding (as required).

MAINTENANCE

Conduct periodic inspections to check for unnecessary ground disturbance. Also check for clearing and grubbing beyond the contractor's capability and progress in keeping grading and pollution control measures current (in accordance with accepted work schedule).

BMP #114 - Stabilization of Construction Entrance and Roads

DESCRIPTION

A temporary sediment removal device--normally a pad of crushed rock or stone-can be installed at the approach from a construction site to a public roadway, to stabilize the road. This BMP is used to limit sediment tracking from vehicles and equipment leaving the construction site onto public rights-of-way and streets.

Targeted Pollutants

- ● Sediment
- ◒ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ◒ Petroleum hydrocarbons

APPLICATIONS

A stabilized construction entrance (SCE) is appropriate in the following locations:

- Wherever vehicles are entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk or parking area.
- At any unpaved entrance/exit location where there is risk of transporting mud or sediment onto paved roads.

Physical Limits

Drainage area	unlimited
Max slope	15 %
Min bedrock depth	3 feet
Min water table	NA
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

LIMITATIONS

This control measure is not necessarily needed for temporary roads within the construction site (see BMP #115-Erosion Prevention on Temporary Roads).

DESIGN PARAMETERS

Width: The width should be at least 10 ft (3 meters) but not less than the full width of points where ingress or egress occurs. At sites where traffic volume is high, the entrance should be wide enough for two vehicles to pass safely. Flare the entrance where it meets the existing road to provide a turning radius.

Length: The minimum length should be 50 ft (15 meters) except on a single residence lot where a 30 ft minimum would apply.

Depth: Total depth of rock should be at least 6 inches (385 mm).

Aggregate: Fractured stone 2 to 8 in (50 to 200 mm) in diameter (for the base layer) and crushed stone 2 in (50 mm) in diameter or, reclaimed or recycled concrete equilavent.

Geotextile (filter fabric): Most installations will include geotextile (filter fabric) with the properties listed in the table below, to be placed over the entire area to be covered with aggregate. Work on single residential lots will generally not need

geotextile unless there's potential for excessive erosion, a high water table or other risk factor.

Stabilization of Construction Entrance/Roads/Driveways

The geotextile shall be a woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The geotextile shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the properties of the following table:

Geotextile Properties	Light Duty[1] Roads Grade Subgrade	Heavy Duty[2] Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Brust Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 modified
Equivalent Opening Size	40-80	40-80	US Std Sieve CW-02215
Aggregate Depth (in)	6	10	--

[1]Light Duty Road: Are sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[2]Heavy Duty Road: Are sites with only rough grading, and where most ravel would be multi-axle vehicles. Trevira Spunbond 1135, Miraft 600X, or equivalent.

[3]Geotextiles not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Drainage: Runoff from a stabilized construction entrance should drain to a sediment trap or a sediment basin. Piping of surface water under the entrance shall be provided as needed. If piping is impossible, install a mountable berm with 5:1 slopes.

Dust Control: Dust control should be provided at all times (see BMP #116-Dust Control).

CONSTRUCTION GUIDELINES

- Clear all vegetation, roots, and all other obstructions in preparation for grading.
- Prior to placing geotextile (filter fabric), make sure that the entrance is properly graded and compacted.
- To reduce maintenance and loss of aggregate, place geotextile over the existing ground before placing the stone for the entrance.
- Place a 1 ft (300 mm) layer of fractured stone over the entire width and length of the entrance.
- Place a 4 in layer of 2 in (100 mm layer of 50 mm) crushed stone over the base layer.

MAINTENANCE

The entrance must be maintained in a condition which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with additional 2 in (50mm) stone (as conditions demand) and repair or clean-out of any structures used to trap sediment.

All materials spilled, dropped, washed, or tracked from vehicles onto roadways or into storm drains must be removed immediately. When necessary, vehicle wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate which drains into an approved sediment trap.

Trapped sediment shall be removed from the site or stabilized on site and prevented from entering storm drains, ditches or watercourses. Disturbed soil areas resulting from removal shall be permanently stabilized.

The stabilized construction entrance may be removed after final site stabilization is achieved or after the temporary BMPs are no longer needed.

BMP #115 - Erosion Prevention on Temporary and Private Roads

DESCRIPTION

Targeted Pollutants

- ● Sediment
- ◒ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ◒ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	15%
Min bedrock depth	3 ft
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

Any of several measures can be used to control erosion and sedimentation originating with haul roads, detours, access roads, and other unpaved or temporary roadbeds associated with a construction project. Possible measures include :

Road Placement: Place temporary roads as far as possible away from streams, surface waters or wetlands .

Open-Top Box Culvert: A wooden culvert installed across the road grade to convey surface runoff and roadside ditch flows to the downslope side. Open-top box culverts are useful for collecting surface runoff and ditch flows and channeling this water across the road without eroding the drainage system or road surface.

Waterbar (or Cross Ditch): A cut and berm built at a downward angle across the roadway, extending from the cutbank to the opposite fill shoulder. Waterbars reduce erosion by diverting storm water runoff from the road surface and directing it to a safe discharge area.

Road Sloping: Constructing the road with an outward slope of 1 to 2 percent from the cut slope to the fill slope. Sloped roads are designed to divert surface water off the entire road surface so that water does not concentrate in any specific location.

Rolling Dip: Constructing the road with shallow, outward-sloping dips or undulations to collect surface runoff and convey it away from the road surface.

Level Spreader: A drainage outlet constructed by cutting a shallow trench at zero grade across a slope to disperse concentrated runoff. Level spreaders convert concentrated flow into sheet flow for discharge at nonerosive velocities onto areas stabilized by vegetation. By reducing runoff velocity, they help reduce erosion, enable sediment to settle out, and enhance infiltration.

APPLICATIONS

Open-Top Box Culvert: Used, as a substitute for pipe culverts, for cross drainage on lightly used, unpaved roads on steep grades (greater than 6 percent).

Waterbar: Used as a temporary or permanent drainage facility on light-use, low-maintenance, unpaved roads. Waterbars should be placed above grade changes to prevent water from flowing down steeper portions of roads or skid trails. Bars may also be placed above intersections of roads, skid trails, or landings to protect these disturbed areas.

Road Sloping: Used as a drainage measure on temporary or low-traffic haul roads where erosion of the roadbed and fill slope is unlikely due to low runoff volume or intensity.

Rolling Dip: Used as a runoff diversion measure to prevent erosion of the road surface. Rolling dips are effective on long inclines to keep storm water from flowing directly down the road, where it may cause gullying and other damage to the road surface and grade.

Level Spreader: Useful where concentrated runoff from bare ground or other unstabilized areas can be diverted onto stabilized areas under sheet flow conditions. Level spreaders are often placed at the outlets of diversion dikes or runoff interception trenches to control runoff, dissipate water velocity, and disperse the water over a broad surface area. Level spreaders are relatively inexpensive to install. They may be used on slopes of 3:1 or flatter.

LIMITATIONS

Open-Top Box Culvert: Generally, box culverts are not required on grades of 6 percent or less and are ineffective under continuous or recurrent use where cleaning is sporadic.

Waterbar: Suitable only for light-use, low-maintenance, unpaved roads.

Road Sloping: Suitable only for low-traffic haul roads where runoff volume and intensity are low.

Rolling Dip: Not suitable on road grades steeper than 5 percent.

Level Spreader: Level spreaders are not recommended for use in most situations. They are not suitable on slopes steeper than 3:1 or where the soils are easily erodible. They should be constructed only on natural soils, not on fill material. Level spreaders cannot handle large quantities of sediment-laden storm water. If altered by erosion or other disturbance, they may "short circuit" and actually concentrate flows into small streams instead of spreading the flows into sheet flow.

DESIGN PARAMETERS

Open-Top Box Culvert: Box culverts can be built from logs; lumber; discarded guardrail; or commercial, corrugated steel. They are installed at a skewed angle downgrade across the roadway, with the discharge end extending 6 to 12 in (150 to 300 mm) beyond the surface of the roadbed.

Spacing between culverts should be in accordance with recommended cross drainage spacing in Table 1. Where recommended spacing is less than 33 ft (10 meters), the road should be paved with gravel or crushed rock.

Waterbar: Waterbars are generally constructed using a blade-equipped tractor or by hand. The size of the waterbar depends on the amount of precipitation in the area, the soil erodibility, and anticipated traffic.

- The waterbar should extend from the cutbank side of the road completely across to the fillslope side.
- Cut dimensions: Up to 16 in (400 mm) deep across road, 8 to 16 in (200 to 400 mm) deep at outlet, 3 to 4 ft (1.0 to 1.2 meters) wide.
- Berm dimensions and orientation: 1 to 2 ft (300 to 600 mm) high 5 in (150 mm) minimum height, skewed at angle of 30° to 40° across road.
- Spacing between bars: Use Table 1, for recommended cross drain spacing on low to relatively moderately steep topography.
- Discharge: Runoff should not be directed onto fill material without proper energy dissipation and drainage away from the fill.

Road Sloping:

- The slope should be approximately 1 to 2 percent from the cut slope outward to the fill slope.
- Berms on the outside of the road should be limited or removed to allow water to flow off the road surface.
- Provide sediment collection or erosion-control measures at the toe of the fill slope to prevent excessive erosion and sediment transport.

Rolling Dip: (applies to roads greater that 150 ft long only)

- The dip should be approximately 1 ft (0.3 meter) below the surface plane of the road. The upgrade approach to the bottom of the dip should be approximately 66 ft (20 meters) long. The downgrade approach to the bottom of the dip should be approximately 23 ft (7 meters) long.
- Align the dip across the road at nearly a 90-degree angle and slope it outward approximately 5 percent.

Table 1. Recommended Cross Drain Spacing (Source: ITD, 1994)

Road Grade (percent)	Spacing Between Open-Top Culverts, feet (meters)
2 to 5	300 to 500 (90 to 150)
6 to 10	200 to 300 (60 to 90)
11 to 15	100 to 200 (30 to 60)
16 to 20	<100 (<30)

CONSTRUCTION GUIDELINES

Open-Top Box Culvert: Construct a box-like frame (three-sided, open-topped) of logs; lumber; discarded guardrail; or commercial, corrugated steel. Install it flush with the road surface, skewed at an angle downgrade across the roadway. Set the inflow end at the same grade as the side ditches on the road and extend it into the cut bank. The discharge end should extend 6 to 12 in (150 to 300 mm) beyond the surface of the roadbed and should be directed onto vegetated ground or riprap or into another erosion-control structure such as a sediment trap or catch basin.

Waterbar: Cut each waterbar into solid soil to a minimum depth of 6 in (150 mm) next to the cutbank and 8 in (200 mm) at the road shoulder, with an adverse grade on the downroad or downgrade side of the waterbar. Build a continuous, firm berm of soil, at least 6 in (150 mm) above normal grade, parallel to the waterbar cut on its downhill side. Include a bank tie-in point, cut 6 to 12 in (150 to 300 mm) into the roadbed. For added stability, the bar may be compacted with a nonerosive fill material. The completed waterbar must extend across the full roadway width, aligned at an angle of 30° to 40° relative to the roadway. A dissipation or filter device (such as riprap or silt fence) may be needed below the waterbar to control erosion and trap sediment.

Road Sloping: Road sloping is built into the road during construction. Install erosion- and sediment-control measures downslope before completing the finish grade of the sloped road. Then construct the outward slope of 1 to 2 percent, as specified in the contract plans.

Rolling Dip: Rolling dips are built into the road, during construction, following the natural contours of the land. Install erosion and sediment measures at the low point of the dip (drainage outfall to fillslope) before final grading to direct storm water discharge from the dip. Construct the dip according to the specifications shown in the contract plans. If not specified, make the dip 1 ft (300 mm) deep, with a 23 ft (7-meter)-long approach on the downgrade side and a 66 ft (20-meter)-long approach on the upgrade side.

MAINTENANCE

Inspect all devices regularly according to provisions of the contract or project site plan. Make repairs promptly to avoid progressive damage. Remove accumulated sediments as necessary to ensure proper functioning.

Open-Top Box Culvert: Clean and repair the culverts on a regular basis. Remove sediments and other debris which may block drainage flow or decrease structural efficiency.

Waterbar: Properly constructed bars should require little or no maintenance. However, all waterbars need to be open at the lower end so water can easily flow away from the roadway. Hand shovel work may be necessary following high runoff periods or severe storms to ensure unrestricted flow.

Road Sloping: Minor regrading may be required to maintain slope angle.

Rolling Dip: Outflows should be kept free of debris to prevent ponding.

BMP #116 - Dust Control

DESCRIPTION

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ◒ Petroleum hydrocarbons

Physical Limits

Drainage area	N/A
Max slope	5%
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	N/A
Freeze/Thaw	N/A
Drainage/Flood control	no

This fact sheet describes products or measures used for reducing or preventing wind erosion by protecting the soil surface, roughening the surface reducing the surface wind velocity. Several dust control treatments are described below. Other methods are also available .

Vegetative Cover: For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see BMP #145-Seeding and BMP #146-Sodding).

Mulch (including gravel mulch): When properly applied, mulch offers a fast, effective means of controlling dust (see BMP#121-Mulching).

Spray-On Adhesive: Asphalt emulsions, latex emulsions, or resin in water can be sprayed onto mineral soil to prevent their blowing away (see BMP #122-Hydromulching).

Sprinkling: The site may be sprinkled with water until the surface is wet. Sprinkling is especially effective for dust control on haul roads and other traffic routes.

Stone: Stone or gravel used to stabilize construction roads and disturbed soils can also be effective for dust control and reduce soil losses from those areas by up to 80 percent.

Surface Roughening: Tilling or discing the surface of disturbed soils to produce a rough surface or ridges which when perpendicular to prevailing winds can reduce soil losses due to wind by 80 percent (see BMP #126-Slope Roughening).

Barriers: A board fence, wind fence, sediment fence, or similar barrier can control air currents and blowing soil. All of these fences are normally constructed of wood. Perennial grass and stands of existing trees may also serve as wind barriers. Barriers prevent erosion by obstructing the wind near the ground and preventing the soil from blowing off-site.

APPLICATIONS

The above measures for dust control should be used when open dry areas of soil are anticipated on the site. Clearing and grading activities create the opportunity for large amounts of dust to be blown. Therefore, one or several dust control measures should be considered prior to clearing and grading. In many cases, water erosion control measures incorporated into the project will indirectly prevent wind erosion.

As a standard practice, any exposed area should be stabilized using vegetation to prevent both wind and water erosion. When rainfall is insufficient to establish vegetative cover, mulching is an effective way of conserving moisture, preventing

surface crusting, reducing runoff and erosion, and helping to establish vegetation. It is a critical treatment on sites with erosive slopes.

LIMITATIONS

Vegetative measures may not be practical during dry periods unless a reliable supply of establishment water is available. Other methods should be stipulated in the project contract to ensure that dust control is not overlooked.

Barriers (such as walls or fences) can be part of the long-term dust control strategy in arid and semiarid areas, but they are not a substitute for permanent stabilization.

DESIGN PARAMETERS

Dust Prevention: The best method of controlling dust is to prevent dust production. This can best be accomplished by limiting the amount of bare soil exposed at one time. In project design, identify all areas where ground disturbance will not be allowed. Design and locate haul roads, detours, and staging areas to avoid unnecessary exposure of bare ground and avoid using areas that are the most susceptible to wind erosion.

In the stormwater site plan, specify staging or work sequencing techniques that minimize the risk of wind erosion from bare soil. In most cases, this will require a change from traditional construction techniques that allow large areas to be disturbed at the outset of construction and to remain exposed for long periods of time.

Vegetative Cover: Follow recommended seeding and planting specifications. If site conditions are favorable, use an extended seeding season to ensure that seeding becomes established over as much of the project as possible before winter shutdown or substantial completion. Specify the use of establishment water to accelerate vegetative stabilization if other means of long-term slope protection are not feasible.

Mulch: Apply according to the design parameter for BMP #121.

Sprinkling: Apply at a rate of 3.2 gallons per acre (35 liters per hectare) so that the soil is wet but not saturated or muddy and so that air quality requirements are maintained.

Stone: At ingress/egress to public highways, apply as indicated in BMP #114-Stabilization of Construction Entrance. For detours, haul roads, or temporary traffic routes through the construction site, provide a 2.4 in (60 mm) minimum thick layer of fractured stone 1 to 2 in (25 to 50) mm in diameter. Also see BMP#115-Erosion Prevention on Temporary Roads.

Surface Roughening: Tilling or discing should leave 6 in (150 mm) (minimum) furrows, preferably perpendicular to the prevailing wind direction, to gain the greatest reduction in wind erosion. If the surface cannot be furrowed perpendicular to the prevailing wind direction, roughening the surface by using a ripper/scarifier (grader) or a ripper (cat) will produce the desired result of a 6 in (150mm) irregular surface.

Barriers: A wind barrier generally protects soil downwind for a distance of 10 times the height of the barrier. If additional protection is needed, use other methods in conjunction with the barrier.

CONSTRUCTION GUIDELINES

Site Assessment: Assess the potential problem of wind erosion and dust generation at the project site. Consider the soil type, prevailing wind direction, and the effect of other prescribed erosion control measures.

Use Preventive Strategies Wherever Possible:

- Minimize amount of bare ground exposed at one time.
- Minimize amount of ground disturbance occurring when wind erosion is highest.

Implement Dust Control Measures as Needed:

- Provide stabilized roadway to minimize amount of dust generated by construction vehicles and highway traffic (gravel, pave or moisten the bare areas of the highway or detour route).
- Apply protective materials to exposed areas (e.g., stone, mulch, adhesive/ emulsions).
- Install barriers to prevent dust from blowing off site.
- Establish vegetation at the earliest possible opportunity (using establishment water if necessary to ensure viability).
- Keep haul roads, detours, and other bare areas moist by sprinkling them with water.

MAINTENANCE

Dust control requires constant attention--it is not a one-time or once-in-awhile activity. Dust control sprinkling may have to be done several times a day during hot, dry weather.

Areas protected by mulch, adhesive emulsions, or barriers need to be checked at regular intervals according to the inspection schedule set forth in the stormwater plan. Remove sediments that accumulate behind any sediment fence or barrier when the accumulation reaches one half the height of the barrier. Dispose of the sediments only in an approved location (not in wetlands or where they will contribute to pollution at the disposal site).

Apply chemical controls (emulsions and resins) at the manufacturer's specified rates and in accordance with all federal, state, and local regulations governing their use. Chemical products must be stored, handled, and disposed of in accordance with all applicable regulations and department policies.

BMP #117 - Cover for Materials and Equipment

DESCRIPTION

This BMP includes partial or total physical enclosure of materials, equipment, process operations, or activities. Covering prevents stormwater from coming into contact with potential pollutants and reduces material loss from wind blowing. Tarpaulins, plastic sheeting, roofs, buildings, and other enclosures are examples of covering that are effective in preventing stormwater pollution. Covering can be temporary or permanent.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ● Trace metals
- ○ Bacteria
- ● Petroleum hydrocarbons

APPLICATIONS

Covering is a simple, effective, and usually inexpensive way of reducing or preventing pollution. It is appropriate for outdoor material storage piles, such as stockpiles of dry materials, topsoil, spoils piles, gravel, sand, compost, sawdust, wood chips, and building materials. It is also effective where containers of liquids or solids are stored or transferred. Although it may be too expensive to cover or enclose all construction activities, the high-risk parts of a site can often be separated and covered. For example, chemical preparation areas, vehicle maintenance and washing areas, storage areas for chemically treated products and toxic wastes (e.g., used oils).

Physical Limits

Drainage area	N/A
Max slope	N/A
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	N/A
Freeze/Thaw	N/A
Drainage/Flood control	no

LIMITATIONS

- Covering alone may not protect exposed materials from contact with stormwater runoff/run-on.
- Requires frequent inspections. Consider curbing or an elevated platform to prevent pollution from run-on water.

DESIGN PARAMETERS

In selecting an appropriate covering, evaluate the strength and longevity of the covering, as well as its compatibility with the materials or items being enclosed. Cost, aesthetics, weather conditions, drainage patterns, and size of the stockpiles or storage area are other factors affecting the choice of covering.

- In designing a covering for materials, remember to provide adequate access for loading, handling, and transfer. Cost considerations may justify a less-than-optimum access arrangement in some cases. For instance, tarpaulins and plastic sheeting have to be removed or rearranged to allow continued access as materials are depleted, but they are less expensive than a permanent structure such as a roof or shed.

- Climate or weather conditions also influence the choice or design of a covering. Tarpaulins and sheeting may be difficult to keep secured in extremely windy areas.

- Where a permanent structure is indicated for a particular area or activity, consider building a roof instead of a complete enclosure. This will reduce costs and may also eliminate the need for ventilation and lighting systems that could be needed in a building.

- Consider the nature of the materials being enclosed, especially if they pose environmental or safety dangers. Materials that are biological, flammable, explosive, or chemically reactive require special ventilation and temperature control measures.

- Covering alone may not protect exposed materials from stormwater contact. Where stormwater runon is a potential problem, place the material on an elevated, impermeable surface or build curbing around the outside of the materials to prevent poluution of stormwater from adjacent areas.

CONSTRUCTION GUIDELINES

Tarpaulins and Plastic Sheeting: Obtain enough fabric or sheeting to cover the indicated volume or area. Anchor the edges of the covering with stakes, tie-down ropes, large rocks, tires, or other readily available, heavy objects. Maintain an overlap of one meter along the border of separate sheets and securely anchor the overlap area so that it does not separate (through wind or other causes), allowing water to leak into the protected materials.

Roofs, Sheds, and Buildings: Construct according to plans or drawings in accordance with existing building codes and departmental standards for such construction.

MAINTENANCE

Frequently inspect coverings for damage and general wear. Repair or replace them immediately, as needed.

BMP #118 - Spill Prevention and Control

DESCRIPTION

Targeted Pollutants

- ○ Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ◒ Petroleum hydrocarbons

Physical Limits

Drainage area	N/A
Max slope	N/A
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	N/A
Freeze/Thaw	N/A
Drainage/Flood control	no

This fact sheet describes methods of minimizing exposure of pollutants to storm water runoff by enclosing any drips, overflows, leaks, and other liquid material releases or by isolating pollutant spills from stormwater runoff.

There are numerous spill containment methods, ranging from large structural barriers to simple, small drip pans. The benefits vary based on cost, maintenance requirements, and the size of spill control. Three possible options are discussed below:

Containment Diking: Temporary or permanent earth berms, concrete berms, or retaining walls designed to hold spills. Diking is one of the best protective measures against stormwater pollution because it surrounds the area of concern and holds the spill, keeping spill materials separated from the storm water outside of the diked area. Diking is one of the most common types of spill containment. Also see BMP #140-Earth Dike and BMP #142-Temporary Berms.

Curbing: Like containment diking, curbing is a barrier that surrounds an area of concern. It prevents spills or leaks from being released to the environment by routing runoff to treatment or control areas. The terms "curbing" and "diking" are sometimes used interchangeably, but curbing is usually small scale and cannot contain large spills like diking can.

As with diking, common materials for curbing include earth, concrete, synthetic materials, metal, or other impenetrable materials. Asphalt is also a common material used in curbing.

Drip Pans: Pans used to contain very small volumes of leaks, drips, and spills. Drip pans can be depressions in concrete, asphalt, or other impenetrable materials, or they can be made of metals, plastic, or any material that does not react with the dripped chemicals. Empty or discarded containers may be used as drip pans. Catch drips so that the materials or chemicals can be cleaned up easily or recycled before they can contact stormwater. Drip pans can be a temporary or permanent measure.

APPLICATIONS

Containment Diking: Diking can be used at any construction site, but it is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas. It is an effective containment method around tank truck loading and unloading areas. Proper diking contains spills, leaks, and other releases and prevents them from flowing into runoff conveyances, nearby streams, or infiltration

into groundwater. It also allows for proper disposal and/or recycling of materials captured within the dike.

Curbing: Curbing is usually small scale; it cannot contain large spills like diking can. However, many facilities use curbing to contain small areas used for handling and transferring liquid materials.

Curbing is already a common practice. It is inexpensive, easy to install, and provides excellent control of run on. As with diking, materials spilled within a curbed area can be collected for proper disposal and/or recycling.

Drip Pans: Drip pans can be used at any site where valves and piping are present and the potential for small-volume leakage and dripping exist. Although leaks and drips should be repaired and eliminated as part of preventive maintenance programs, drip pans can provide a temporary solution where repair or replacement must be delayed. In addition, drip pans can be an added safeguard when they are positioned beneath areas where leaks and drips may occur.

Drip pans are inexpensive, easy to install, and simple to operate. They allow for reuse or recycling of the collected material.

LIMITATIONS

Containment Diking:

- May be too expensive for some smaller facilities.
- Requires maintenance.
- Could collect polluted stormwater, with possibe infiltration to ground water.

Curbing:

- Not effective for holding large spills.
- May require more maintenance than diking.

Drip Pans:

- Suitable only for small volumes.
- Must be inspected and cleaned frequently.
- Must be secured during poor weather conditions.
- Requires that personnel are trained in proper disposal methods so that contents are not disposed of improperly.

DESIGN PARAMETERS

Containment Diking:

- Size: For tank truck loading and unloading operations, the diked area should be capable of holding an amount equal to any single tank truck compartment.
- Materials: Materials used to construct the dike should be strong enough to safely hold spilled materials. The materials used usually depend on what is available on site and the substance to be contained. Dikes may be made of earth (i.e., soil or clay), concrete, synthetic materials (liners), metal, or other impervious materials. Containment dikes may need to be designed with impervious materials to prevent leaking or pollution of stormwater, surface water, and ground water supplies.
-
- In general, strong acids and bases may react with metal containers, concrete, and some plastics. So where spills may consist of these substances, other alternatives should be considered. Some of the more reactive organic chemicals may also need to be contained with special liners. If uncertain about the suitability of certain dike construction materials, refer to the *Material Safety Data Sheet* (MSDS) for the chemical being contained.

Curbing: When using curbing for runoff control, protect the berm by limiting traffic and installing reinforced berms in areas of concern.

Materials spilled within a curbed area can be tracked outside of that area when personnel and equipment leave the area. This tracking can be minimized by grading within the curbing to direct the spilled materials to a downslope side of the curbed area. This will keep the materials away from personnel and equipment that pass through the area. It will also allow the materials to accumulate in one area, making cleanup much easier.

Manual or mechanical methods, such as those provided by sump systems, can be used to remove accumulated material from a curbed area.

Drip Pans: When using drip pans, consider local weather conditions, the location of the drip pans, materials used for the drip pans, and how the pans will be cleaned.

The location of the drip pan is important. Because drip pans must be inspected and cleaned frequently, they must be easy to reach and remove. Take special care to avoid placing drip pans in precarious positions such as next to walkways or on an uneven surface. Drip pans in these locations are easily overturned and may present a safety or environmental hazard.

Weather is also an important factor. Heavy winds and rainfall can move or damage drip pans because the pans are small and lightweight. To prevent this, secure the pans by installing or anchoring them. Drip pans may be placed on platforms or behind wind blocks or may be tied down.

MAINTENANCE

Containment Diking: Inspect containment dikes during or after significant storms or spills to check for washouts or overflows. In addition, regular testing to ensure that

dikes are capable of holding spills is recommended. Soil dikes may need to be inspected on a more frequent basis.

Changes in vegetation, inability of the structure to retain stormwater dike erosion, or soggy areas indicate problems with the dike's structure. Damaged areas should be patched and stabilized immediately, where necessary. Earthen dikes may require special maintenance of vegetation, such as mowing and irrigation.

When evaluating the performance of the containment system, pay special attention to the overflow system, since it is often the source of uncontrolled leaks. If overflow systems do not exist, accumulated stormwater should be released periodically. Polluted stormwater should be treated prior to release. Mechanical parts (such as pumps) or manual systems (slide gates, stopcock valves) may require regular cleaning and maintenance.

Curbing: Since curbing is sized to contain small spill volumes, frequent maintenance is needed to prevent overflow of any spilled materials. Inspect all curbed areas regularly and clean clogging debris. Repair the curb by patching or replacing it as needed to ensure effective functioning. Inspections should be conducted before forecasted rainfall events and immediately after storm events. If spilled or leaked materials are observed, cleanup should start immediately to allow space for future spills. In addition, prompt cleanup of spilled materials will prevent dilution by rainwater, which can adversely affect recycling opportunities.

Drip Pans: For drip pans to be effective, site operators must pay attention to the pans and empty them when they are nearly full. Because of their small holding capacities, drip pans will easily overflow if not emptied. Also, recycling efforts can be affected if stormwater accumulates in drip pans and dilutes the spilled material. It is important to have clearly specified and easily followed practices of reuse/recycle and/or disposal, especially the disposal of hazardous materials. Consider dumping the drip pan contents into a nearby larger-volume storage container and periodically recycling the contents of the storage container.

Frequent inspection of the drip pans is necessary due to the possibility of leaks in the pan itself. Also check for random leaking of piping or valves and for irregular, slow drips that may increase in volume. Conduct inspections before forecasted rainfall events to remove accumulated materials. Empty accumulations immediately after each storm event.

BMP #119 - Vehichle/Equipment Washing and Maintenance

DESCRIPTION

A typical system is a lined, depressed area that collects the water used in washing off the trucks, cars, or other construction vehicles/machinery, and drains it into a collection or treatment system.

Targeted Pollutants

- ● Sediment
- ● Phosphorus
- ● Trace metals
- ○ Bacteria
- ● Petroleum hydrocarbons

Physical Limits

Drainage area	N/A
Max slope	5%
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	N/A
Freeze/Thaw	N/A
Drainage/Flood control	no

APPLICATIONS

A wash down area is used on projects where the soil is silty or heavy in clay, and has the likelihood of transporting dirt and mud offsite. Projects that will take place over the course of the rainy season, and areas where water is expected to be encountered (high ground water table) in the normal course of the project should be considered as candidates.

LIMITATIONS

Washing vehicles generates liquid, semi-solid and solid wastes. These wastes must be contained on-site or treated to prevent pollution of surface and ground water.

Off-site: Treatment is required for all discharges to waters of the State since it could be contaminated with degreasers, hydrofluoric acid, hydrochloric acid, nitric acid, phosphoric acid, oil, hydraulic fluids, lubrication, and engine cleaning solvents. Waters of the State are all surface waters (canals, rivers, ponds, streams and lakes), and all ground water.

Contact the local permitting authority to determine proper disposal methods.

On-site: If wash water discharge to a sediment pond is the system of choice, sufficient acreage is required for the operation.

DESIGN PARAMETERS

Detergents used for vehicle washing should not contain phosphates. Phosphates are a plant nutrient that can cause excessive growth of aquatic plants when discharged into a stream or lake.

A stabilized construction entrance and road (BMP #114), to reduce off-site tracking of mud, dirt and rocks, should be installed at the vehicle wash/maintenance area. Washing and maintenance should be conducted in disturbed areas (staging area), but not in a cut or fill area until grading has been performed, and not where there

will be a high volume of construction traffic. Highly erodible soils or frequently wet areas should be avoided.

Off-site discharge options:

- Lagoon: Pond-like structure that works on the principle of evaporation, is easy to install and requires low maintenance. There is a need to be aware of safety issues (fencing the area from the public).
- Land application system: Large land area is required. This alternative is the lowest in out-of-pocket cost.
- Filtering and recycling of wash water: A good option for conservation measures. Initially, expense would be high. Monitoring of the operation would be more intensive.
- Municipal waste water treatment plant: This option is available only in areas where a municipal waste water treatment plant exists and the operation is capable of handling the load. This is the best option for limiting liability for larger construction projects.

CONSTRUCTION GUIDELINES

Designate an area that can be graded and bermed. The design should collect waste water for evaporation or direct it to an off-site containment or treatment system. A lined pond should be used where pollutants such as oil, grease, fuels, etc., may reach the high ground water table.

MAINTENANCE

Check system for integrity. Are the controls working as designed? Clean up sediments that have been tracked by vehicles onto nearby roadways.

BMP #120 - Waste Management

DESCRIPTION

This BMP entails meeting the regulatory requirements of hazardous waste management which includes hazardous waste determination; acquiring an EPA identification number; accumulation; record keeping reporting; and transportation manifesting. Good housekeeping will minimize the contribution of pollutants to stormwater discharges by handling and storing hazardous materials onsite in a clean and orderly manner.

Targeted Pollutants

- ◒ Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

Compliance with applicable regulations will protect human health and the environment from hazardous waste generated by construction activities, reduce liability, and prevent unnecessary interruptions to schedules (i.e., project shut down due to environmental investigations/enforcement actions). The first step in preventing pollution of stormwater runoff is to maintain a clean and orderly work environment. This will reduce the possibility of accidental spills. Common sense is the simplest, inexpensive method to utilize. Improving the operation and maintenance of industrial machinery; material storage practices; material inventory controls; routine and regular clean-up; maintaining well organized work areas; and educational programs for employees regarding these practices will assist in reaching these goals.

Physical Limits

Drainage area	N/A
Max slope	N/A
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	N/A
Freeze/Thaw	N/A
Drainage/Flood control	no

LIMITATIONS

Carelessness and poor judgment often result in problems associated with the disposal of hazardous materials. Not being fully aware of all the hazards at the site could increase the potential for mishandling of such wastes, resulting in stormwater contamination.

DESIGN PARAMETERS

Select a designated waste collection area on-site. Secure an adequate number of containers with lids or covers. If possible provide a covered area or spill containment pallets. Arrange for waste collection before containers overflow (additional containers and more frequent pick-ups will be needed during the demolition phase). Provide immediate cleanup in case of a spill. Assure waste is transported and disposed of at an approved facility. A liner, concrete pad, berm, etc., should be utilized to keep waste separated and contain accidental spills, so they do not pollute stormwater

runoff. Provide labels and signs for the area to educate contractors about proper storage and handling, and to comply with regulatory requirements.

CONSTRUCTION GUIDELINES

The best way to avoid polluting runoff from outside material storage areas is to prevent stormwater run-on or rain from coming in contact with the materials. Methods that can be utilized to accomplish this are

- Identifying, controlling, and enforcing storage and disposal/stockpile areas
- Providing a barrier such as a liner, concrete pad or berm
- Protecting the storage area by:
- storing the material indoors
- covering the area with a roof
- covering the material with a temporary covering
- Engineering safeguards such as:
- overflow protection devices
- protective guards around tanks, storage area, etc.

MAINTENANCE

- Regularly pick up and dispose of all garbage and waste material.
- Make sure equipment is working properly.
- Routinely inspect for leak or conditions that could lead to discharges of chemicals or contact of stormwater:
- external corrosion and structural failure
- installation problems
- evidence of spills or overfills
- Locate storage areas away from direct traffic routes.
- Stack according to directions to avoid damage due to improper weight distribution.
- Store likes together, separate incompatible wastes.
- Assign hazardous material inventory to a limited number of people.
- Keep up-to-date inventory of all hazardous materials and wastes.

- Identify all chemical substances present at the work site.
- Label all containers with name, hazards, handling, and first aid information.
- Mark those that require special instructions.
- Cleanup of liquid or dry material spills.
- Provide initial and annual training for employees on the hazards and the proper handling procedures.
- Do not mix products together unless specifically recommended.
- Use all the product before disposing of container.
- Do not remove original product label from container until container has been completely emptied.

BMP #121 - Mulching

DESCRIPTION

Mulching is a temporary soil stabilization or erosion control practice where materials such as straw, grass, grass hay, compost, wood chips or wood fibers are placed on or incorporated into the soil surface. In addition to stabilizing soils, mulching can reduce the speed of stormwater runoff over an area. When used together with seeding or planting, mulching can aid in plant growth by holding the seed, fertilizers, and topsoil in place, by helping to retain moisture, and by insulating against extreme temperatures.

Targeted Pollutants

- ● Sediment
- ◒ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	2 ac
Max slope	50%
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

Mulching protects the soil surface from splash erosion. It retards runoff, traps sediment, and creates more favorable conditions to assist germination and the early development of plants. Common natural and synthetic (stabilizers) mulches suitable for use at construction sites include:

Vegetative materials: wheat straw, rye straw, barley straw, grass hay

Wood products: wood cellulose fibers, wood chips, bark, sawdust

Other organic materials: leaves, peat, manure, compost

Rock products: gravel, slag, crushed stone

Fabricated mulch: jute, burlap, coconut (coir), excelsior, Kraft paper string

Synthetic mulch: asphalt, vinyl, plastics, latex, rubber, adhesives or "tackifiers".

APPLICATIONS

Mulch is an immediate, effective, and inexpensive means of controlling dust and erosion and aiding revegetation of construction sites. It provides immediate protection to soils that are exposed and that are subject to heavy erosion; it retains moisture (which may minimize the need for watering); and it requires no removal because of natural deterioration of most mulching materials.

Mulching is often used alone in areas where temporary seeding cannot be used because of the season or climate. It may be used in conjunction with other treatments for increased effectiveness. Use of mulch may or may not require a binder, netting, or tacking agent to hold the mulch in place. On steep slopes and critical areas such as waterways, mulch matting is used with netting or anchoring to hold it in place.

- To aid in establishing vegetation, mulch seeded and planted areas where slopes are steeper then 2:1, where runoff is flowing across the area, or when seedlings need protection from bad weather. If the mulching effect is to be maintained longer than three months, the preferred mulch is vegetative

material. Wheat straw is the most preferred vegetative material, followed by rye straw, barley straw, or grass hay.

- Wood chips are suitable for areas that will not be closely mowed and around ornamental plantings. Chips decompose slowly and do not require tacking, but they must be treated with nitrogen to prevent nutrient deficiency. Wood chips can be very inexpensive if they are obtained from trees cleared on the site. Chips should not be used on slopes greater than six percent because they tend to wash down slopes.

- Bark mulch is suitable for areas planted to grasses that will not be closely mowed. The bark may be applied mechanically or by hand.

- Crushed stone and gravel mulches are appropriate for dust control and soil protection on low-use dirt roads, driveways, and other areas of light vehicular activity within the construction site.

LIMITATIONS

Disadvantages of mulch include the following:

- It may delay germination of some seeds because cover reduces the soil surface temperature.

- Mulch can be easily blown or washed away by runoff if not secured or incorporated. Lightweight mulch, such as straw requires matting, crimping, or other methods to hold it in place.

- Some mulch materials, such as wood chips, may absorb nutrients necessary for plant growth.

- Straw mulch provides organic matter as it breaks down and is incorporated into the soil. If applications are too heavy, however, soil nutrient levels (especially nitrogen) may decline during the period of decomposition. Therefore, prescribed application rates of both the straw mulch and the specified fertilizer should be strictly followed. The use of a fertilizer low in phosphorus is recommended.

- Synthetic spray-on materials are not recommended except for temporary dust/erosion control or for steep, rocky slopes where other mulches and mechanical methods cannot be effectively applied. The synthetic mulches may create impervious surfaces and can have adverse effects on water quality.

- Avoid applying mulch as the only control on long slopes. Break up concentrated flows on these slopes with other BMPs, such as BMP #127-Gradient Terracing, or BMP #132-Check Dams.

DESIGN PARAMETERS

GUIDE TO MULCH MATERIALS, RATES, AND USES				
Mulch Material	**Quality Standards**	**Application Rate 1100 ft^2 (per 100 m^2)**	**Depth and Coverage**	**Remarks**
Gravel, slag,	Washed, 3/4 to 11/2 in (20	280 ft^3 (8 m^3) (or more to ensure	2.75 to 3.1 in (70 to 80	Excellent mulch for short slopes

or crushed stone	to 40 mm) diameter with at least 30% of it larger than 3/4 in (20 mm) diameter.	90% coverage at 2.5 tons/1100 ft^2(2.3 metric tons/100 m^2).	mm uniform covering.	around woody plants and ornamentals. Use where subject to foot traffic. Approximately 42.5 lb/ft (660 $kg/m^{3)}$.
Hay or straw	Air dried, free of unwanted seeds and coarse material. Fibers should not be chopped or ground to reduce fiber length. Minimum fiber length - 8 in (200 mm).	88 TO 110 lb (40 to 50 kg) (2 to 3 bales).	50 to 80 mm to form a uniform mat through which 20 to 40% of the original ground surface can be seen.	Use where the mulching effect is to be maintained for >3 months. Subject to blowing unless kept moist, punched, or tacked down. Most common and widely used mulching material. Can be used in critical erosion areas.
Wood fiber cellulose	Dyed material should not contain any growth inhibiting factors.	22 to 33 lb (10 to 15 kg)		If used on critical areas, double the normal application rate. Apply with hydromulch. No tie-down required. Packaged in 110 lb (50 kg) bags.
Wood chips	Do not use kiln-dried or air-dried material. Chip size 1/2 x 1 1/2 in (15 x 40 mm) diameter and 1/10 to 1/2 in (3 to 15 mm thick.		2.75 to 3.1 in (70 to 80 mm) uniform depth	Applying at over the specified thickness may markedly reduce soil nutrients for a long time. Increase fertilizer 25 percent with wood chip mulch on revegetation sites.
Compost	Odorless or earthy smell	5.3 to 53 ft^3 (0.15 to 1.5m^3)	2 to 3.1 in (50 to 80 mm) uniform depth	Inexpensive, but may not be available in some areas.

Stone and gravel:

- After the gravel or stone is applied, construction traffic may move over it. Areas which become compacted or depressed should be remulched to the same level as the remaining area to prevent flows from the site from becoming channelized into these depressions.
- Upon completion of activities on the site, the gravel or stone mulch may be left in place during revegetation operations.
- When used for driveways or dirt roads, a filter blanket should be placed under the gravel.

Straw:

- Straw mulch forms a loose layer when applied over a loose soil surface. To protect the mulch from wind drifting and water damage, it should be stabilized by covering it with netting, such as jute, or by spraying it with a tacking agent. See construction guidelines for more information.
- Straw mulch should cover the entire seeded area or exposed slope. The mulch should extend into existing vegetation or stabilized areas on all sides to prevent wind or water damage which may start at the edges of the mulched area
- The straw fibers should be applied to form a uniform cover of loose straw through which 20 percent or less of the original ground surface can be seen. No large clumps of unscattered straw should exist after application.

- On small slopes, straw mulch should be applied by hand broadcasting to a uniform depth of 2 to 3.1 in (50 to 80 mm). On larger slopes, straw can be blown onto the slope to achieve a uniform cover of 2 to 3.1 in (50 to 80 mm).

Wood chips:

- Due to bacterial action during decomposition, nutrient concentrations in the soil may be depressed under a layer of wood chips. Because of this, applications should not exceed the specified thickness which would cause a marked decline in some soil nutrients for longer periods.

- When using wood chips to mulch revegetation projects, the specified application of fertilizer should be increased approximately 25 percent to replenish soil nutrients lost due to breakdown of wood chips.

Effectiveness of mulches:

- Crushed stone and gravel mulches retain their effectiveness indefinitely if properly applied and protected from compacting traffic. Sediment generation reduction is estimated at 70 to 90 percent, and nutrient generation reduction at 50 to 70 percent.

- Straw mulches react similarly to hydromulches, as they break down fairly rapidly. However, straw is twice as effective and at about half the cost of hydromulches. Sediment reduction by straw mulch without vegetation is 90 to 95 percent for a few months. It drops to 70 to 90 percent in 6 months, and further to 40 to 60 percent in 2 years, and 10 to 30 percent after that. Nutrient reductions are estimated at 60 to 80 percent for a few months, 50 to 70 percent in 6 months, 20 to 50 percent up to 2 years, and 0 to 10 percent beyond 2 years.

- Wood chips deteriorate more slowly than wood fiber and therefore retain their effectiveness longer. Sediment reductions of 90 to 95 percent can be expected for a year, 80 to 90 percent up to 2 years, and 50 to 60 percent beyond 2 years. Nutrient reductions of 60 to 80 percent, 50 to 70 percent, and 30 to 50 percent are estimated for the same period.

CONSTRUCTION GUIDELINES

Seeding (temporary or permanent) can take place prior to or concurrent with mulching. Other surface runoff control measures should be installed prior to seeding and mulching. If seeding is prior to mulching, mulches must be applied to seeded areas immediately after seeding. Mulches should not be applied when free surface water is present, but may be applied to damp ground. The choice of materials for mulching will be based on the type of soil to be protected, site conditions, season, and economics.

Straw mulch: The straw must be stabilized to prevent it from being damaged by water or wind (blown away). Use one of the following methods:

- Hand punching can be used on small sites, sites with rock and stone on the surface, sites with slopes which are steeper than 3:1, or sites which have been wattled. Take care not to damage wattling or planted vegetation. Use a spade or shovel to punch the straw into the slope until all areas have straw standing perpendicularly to the slope and embedded at least 4 in (100 mm)

into the slope. The bunches of straw should resemble the tufts of a toothbrush.

- Roller punching can be used on large, gently sloping sites without significant outcroppings of rock and stone. Roller punching should not be used on sites which have been wattled (unless there is adequate space between lines of wattling) or on planted sites. A roller equipped with straight studs not less than 6 in (150 mm long), from 4 to 6 in (100 to 150 mm) wide, and approximately 3/4 in (20 mm) thick, will best accomplish the desired effect. Studs should stand approximately 8 in (200 mm) apart and should be staggered. All corners should be rounded to prevent withdrawing the straw from the soil. Vegetative planting may be conducted following roller punching.

- Crimper punching involves specially designed straw-crimping rollers. These are suitable for use wherever roller punching can be used. The crimpers consist of serrated disk blades, set 4 to 8 in (100 to 200 mm) apart, which force straw mulch into the soil. Crimping should be done in two directions with the final pass conducted across the slope rather than up and down it.

- Tacking agents may be used on any type of site, but are best used only on very stony or rocky soils or small, steep slopes. Apply 28.5 ft^3/ac (2.0 cubic meters per hectare) of the tacking agent or its equivalent over the straw mulch. Agents which are neutral or nearly neutral in color and of demonstrated effectiveness for the soils and climate of the application area are acceptable.

- Matting may be used on large, steep areas which cannot be punched with a roller. Jute or wood excelsior on plastic netting shall be applied over unpunched straw according to BMP #124-Matting.

MAINTENANCE

Inspect all mulched areas periodically (according to the inspection interval prescribed in the project site stormwater plan and after runoff-producing storm events. Repair damaged areas of the mulch immediately. Reseed or replant such areas, if necessary, before replacing the mulch cover.

Straw mulch and other organic products do not have to be removed when the vegetation becomes established.

BMP #122 - Hydromulching

DESCRIPTION

Hydraulic mulching is a process where wood fiber mulch, processed grass, hay or straw mulch are applied with a tacking agent in a slurry with water to provide temporary stabilization of bare slopes or other bare areas. This mulching method provides uniform, economical slope protection. It may be combined with hydroseeding as a revegetation method (see BMP #145-Seeding).

Targeted Pollutants

- ● Sediment
- ◒ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	2 ac
Max slope	15 %
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

APPLICATIONS

Hydraulic mulching is an effective way to increase water retention (thereby reducing erosion) for six months or up to one year. Beyond one year, the effectiveness drops off.

Hydraulic mulching can be applied to areas that are within about 200 feet (60 meters) of a road or that can otherwise be reached by truck. Small roadside slopes and large, relatively flat areas are well adapted to this method. When adequate moisture exists, the slurry can be combined with seed and fertilizer to initiate stabilization and revegetation in a single application (see BMP #112-Preservation of Existing Vegetation). The mulch usually lasts about a year. The growing vegetation is needed to provide continued stabilization.

LIMITATIONS

- Loses effectiveness after one year.
- Only suited for physically stable slopes (at natural angle of repose, or less).
- Avoid hyrdraulic mulching on long uninterrupted slopes. Break up concentrated flows with other BMPs, such as BMP #127-Gradient Terracing or BMP #132-Check Dams.

DESIGN PARAMETERS

Effectiveness: Hydraulic mulching initially reduces sediment generation by 70 to 80 percent as compared to sediment production off bare slopes. Within two years, the breakdown of wood fiber will have reduced its effectiveness to 40 to 60 percent. Beyond that time, only 10 to 30 percent effectiveness can be expected, and the mulch should be replaced. Nutrient generation is typically reduced 50 to 70 percent for six months, 20 to 50 percent up to two years, and 0 to 10 percent beyond two years.

Equipment: The hydraulic mulching machine should be equipped with a gear-driven pump and a paddle agitator. Agitation by recirculation from the pump is not

acceptable. Agitation must be sufficient to produce a homogeneous slurry of tacking agent and mulch (and seed fertilizer, if used).

Application rates: Apply the water at a minimum rate of 3000 gallons per acre (28 cubic meters per hectare). Tacking agent should be applied at 28.5 ft^3 (2.0 m^3) of wet ingredients per acre (hectare) or 90 kilograms of dry ingredients per hectare.

When seeding is combined with hydraulic mulching, be sure to include an appropriate specified formulation at the specified rate. Legume seeds should be pellet inoculated with the appropriate bacteria. Inoculation rates should be four times that required for dry seeding.

CONSTRUCTION GUIDELINES

- The time allowed between placement of seed in the hydraulic mulcher and the emptying of the hydraulic mulcher tank should not exceed 30 minutes.
- Wood fiber may be dyed to aid in uniform placement. Dye should not stain concrete or painted surfaces nor injure plant or animal life when applied at the manufacturer's recommended rate.
- Application of the slurry should proceed until a uniform cover is achieved.
- The applicator should not be directed at one location for too long a period of time or the applied water will cause erosion.

MAINTENANCE

Hydraulically-mulched slopes should be inspected periodically for damage due to wind, water, or human disturbance. Repair all damaged areas immediately using hydraulic mulching at the original specifications or straw mulch.

BMP #123 - Geotextile

DESCRIPTION

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	100 ac
Max slope	100%
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

Geotextiles are porous fabrics known in the construction industry as filter fabrics, road rugs, synthetic fabrics, construction fabrics, or simply fabrics. Geotextiles are manufactured by weaving or bonding fibers made from synthetic materials such as polypropylene, polyester, polyethylene, nylon, polyvinyl chloride, glass, and various mixtures of these materials.

The material is applied from a roll and anchored into place to provide a continuous sheet over the exposed slope or surface. This sheeting reduces raindrop impact and surface erosion on disturbed soils. It can also protect new vegetation and aid in growth and establishment of vegetation by retarding evaporation of soil moisture. They can also be used on benched slopes.

Geotextiles are used for a variety of purposes as separators or reinforcement, for filtration and drainage, and for erosion control on slopes or stream banks.

Matting or netting made of biodegradable materials (such as jute, wood fiber, straw, coconut, paper, or cotton) can be used for many of these same purposes, but is not as durable. These products are discussed separately under BMP #124-Matting.

APPLICATIONS

Geotextiles are an effective tool to prevent surface erosion and promote rapid establishment of a permanent (or temporary) vegetative cover. The two main applications are for slope protection and as a flexible channel lining. For slope protection applications, the fabrics are useful in preventing the loss of top soil, thereby reducing surface erosion and promoting establishment of vegetative cover. They should be given serious consideration where slope, high flows, or other factors prevent use of organic matting.

Used alone, geotextiles can function as erosion control matting to stabilize channels and swales or to protect recently-planted seedlings until they become established. They may be placed in ditches or along stream banks to protect new plantings if more elaborate measures such as riprap or rock revetments are not appropriate. The purpose of this application is to protect the integrity of the ditch or stream while permanent vegetative cover becomes established.

Geotextiles are also used as separators. An example of such a use is geotextile as a separator between riprap and soil. This "sandwiching" prevents the soil from being eroded from beneath the riprap.

The primary advantages of geotextiles are:

- Relatively low cost for many applications.

- Ease and convenience for many applications.
- Quick and effective protection against erosion problems.
- Design methodologies are available for many uses.
- A wide variety of geotextile products is available to match specific needs.
- Synthetic geotextiles may be removed and reused if economically feasible.
- Better resistance to high flow situations than organic matting.

LIMITATIONS

- Effectiveness may be reduced drastically if the fabric is not properly selected, designed, or installed.
- Many synthetic geotextiles are sensitive to light and must be protected prior to installation.
- Geotextiles that are not biodegradable should not be used where their presence or appearance is aesthetically unacceptable.
- Should not be placed on 1:1 (50%) slopes if they are to be covered with overlying material.

DESIGN PARAMETERS

Maximum slope steepness: Products are available for up to 1:1 steepness.

Durability/decomposition: Some synthetic geotextiles persist a very long time and should be considered a permanent measure. Others remain effective for less than a year. Those types designed to assist in establishment of vegetation will eventually photodegrade or decompose. If a short-term, degradable product is needed, see BMP #124-Matting.

Materials: In determining how much fabric is needed, allow for an overlap of 4 in (100 mm) on both sides of each roll and 3 ft (1 m) at the ends of rolls. Also, the fabric should extend beyond the edge of the exposed area at least 1 ft (300 mm) at the sides and 3 feet (1 m) at the top and bottom. Staples should be of 1/10 in (3 mm) diameter (or heavier) steel wire. Allow for a spacing of approximately 5 ft (1.5 m) apart along the sides and center of each roll and not more than 1 ft (300 mm) apart along upper end of a roll or at the overlap of two rolls.

CONSTRUCTION GUIDELINES

- The soil must be reasonably smooth. Fill and compact any rills and gullies. Remove protruding rocks and other obstructions.
- Apply the individual rolls up and down the slope, from the top to the bottom--never along the contour.

- Overlap the sides of rolls at least 4 in (100 mm), and make sure there is at least a 3 ft (1 m) overlap when an uphill roll joins to a downhill roll. The uphill roll should overlie the downhill roll.
- Extend the fabric beyond the edge of the mulched or seeded area at least 300 mm at the sides and 3 ft (1 m) at the top and bottom of the area. If existing vegetation or structures mark the boundaries of the area, the fabric should continue into the stable vegetated area or to the edge of the structure.
- At the top of the area, bury the end of each roll in a trench at least 8 in (200 mm) deep. The trench should then be backfilled and tamped.
- Staples should be driven perpendicularly into the slope face. Place them approximately 5 ft (1.5 m) apart down the sides and center of the roll, and not more than 1 ft (300 mm) apart at the upper end of a roll or at the end overlap of two rolls.
- Be sure the fabric makes uniform contact with the slope face underneath. No "bridging" of rills or gullies should be allowed.

MAINTENANCE

Inspect weekly or monthly and within 24 hours after each runoff-producing storm. To assure proper functioning, complete one inspection during the first runoff-producing event after installation. If fabric sheeting is damaged or missing, replace it immediately to restore full protection. Also inspect to ensure that channelization and erosion is not occurring underneath fabric (sediment outwash is the most visible sign of this.)

Products used for temporary control may be removed and reused, if this can be done without leaving the area susceptible to erosion.

BMP #124 - Matting

DESCRIPTION

A porous net or fibrous sheet that is laid over the ground surface for slope stabilization and erosion control, or to hold a mulch in place and protect it against wind or water damage. Matting and netting are sometimes classified as geotextiles (see BMP #123), but in this catalog, matting is considered to be materials made from biodegradable materials including straw, coconut (coir), jute, wood fiber (excelsior), paper, and cotton. Some of these organic materials may be held in place by plastic netting.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	100 ac
Max slope	100%
Min bedrock depth	2 ft
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

APPLICATIONS

A wide variety of matting materials may be used for erosion control. Most are of two main types: woven—such as jute, or bonded to plastic—such as excelsior. Application examples for these two types are listed below.

Jute matting: Jute matting or netting is available as a heavy fiber net which is generally purchased in rolls and is stapled/anchored to slopes to provide a uniform covering. This covering protects mulches, provides additional water-holding capacity, and aids in moderating environmental fluctuations near the ground surface (as does a mulch).

Jute matting can be applied over straw, grass hay, wood fiber, or manure mulches when wind or water damage would occur without a protective net. Matting is the best single method for protecting the integrity of a mulched area. It may be applied alone as an alternative to straw or wood fiber mulches on flat sites for dust control and seed germination enhancement, but should not be applied alone where runoff quantities are significant.

Wood fiber (Excelsior) matting: Wood fiber matting is made by bonding wood excelsior fibers to a paper or plastic reinforcing net. The matting is generally purchased in rolls and stapled to slopes to provide a uniform covering which can protect mulches, provide enhanced water-holding capacity, and aid in moderating environmental fluctuations near the ground surface.

Matting can be useful in the following circumstances:

- Construction sites becoming temporarily inactive (inactive period greater than two weeks and less than one year).
- Graded areas receiving permanent revegetation treatment by seeding.
- Bare areas receiving permanent revegetation treatment by seeding.

Plastic netting: Plastic netting (photo/biodegradable) is a monolithic plastic clothlike material. It is used primarily to hold straw and other materials in place. Plastic netting is more durable than jute or wood fiber matting. It is much easier to handle and requires less labor, but has no mulch capabilities itself. Plastic netting alone provides no soil stabilization or erosion control. It is best used to hold down mulches until vegetation becomes established.

LIMITATIONS

- Should not be used where overland water flow will exceed 6.5 ft/s (2 m/s). Because of the following characteristics of plastic netting and wood fiber matting, jute matting, straw or straw coconut matting are preferred.
- Plastic netting does not function as a mulch (as does jute matting) since it does not absorb water. When plastic netting is used to anchor straw mulch, it increases the effectiveness of the mulch, but does not provide direct control of erosion and sedimentation or nutrient generation. Straw mulch rates should be increased 25 percent when plastic netting is used instead of jute or straw.
- Wood fiber matting is more difficult to put in place than jute, and is less predictable in controlling erosion. Properly applied, it can be as effective as jute matting at sediment and nutrient reduction. However, it is often 10 to 20 percent less effective.

DESIGN PARAMETERS

- Jute matting should be fiber cloth of a uniform plain weave, undyed and unbleached single jute yarn, 3 to 4 ft (1.0 to 1.2 m) wide and weighing an average 0.4 lb per linear foot (600 grams per linear meter) of cloth with a tolerance of plus or minus 5 percent. It should have approximately 78 warp ends per width of cloth and 45 weft ends per linear meter of cloth. The yarn shall be of a loosely twisted construction having an average twist of not less than 6.3 turns per 4 in (100 mm) and should not vary in thickness by more than half of its normal diameter.
- Wood fiber matting should consist of machine-produced mats of curled wood excelsior, of which 80 percent have a 8 in (200 mm) or longer fiber length. It should be of consistent thickness with the fiber evenly distributed over the entire area of the blanket (backing). The top side of each blanket should be covered with a 1 x 3 in (25 x 75 mm) weave of twisted Kraft paper or biodegradable plastic mesh that has a high wet strength. Blankets should be fire and smolder resistant and contain no chemical additives. Blankets shall be in rolls 3 to 4 ft (1.0 to 1.2 m) wide and 130 to 200 ft (40 to 60 m) long.
- Plastic netting with mesh opening from 1/10 x 1/10 in (3 x 3 mm) to 1/5 x 1/5 in (6 x 6 mm) should be applied over straw mulch similarly to the method specified below for jute matting.

Effectiveness: Jute matting acts similarly to straw mulch or hydromulch. Sediment reduction is typically 70 to 90 percent for up to 6 months, 40 to 60 percent for up to 2 years, and 10 to 30 percent beyond 2 years. Nutrient reduction is estimated at 50

to 70 percent for 6 months, 20 to 50 percent for up to 2 years, and 0 to 10 percent beyond 2 years.

Due to the difficulty of proper application, wood excelsior matting has a more variable effectiveness than straw, jute, or hydromulch. Properly applied, it can be as effective. Sediment reduction should range from 50 to 90 percent, 20 to 60 percent, and 0 to 30 percent in 6 months, 2 years, and beyond 2 years, respectively. Nutrient reductions for the same time periods are estimated to be 30 to 70 percent, 10 to 50 percent, and 0 to 10 percent.

CONSTRUCTION GUIDELINES

The following guidelines apply to all matting and netting installations.

- The soil must be reasonably smooth. Fill and compact any gullies and rills. Rocks, vegetation or other obstructions which rise above the level of the soil should be removed.
- After site preparation and seeding (if any), the rolls of netting or matting should be rolled onto the surface from the top of the slope to the bottom of the slope. It is preferred that rolls are not constructed in a horizontal direction across the slope face. The rolling should follow water flow direction.
- At the top of the area, bury the end of each roll in a trench at least 8 in (200 mm) deep. The trench should then be backfilled and tamped.
- Overlap the sides of rolls at least 4in (100 mm), and make sure that there is at least a one-meter overlap when an uphill roll joins to a downhill roll. The uphill roll should overlie the downhill roll.
- Extend the matting beyond the edge of the mulched or seeded area at least 1 ft (300 mm) at the sides and one meter at the top and bottom of the area. If existing vegetation or structures mark the boundaries of the area, the matting should continue into the stable vegetated area or to the edge of the structure.
- Staples should be driven perpendicularly into the slope face. Place them approximately 3 ft (1.0 m) apart down the sides and center of the roll, and not more than 1 ft (300 mm) apart at the upper end of a roll or at the end overlap of two rolls.
- Staples should be of heavy gauge wire 7/100 in (2 mm in diameter or greater), bent into a "U" shape, with legs at least 6 in (150 mm) long, and a 1 in (25 mm) crown. Use longer staples and greater frequency in loose or sandy soil.
- Be sure the matting makes uniform contact with the slope face underneath. No "bridging" of rills or gullies should be allowed.
- If wood fiber matting is to be applied without other mulches, the minimum thickness of mat should be 1.5 (40 mm). If the mat is to be applied over other mulches, the minimum mat thickness shall be 0.6 (15 mm).

MAINTENANCE

Inspect at regular intervals and after each runoff-producing storm event. Make repairs as necessary to restore complete coverage and full effectiveness of the matting or netting.

BMP #125 - Pipe Slope Drain

DESCRIPTION

A pipe slope drain is a device used to carry concentrated runoff from the top to the bottom of a slope that has already been damaged by erosion or is at high risk for erosion. It may be used to convey runoff from offsite around a disturbed portion of the site. It may also be used to drain saturated slopes that have the potential for soil slides. Pipe slope drains can be either temporary or permanent, depending on the method of installation and the material used.

Pipe slope drains are made of flexible tubing or rigid pipe with a prefabricated entrance section. Other temporary slope drains may use plastic sheeting, stone gutters, fiber mats, riprap, concrete or asphalt ditches, or half-round pipe. Outlet protection such as riprap must be provided for velocity dissipation at the drain outlet.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ◒ Petroleum hydrocarbons

Physical Limits

Drainage area	5 ac
Max slope	50%
Min bedrock depth	2 ft
Min water table	5 ft
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	yes

APPLICATIONS

Pipe slope drains are used whenever it is necessary to convey water down a slope without causing erosion. They are especially effective before a slope has been stabilized or before permanent drainage structures are ready for use. Pipe slope drains may be used with other devices, including sediment traps (BMP #137), and vegetative buffer strips (BMP #136).

Temporary pipe slope drains, usually flexible tubing or conduit, may be installed prior to the construction of permanent drainage structures. Permanent slope drains may be placed on or beneath the ground surface; pipes, sectional downdrains, paved chutes, or clay tiles may be used.

Pipe slope drains are appropriate in the following general locations:

- On cut or fill slopes before permanent storm water drainage structures have been installed.
- Where earth dikes or other diversion measures have been used to concentrate flows.
- On any slope where concentrated runoff crossing the face of the slope may cause gullies, channel erosion, or saturation of slide-prone soils.
- As an outlet for a natural drainageway.

The drainage area may be up to 10 acres (4 hectares).

LIMITATIONS

Not suitable for drainage areas greater than 10 acres (4 hectares).

DESIGN PARAMETERS

Pipe sizing: Typical relationships between area and pipe diameter are shown below:

RELATIONSHIP BETWEEN AREA AND PIPE DIAMETER	
Maximum Drainage Area acres (hectares)	Pipe Diameter in (millimeters)
0.5 acres (0.2)	12 in (300)
1.5 acres (0.6)	18 in (450)
2.5 acres (1.0) 3.5 acres (1.4) 5.0 acres (2.0)	21 in (525) 24 in (600) 30 in (750)

Spacing: For a two-lane highway construction project, experience has shown that temporary slope drains should be spaced at a longitudinal interval of 500 ft (150 meters) on a 2 percent grade, 200 ft (60 meters) on a 4 percent grade, and as may be dictated by field conditions on a grade of 5 percent or greater.

Materials: Pipe may be any heavy-duty, flexible tubing designed for this purpose, including nonperforated, corrugated plastic pipe; corrugated metal pipe; bituminous fiber pipe; or specially designed flexible tubing.

A standard flared end section secured with a watertight fitting should be used for the inlet. A standard T-section fitting may also be used. Extension collars should be 1 ft (300 mm) long segments of corrugated pipe. All fittings must be watertight.

Slope of drain: Try for a 3 percent minimum.

CONSTRUCTION GUIDELINES

Temporary slope drains should be installed with inlets at points where water is discharged from ditches, berms, or other points of concentrated flow. All drains should be anchored to the slope to prevent disruption by water or other forces. The inlet section of the drain should be properly installed to funnel the flow into the drain. It is often necessary to construct cross berms to direct flow into the inlet.

- Place the pipe slope drain on undisturbed or well-compacted soil.

- Soil around and under the entrance section must be hand tamped in 4 to 8 in (100- to 200-mm) lifts to the top of the dike to prevent piping failure around the inlet.
- Place filter cloth under the inlet, extend it 3 to 5 ft (1 to 2 meters) in front of the inlet, and key it in 6 in (150 mm) on all sides to prevent erosion. A 6 in (150-mm) metal toe plate may also be used for this purpose.
- Securely stake the pipe slope drain to the slope at intervals of 10 ft (3 meters) or less, using grommets provided for this purpose.
- Make sure that all slope drain sections are securely fastened together and have watertight fittings.
- Extend the pipe beyond the toe of the slope and discharge at a nonerosive velocity into a stabilized area or to a sedimentation trap or pond. Use rock outlet protection if necessary.
- The pipe slope drain <u>should</u> have a slope of 3 percent or steeper.
- The height at the centerline of the earth dike should range from a minimum of 1 ft (300 mm) over the pipe to twice the diameter of the pipe measured from the invert of the pipe. It should also be at least 6 in (150 mm) higher than the adjoining ridge on either side.
- At no point along the dike will the elevation of the top of the dike be less than 6 in (150 mm) higher than the top of the pipe.
- Immediately stabilize all areas disturbed by installation or removal of the pipe slope drain.

MAINTENANCE

- Inspect the slope drain regularly and after every storm. Make any necessary repairs within 7 days or before the next storm (whichever comes first).
- Check to see that water is not bypassing the inlet or undercutting the inlet or pipe. If necessary, install headwalls or sandbags to prevent bypass flow.
- Check for erosion at the outlet point and check the pipe for breaks or clogs. Install additional outlet protection if needed and immediately repair the breaks and clean any clogs.
- Do not allow construction traffic to cross the pipe slope drain and do not place any material on it.
- If a sediment trap has been provided, clean it out when the sediment level reaches one-third to one-half the design volume.
- A temporary slope drain should remain in place up to 30 days after slopes have been completely stabilized.

BMP #126 - Slope Roughening

DESCRIPTION

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	1 ac
Max slope	20%
Min bedrock depth	3 ft
Min water table	5 ft
SCS soil type	BCD
Freeze/Thaw	good
Drainage/Flood control	no

This BMP entails establishing a rough soil surface by creating horizontal grooves, furrows, depressions, or steps running parallel to the slope contour over the entire face of a slope. This reduces the speed of runoff, increases infiltration, and traps sediment. It also helps establish vegetative cover by reducing runoff velocity and providing stable, level areas where seedlings can take hold and grow. This measure may be used prior to seeding/planting and should be applied using appropriate machinery.

Alternately, in some cases, leaving the slope in a roughened condition will control erosion and provide suitable rooting areas for plant seedlings better than a finely-graded slope. Other measures, such as flow diversion must be used to keep erosion from occurring while vegetation is being established.

APPLICATIONS

Slope and surface roughening provide simple, inexpensive, and immediate short-term erosion control for bare soil where vegetative cover is not yet established. The practice is appropriate for all slopes, although different methods are used depending on the steepness of the slope, the type of slope (cut or fill), soil and rock characteristics, future mowing and maintenance requirements, and type of equipment available. All slopes steeper than 3:1 and greater than 5 ft (1.5 meters) vertical height require roughening and may also require terracing, grooving, or furrowing prior to seeding.

LIMITATIONS

This BMP is limited to slopes in medium to highly cohesive soils or in soft rock which can be excavated without ripping. Slope angle must be gentle enough to permit access to heavy equipment. The method is not applicable for use in moraines and other depositional soils. In addition, serration is of limited effectiveness in anything more than a gentle rain, and it is only a temporary measure. If the roughening is washed away in a heavy storm, the surface will have to be reroughened and reseeded.

This BMP is not a stand-alone measure, it must be implemented in conjunction with other BMPs.

DESIGN PARAMETERS

Slope roughening can be used with seeding, planting, and temporary mulching to stabilize an area. For steeper slopes and slopes that will be left roughened for longer period of time, try a combination of surface roughening and vegetative stabilization. Surface roughening should be applied immediately after grading activities have ceased (temporarily or permanently) in an area.

Different methods can be used to roughen the slope surface. They include stair-step grading, grooving (using disks, spring harrows, or teeth on a front-end loader), and tracking (driving a crawler tractor up and down a slope, leaving the cleat imprints perpendicular to the slope). The selection of an appropriate method depends on the grade of the slope, mowing requirements after vegetative cover is established, whether the slope was formed by cutting or filling, and type of equipment available.

Slopes steeper than 2:1: Any slope steeper than 2:1 should be terraced or stair-step graded, with benches wide enough to retain sediment eroded from the slope above. See BMP #127 (Gradient Terracing).

Slopes between 3:1 and 2:1: Cut slopes with a gradient steeper than 3:1 but less than 2:1 should be stair-step graded or groove cut. Stair-step grading works well with soils containing large amounts of small rock. Each step catches material discarded from above and provides a level site where vegetation can grow. Stairs should be wide enough to work with standard earth-moving equipment. Grooving can be done by any implement that can be safely operated on the slope, including those described above. Grooves should not be less than 3.1 in (80 mm) deep or more than 16 in (400 mm) apart.

Fill slopes with a gradient steeper than 3:1 but less than 2:1 should be compacted every 12 in (300 mm) of depth. The face of the slope should consist of loose, uncompacted fill 4 to 6 in (100 to 150 mm) deep that can be left rough or can be grooved as described above, if necessary.

It is important to avoid excessive compacting of the soil surface, especially when tracking, because soil compaction inhibits vegetation growth and causes higher runoff speed. Therefore, it is best to limit roughening with tracked machinery to sandy soils that do not compact easily and to avoid tracking on clay soils.

Slopes flatter than 3:1: Any cut or filled slope that will be mowed should have a gradient less than 3:1. Such a slope can be roughened with shallow grooves parallel to the slope contour by using normal tilling. Grooves should be close together (less than 10 in (250 mm)) and not less than 1 in (25 mm) deep.

CONSTRUCTION GUIDELINES

Timing of work: To slow erosion, slope or surface roughening should be done as soon as possible after the vegetation has been removed from the slope. The roughened areas should be seeded as quickly as possible, preferably within seven days after serration/roughening if weather conditions or water availability permits. In material that ravels or sloughs readily, delay the revegetation effort until at least 30 days after slope serration.

On slopes composed of material that weathers rapidly, slope roughening should be completed early in the summer. This will allow material to slough off the step face prior to fall seeding or planting so it does not smother the seeds or seedlings.

Equipment: Various types of heavy equipment of various kinds can be successfully used for slope roughening:

- A front-end loader equipped with disks, harrows, or teeth can make grooves across the slope.
- Driving a crawler tractor up and down the slope will make cleat imprints perpendicular to the slope.
- A dozer, equipped with a special blade containing a series of square grooves and positioned at the same angle as the cut, can serrate the slope along the contours.

Methods:

- Fill slopes constructed with highly erodible soils or soils containing high-clay contents shall be minimally compacted prior to establishing a roughened surface. However, excessive compaction of the surface soil is undesirable because of reduction in infiltration and suppression of vegetation rooting.
- Make the grooves or depressions approximately horizontal (or parallel the roadway grade if its profile grade is less than 2 percent).
- Excavate each series of grooves in the opposite direction from the preceding series to minimize buildup of loose material at the ends of the steps or cuts.
- Loose material collected at the ends of steps should be removed and the ends blended into the natural ground surface.
- If encountering rock that is too hard to rip, try to blend the grooves into the rock.
- Remove materials which fall into the ditchline or roadway and any rock fragments larger than one-third the shelf width.
- Construct a slope bench at the bottom of the slope face.

MAINTENANCE

Inspect the slopes periodically for damage from surface runoff and seepage and inspect after each runoff-producing storm. Damage caused by construction-related activities should be repaired as soon as possible. If rills appear (small watercourses that have steep sides and are usually less than 100 mm deep), they should be immediately filled, and the slope should be promptly regraded and adequately protected.

BMP #127 - Gradient Terracing

DESCRIPTION

Gradient terracing is a term used to describe an earth embankment or ridge-and-channel arrangement constructed along the face of a slope at regular intervals. Gradient terraces are constructed at a positive grade. They reduce erosion damage by capturing surface runoff and directing it to a stable outlet at a speed that minimizes erosion.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

Gradient terraces are usually limited to use on long, steep slopes that have a water erosion problem or where it is anticipated that water erosion will be a problem. They are used for reducing runoff velocity and increasing the distance of overland runoff flow. They hold moisture better than do smooth slopes, and they minimize sediment loading of surface runoff.

Physical Limits

Drainage area	10 ac
Max slope	50%
Min bedrock depth	6 ft
Min water table	8 ft
SCS soil type	BCD
Freeze/Thaw	good
Drainage/Flood control	Yes

LIMITATIONS

Gradient terraces should not be constructed on excessively steep slopes or in areas with sandy or rocky soils. They will be effective only where suitable runoff outlets will be available. Gradient terraces may significantly increase cut and fill costs and cause sloughing if too much water infiltrates the soil.

DESIGN PARAMETERS

Gradient terraces should be designed and installed according to a plan determined by an engineering survey and layout. It is important that gradient terraces are designed with adequate outlets, such as a grassed waterway, vegetated area, or tile outlet. In all cases, the outlet should direct the runoff from the terrace system to a point where the outflow will not cause erosion or other damage. Vegetative cover should be used in the outlet where possible. The design elevation of the water surface of the terrace should not be lower than that at the junction of the outlet area when both are operating at design flow. Terraces can be constructed with linings to carry water to the outlet and can be used with a dike or similar measure above the terrace to divert runon from reaching the terraced slope.

CONSTRUCTION GUIDELINES

Construction of gradient terraces should be completed using equipment that is capable of meeting the specification established in the construction plans.

MAINTENANCE

Inspect the gradient terraces regularly during project construction and inspect them after any major storm. If used as a permanent BMP, inspect at least once a year after project completion and after major storms. Evaluate whether the terrace is functioning effectively as a runoff collection and diversion device and note whether other stabilization measures (including vegetation) are performing effectively. Take prompt action as needed to ensure proper drainage and slope stability.

BMP #128 - Retaining Walls

DESCRIPTION

Walls constructed against a slope or stream bank to prevent slope erosion or slope failure, or undercutting of the bank. Examples of retaining wall materials include: concrete, concrete masonry, rock, wood planking or railroad ties, and metal bins. Also see BMP #129- Gabions.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	67 %
Min bedrock depth	N/A
Min water table	3
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

APPLICATIONS

For slope protection or stabilization under extreme conditions or to protect erodible, unstable stream banks.

Concrete retaining wall: An engineered concrete wall which is designed to stabilize a slope and retain the rock or soil behind it. In addition to a solid concrete wall, precast, interlocking concrete blocks could be used.

Masonry retaining wall: An engineered structure similar to a concrete retaining wall but using masonry blocks, usually of specific design for aesthetic appeal.

Native rock retaining wall: A low-gravity wall constructed of rock materials native to the construction site. It provides an aesthetically attractive method of stabilizing a slope. Native rock is suitable for walls up to about 6.5 feet (2 meters) in vertical height where the slope is steeper than 2:1 behind the wall. They can be higher on slopes of 2:1 (or flatter) gradient with proper engineering design.

Redwood (wood planking) retaining wall: A retaining wall constructed of redwood planking and posts. Redwood retaining walls are useful for relatively small slopes of loose material which are underlain by a rigid rock base material or a firm, non-plastic subsoil with high shear strength. The firm foundation is necessary to securely anchor the wall. Can construct in poorer foundation soils by using longer posts and closer spacing, 3 feet (1.0 meter) maximum. Redwood will generally last longer than other woods.

Railroad tie retaining wall: A retaining wall constructed of railroad ties. These are useful for relatively small slopes of loose material which are underlain by a rigid base of rock or a firm, non-plastic subsoil. The wall must be securely anchored to the rock base or firm subsoil.

Mechanically stabilized earth (MSE) retaining walls: The following are considered MSE walls: reinforced earth, retained earth, Hilfiker, Genesis (Keystone/Tensar), and T-wall. All of those designs use some type of anchored structure to retain earthen materials behind a wall.

LIMITATIONS

Retaining walls should be considered a permanent measure only. Cost and site-specific design requirements limit their use to situations where other stabilization measures would be ineffective or aesthetically unacceptable.

- Native rock retaining walls have a maximum height of about 6.5 feet (2 meters).
- Redwood retaining walls require a firm foundation to anchor the wall.
- Wood treated with creosote or other chemicals to retard decay may leach out and cause toxic effects. Treated railroad ties should not be used along sensitive streams for instance.

DESIGN PARAMETERS

Retaining walls require a site-specific design. Wall heights, requirements for drainage, and suitable materials must be determined through on-site inspections. Listed in this fact sheet are some suggestions of appropriate applications of retaining walls for erosion control. All types of retaining walls should conform to local building codes and ordinances. Plans and specifications should be prepared by professional engineers for most installations, including all that fall outside the parameters listed under the physical limits.

CONSTRUCTION GUIDELINES

Concrete retaining walls: Construct as designed by a professional engineer or as shown on the plans.

Masonry retaining walls: Construct as designed by a professional engineer or as shown on the plans.

Native rock retaining walls:

- Remove all large rocks from the eroding slope face and stockpile on site.
- Excavate a footing trench along the toe of the slope.
- Place the largest rocks in the footing trench with their longitudinal axis normal to the embankment face. Arrange subsequent rock layers so that each rock above the foundation course has a three-point bearing on the underlying rocks.
- The slope of the wall should be between 1/2:1 and vertical, depending upon the height of the wall, the height of the slope, the width of the right-of-way, or other limitations on space.
- Obtain fill material from the slope and place it behind the rock wall. Slope above the wall should be maintained at 2:1 or less with a slope bench at the toe. Backfill the footing trench with excavated material.
- If a roadway is located at the toe of the wall, pave the roadway up to the base of the rock wall and provide roadway curb for water transport. If a

roadway is not located at the toe of the retaining wall, slope the backfilled material away from the wall at 2 percent and stabilize it.

- Revegetate the stabilized slope immediately with a method applicable to the particular site. (See Sections 4.5 and 5.2 of this manual.)

Redwood (wood planking) retaining wall:

- Prepare the site by rough grading the slope surface, then work from the bottom of the slope towards the top.
- Set the bottom course of redwood posts into rigid base foundation material and secure with a concrete collar.
- Install planking on the upslope side of the posts. Provide sufficient vertical spacing to allow drainage at the base of the wall and between planks.
- Backfill behind the wall with material from the slope above. Slope the backfill material between redwood walls at 2 percent toward the top of the lower wall.
- Proceed in a similar fashion up the slope to the desired height.
- Revegetate the backfilled benches behind the walls according to procedures applicable to the specific site (see Sections 4.5 and 5.2 of this manual).

Railroad tie retaining wall:

- Prepare the site by rough grading the slope surface, then work from the bottom of the slope toward the top.
- Set the bottom course of railroad ties onto a rigid base foundation material and secure with pinning or metal collars.
- Backfill behind the wall with material from the slope above. Slope the backfill material between the tiers of railroad ties at 2 percent toward the top of the lower wall. If the engineered wall requires deadmen, install in accordance with the design drawing.
- Proceed in a similar fashion up the slope to the desired height. If the total height exceeds 2 meters, the wall must be designed and approved by a registered engineer.
- Revegetate the backfilled benches behind the walls according to procedures applicable to the specific site (see Sections 4.5 and 5.2 of this manual).

MSE retaining wall:

- Prepare the site and construct as shown on the plans.

MAINTENANCE

Retaining walls must be inspected periodically on regular intervals to detect signs of structural failure, and to check for damage caused by subsurface drainage or

material sloughing. In stream bank installations, inspect for signs of undercutting and other instability. Make all repairs promptly, as needed.

BMP #129 - Gabions

DESCRIPTION

Rectangular wire-mesh cages that are filled with rock and wired together to form a protective but permeable structure for slope stabilization and erosion control .

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

Gabions can be used as retaining walls to mechanically stabilize steep slopes, or for revetments, weirs, channel linings, culvert headwalls, and culvert outlet aprons. They are particularly useful where seepage is anticipated. For related information, refer to BMP #128 (Retaining walls).

Physical Limits

Drainage area	unlimited
Max slope	40%
Min bedrock depth	N/A
Min water table	2 ft
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

LIMITATIONS

Materials costs and professional design requirements may make use of gabions impractical. Gabions may alter stream dynamics or adversely affect wildlife habitat. When used in channels with high sediment loads, the galvanizing wire on the cages quickly wears off, causing rusting and the premature failure of the cages.

DESIGN PARAMETERS

- Construction plans and specifications should be prepared by professionals familiar with the use of gabions. The structure must be able to handle expected storm and flood conditions.
- On streambank applications, the foundation is an important design feature of the structure. Consider the potential for the stream to erode the sides and bottom of the channel and make sure the gabions will be supported properly.
- The gabion structure must be securely "keyed" into the foundation and abutment surfaces. The rock filling holds the gabions in place by gravity, but tie-backs may be used if conditions warrant additional structural strength.
- Gabions are usually placed on a filter blanket (gravel layer of filter cloth) or both.

Materials

Gabions should be fabricated in such a manner that the sides, ends, lids, and diaphragms can be assembled at the construction site into a rectangular basket of required sizes. Gabions should be of single unit construction -- the base, ends, and sides should either be woven into a single unit or one edge of these members connected to the base section of the gabion in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh.

Where the length of the gabion exceeds its horizontal width, the gabion should be equally divided by diaphragms, of the same mesh and gage as the body of the gabions, into cells whose length does not exceed the horizontal width. The gabion should be furnished with the necessary diaphragms secured in proper position on the base section in such a manner that no additional tying at this juncture will be necessary.

All perimeter edges should be securely selvedged or bound so that the joints formed by tying the selvedges have the same strength as the body of the mesh.

The fill material for the wire gabions should be rock ranging in size from a minimum of 4 inches (100 mm) to a maximum of 8 inches (200 mm), both measured in the greatest dimension. Rock should be sound, durable, well graded, and should be obtained from a source approved by the Engineer.

See the ITD Catalog of Best Management Practices (July 1994) for additional detailed design criteria for gabions.

CONSTRUCTION GUIDELINES

Empty gabion baskets should be placed on a smooth, firm foundation excavated as directed by the plans. Each row, tier, or layer of baskets should be reasonably straight and should conform to the line and grade shown on the plans or established by the Project Engineer. The empty gabion baskets should be fastened to the adjacent baskets along the top and vertical edges. Each layer should be fastened to the underlying layer along the front, back and ends. Fastening should be performed in the same manner as provided for assembling the gabion units.

Unless otherwise indicated on the plans, the vertical joints between basket units of adjacent tiers or layers, along the length of the structure, should be staggered by at least one cell.

Before filling each gabion with rock, all kinks and folds in the wire mesh should be removed and all baskets should be properly aligned. A standard fence stretcher, chain fall or steel rod may be used to stretch the wire baskets and hold alignment.

The gabion cells should be carefully filled with rock placed by hand/machine in such a manner that the alignment of the structure will be maintained and so as to avoid bulges and to minimize voids. All exposed rock surface should have a reasonably smooth and neat appearance. No sharp rock edges should project through the wire mesh.

The gabion cells in any row or layer should be filled in stages so that local deformations may be avoided. At no time should any cell be filled to a depth exceeding 12 inches (305 mm) more than any adjacent cell.

The layer of rock should completely fill the gabion basket so that the lid will bear on the rock when it is secured. The lid should be joined to the sides, ends, and diaphragms in the same manner as specified for joining the vertical edges. The gabion basket lid should be secured so that no more than 1 inch (25 mm) gap remains at any connection.

Gabion rows or layers not completed at the end of each shift should have the last gabion filled with rock tied internally as an end gabion.

The area behind the gabion structure should be backfilled with granular material. Geotextile, if required, should be spread uniformly over the back of the gabion structure as shown on the plans. Joining edges of the geotextile should be overlapped a minimum of 12 inches (305 mm) and should be anchored in position with approved anchoring devices. The Contractor should place the backfill material in a manner that will not tear, puncture, or shift the geotextile.

See the ITD Catalog of Best Management Practices (July 1994) for additional detailed design criteria for gabions.

MAINTENANCE

Inspect regularly and after each major storm. Check for signs of undercutting or other instability. Repair damaged areas immediately to restore designed effectiveness and to prevent damage or erosion of the slope or streambank.

Check wire of cages for rusting and wear. Repair where possible or replace.

BMP #130 - Riprap Slope and Outlet Protection

DESCRIPTION

An arranged layer or pile of rock placed over the soil surface on slopes and at or below storm drain outfalls or temporary dikes.

Riprap used as slope protection protects against erosion and dissipates the energy of runoff or surface water flow. Outlet protection reduces the speed of concentrated storm water flows and thereby reduces erosion or scouring at storm water outlets. In addition, outlet protection lowers the potential for downstream erosion. This type of protection can be achieved through a variety of techniques, including stone or riprap outlet structures and armored scour holes installed below the storm drain outlet.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	5 ac
Max slope	40%
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/flood control	no

APPLICATIONS

For slope protection, use riprap or blanketed slopes. Outlet protection should be installed at the outlets of all pipes, culverts, catch basins, sediment basins, ponds, interceptor dikes, and swales or channel sections where the velocity of flow may cause erosion in the receiving channel. Outlet protection should also be used at outlets where the velocity of flow at the design capacity may result in plunge pools (small, permanent pools located at an inlet or outfall).

Outlet protection should be installed early during construction activities, but may be added at any time, as necessary.

LIMITATIONS

The minimum particle size of the rock must be sized for the maximum expected velocity of flow out of the outlet and the soil conditions where the outlet will be located.

DESIGN PARAMETERS

The design of rock outlet protection depends entirely on the location. Pipe outlets at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to reconcentration of flows and high velocities encountered after the flow leaves the apron.

Tailwater depth: The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half

the diameter of the outlet pipe and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition.

Apron Size: The apron length and width shall be determined according to the tailwater condition.

If the pipe discharges directly into a well-defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade: The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment: The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials: The outlet protection may be done using rock riprap, grouted riprap or gabions (BMP #129). Riprap size shall be based on calculated shear stress. It shall be composed of a well graded mixture of stone size so that 50 percent of the pieces, by weight, shall be larger than the d50 size determined by using the charts. A well graded mixture as used herein is defined as a mixture composed primarily of larger stone sizes but with a sufficient mixture of other sizes to fill the smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the d50 size. Thickness: The minimum thickness of the riprap layer shall be 1.5 times the maximum tone diameter for d50 of 15 inches or less; and 1.2 times the maximum tone size for d50 greater than 15 inches. The following chart lists some examples:

ROCK RIPRAP SIZES AND THICKNESS

Unit shear stress (lb/ft^2)	d_{50} (inches)	d_{max} (inches)	Minimum blanket thickness (inches)
0.67	2	4	6
2.00	6	9	14
3.00	9	14	20
4.00	12	18	27
5.00	15	22	32

6.00	18	27	32
7.80	21	32	38
8.00	24	36	43

Unit shear stress calculated as T = yds

where:

T = shear stress in lb/ft^2

y = unit weight of water, 62.4 lb/ft^3

d = flow depth in ft

s = channel gradient in ft/ft

Stone Quality: Stone for riprap shall consist of field stone or rough unhewn quarry stone. The stone shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual stones shall be at least 2.5.

Recycled concrete equivalent may be used provided it has a density of at least 150 pounds per cubic foot, and does not have any exposed steel or reinforcing bars.

Filter: A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: A gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 10-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria is available in any soils or civil engineering reference or from the National Resources Conservation Service (formerly the Soil Conservation Service).

DESIGN PROCEDURE AND EXAMPLES

1. Investigate the downstream channel to assure that non-erosive velocities can be maintained.

1. Determine the tailwater condition at the outlet to establish which curve to use.

2. Enter the appropriate chart with the depth of flow and discharge velocity to determine the riprap size and apron length required. It is noted that references to pipe diameter in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used.

3. Calculate apron width at the downstream end if a flared section is to be employed.

Example 1: ***Pipe Flow (full) with discharge to unconfined section***

A circular conduit is flowing full:

Q = 280 cfs, diam. = 66", tailwater (surface) is 2 ft. above pipe invert, (minimum tailwater condition)

Read d_{50} = 1.2', and apron length 38'

Apron width = diam. + L_a = 5.5 + 38 = 43.5'

Example 2: ***Box Flow (partial) with high tailwater***

A box conduit discharging under partial flow conditions. A concrete box 5.5' x 10' is flowing 5.0' deep, Q = 600 cfs and tailwater surface is 5' above invert (Max. tailwater condition).

$V = \frac{Q}{} = \frac{600}{} = 12$ fps

A 5x10

At the intersection of the curve d = 60" and V = 12 fps, read d_{50} = 0.4'

Then reading to the d = 60" curve, read apron length = 40'

Apron width, W = conduit width + 0.04 L_a = 10+(0.4) (40) = 26'

Example 3: ***Open Channel Flow with Discharge to Unconfined Section***

A trapezoidal concrete channel 5' wide with 2:1 side slopes is flowing 2' deep, Q = 180 cfs (velocity = 10 fps) and the tailwater surface downstream is 0.8' (minimum tailwater condition).

At intersection of the curve d-24' and V = 10 fps, read d_{50} = 0.7'

Then reading up to the d = 24" curve, read apron length = 22'

Apron width, W = bottom of width of channel + L_a = 5 + 22 = 27'

Example 4: ***Pipe flow (partial) with discharge to a confined section***

A 48" pipe is discharging with a depth of 3', Q = 100 cfs, and discharge velocity of 10 fps (established from partial flow analysis) to a confined trapezoidal channel with a 2' bottom, 2:1 side slopes, n = .04, and grade of 0.6%.

Calculation of the downstream channel (by Manning's Equation) indicates a normal depth of 3.1' and normal velocity of 3.9 fps.

Since the receiving channel is confined, the maximum tailwater condition controls.

At the intersection of d = 36" and v = 10 fps, Read d_{50} = 0.3'

Reading up to the d = 36" curve, read apron length = 30'

Since the maximum flow depth in this reach is 3.1', that is the minimum depth of riprap to be maintained for the entire length.

CONSTRUCTION GUIDELINES

- The subgrade for the filter, riprap or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.
- The rock or gravel shall conform to the specified grading limits when installed respectively in the riprap or filter.
- Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.
- Stone for the riprap or gabion outlets may be placed by equipment. Both shall be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for riprap or gabion outlets shall be delivered and placed in a manner that will insure that it is reasonably homogenous with the smaller stones and spalls filling the voids between the larger stones. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.
- Complete construction of the outlet protection before allowing erosive flows to pass through the outlet.

MAINTENANCE

Once a riprap outlet has been installed, the maintenance needs are relatively low. Inspect after heavy storms and high flows for scouring under the outlet and dislodged stones, and repair damage promptly. For dikes, maintain the area upstream of the outlet structure so that accumulated sediments can be removed when they reach a depth of one-third the height of the dike, or 12 inches (300 mm), whichever is less.

BMP #131 - Inlet Protection

DESCRIPTION

Inlet protection consists of a filtering measure placed around an inlet or drain to trap sediment and prevent the sediment from entering the storm drain system. Additionally, it serves to prevent the silting-in of inlets, storm drainage systems, or receiving channels. Inlet protection may be composed of gravel and stone with a wire mesh filter, block and gravel, filter fabric, or sod. Care must be taken not to cause flooding with diverted flow.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

Inlet protection is appropriate for small drainage areas (less than 1 acre) where storm drains will be ready for use before the drainage area reaches final stabilization. Storm drain inlet protection is also used where:

- A permanent storm drain structure is being constructed on site and there is danger of sediment silting it in before permanent site stabilization.
- There is a threat of sediment silting in an inlet which is in place prior to permanent stabilization.
- Ponding around the inlet structure could be a problem to traffic on site.

Physical Limits

Drainage area	1 ac
Max slope	5%
Min bedrock depth	2 ft
Min water table	2 ft
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

Filter fabric is used for inlet protection when storm water flows are relatively small, with low velocities. Filter fabric inlet protection is appropriate for most types of inlets where the drainage area is 1 acre or less.

Block and gravel filters can be used where velocities are higher. They may be used with most types of inlets where overflow capability is needed and in areas of heavy flows (238 gal/min (15 liters/second) or greater).

Gravel and mesh filters can be used where flows are higher and in locations subject to disturbance by site traffic. This type of protection may be used with most inlets where overflow capability is needed and in areas of heavy flows (238 gal/min (15 liters/second) or greater).

Sod inlet filters are usually used where sediments in the storm water runoff are low.

LIMITATIONS

Filter fabric inlet protection cannot be used where inlets are paved because the fabric must be staked.

Straw bales (BMP #134) are not recommended for inlet protection when the area adjacent to the inlet is paved. Additionally, the bales must be anchored. Consider sandbags (BMP #142) in situations where anchoring of straw bales is not possible (e.g., paved road surfaces).

Inlet protection is a high maintenance item compared with other more permanent measures.

DESIGN PARAMETERS

Several different designs are in use and the configurations vary. Most of the following design considerations apply to all three main types of inlet protection (filter fabric, gravel and mesh, and block and gravel). Some additional concerns apply to only one or two of the types.

Drainage area: Not to exceed 1 acre. Overland flow to the inlet should be no greater than 15 liters/second.

Slope gradient: The drainage area should be fairly flat, with slopes of 5 percent or less. With filter fabric designs, the area immediately surrounding the inlet should not exceed a slope of one percent.

Height of filter fabric: To avoid failure caused by pressure against the fabric when overtopping occurs, it is recommended that the height of the filter fabric be limited to 16 in (0.4 meters) above the crest of the drop inlet.

Sump: Where possible, a filter fabric or block-and-gravel protection device should be provided with a sediment trapping sump 12 to 20 in (300 to 500 mm) deep as measured from the crest of the inlet. Side slopes should be 2:1. The recommended volume of excavation is 860 ft^3/acre (60 cubic meters/hectare) of ground disturbed.

Orientation: To achieve maximum trapping efficiency in gravel-and-mesh or block-and-gravel traps, the longest dimension of the basin should be oriented toward the longest inflow area.

Materials for filter fabric inlet protection:

- Filter fabric (see the fabric specifications for silt fence, BMP #135)
- Wooden stakes 2x2 in (50 mm x 50 mm) (or 2x4 in (50 mm x 100 mm)), with a minimum length of 3 ft (1.0 meter)
- Heavy-duty wire staples at least 45 in (10 mm) long
- Washed gravel 0.8 to 1.2 in (20 to 30 mm) in diameter, with less than 5 percent fines

Materials for excavated gravel inlet protection:

- Hardware cloth or wire mesh with 2/5 to 3/5 in (10 to 15 mm) openings
- Filter fabric (see the fabric specifications for silt fence, BMP #135)
- Washed gravel 0.8 to 4 in (20 mm to 100 mm) in diameter

Materials for block and gravel inlet protection:

- Hardware cloth or wire mesh with 2/5 to 3/5 in (10 to 15 mm) openings
- Filter fabric (see the fabric specifications for silt fence, BMP #135)
- Concrete blocks 4 to 12 in (100 mm to 300 mm) wide
- Washed gravel 0.8 to 4 in (20 mm to 100 mm) in diameter

CONSTRUCTION GUIDELINES

Filter fabric:

- Place a stake at each corner of the inlet and around the edges at no more than 3 ft (1 meter) apart. Drive the stakes into the ground 20 in (500 mm) if possible, or a minimum of 8 in (200 mm).
- For stability, install a framework of wood strips around the stakes at the crest of the overflow area, 20 in (500 mm) above the crest of the drop inlet.
- Excavate a trench 8 to 12 (200 to 300 mm) deep around the outside perimeter of the stakes. If a sediment trapping sump is being provided, then the excavation may be as deep as 2 ft (600 mm).
- Staple the filter fabric to the wooden stakes with heavy-duty staples, overlapping the joints to the next stake. Ensure that 12 to 32 in (300 to 800 mm) of filter fabric extends at the bottom so it can be formed into the trench.
- Place the bottom of the fabric in the trench and backfill the trench all the way around, using washed gravel to a minimum depth of 4 in (100 mm). Use enough gravel to ensure contact between the filter fabric and the underlying surface.

Gravel and mesh:

- Remove any obstructions to excavating and grading. Excavate sump area, grade slopes, and properly dispose of soil.
- Secure the inlet grate to prevent seepage of sediment-laden water.
- Place wire mesh over the drop inlet so the wire extends a minimum of 300 mm beyond each side of the inlet structure. Overlap the strips of mesh if more than one is necessary.
- Place filter fabric over the mesh, extending it at least 500 mm beyond the inlet opening on all sides. Ensure that weep holes in the inlet structure are protected by filter fabric and gravel.
- Place stone or gravel over the fabric/wire mesh to a depth of at least 300 mm.

Block and gravel:

- Secure the inlet grate to prevent seepage of sediment-laden water.
- Place wire mesh over the drop inlet so the wire extends a minimum of 12 to 20 in (300 mm to 500 mm) beyond each side of the inlet structure. Overlap the strips of mesh if more than one is necessary.
- Place filter fabric (optional) over the mesh and extend it at least 20 in (500 mm) beyond the inlet structure.
- Place concrete blocks over the filter fabric in a single row lengthwise on their sides along the sides of the inlet. Excavate the foundation a minimum of 2 in (50 mm) below the crest of the inlet. The bottom row of blocks should be against the edge of the structure for lateral support.
- The open ends of the block should face outward, not upward, and the ends of adjacent blocks should abut. Lay one block on each side of the structure on its side to allow for dewatering of the pool.
- The block barrier should be at least 12 in (300 mm) high and may be up to a maximum of 24 in (600 m) high. It may be from 4 to 12in (100 mm to 300 mm) deep, depending on the size of block used.
- Prior to backfilling, place wire mesh over the outside vertical end of the blocks so that stone does not wash down the inlet.
- Place gravel against the wire mesh to the top of the blocks.

Swale, ditch line or yard inlet protection:

- Excavate completely around inlet to a depth of 18" below notch elevation.
- Drive 2 x 4 post 1' into ground at four corners of inlet. Place nail strips between posts on ends of inlet. Assemble top portion of 2 x 4 frame using overlap joint shown. Top of frame (weir) must be 6" below edge of roadway adjacent to inlet.
- Stretch wire mesh tightly around frame and fasten securely. Ends must meet at post.
- Stretch filter cloth tightly over wire mesh, the cloth must extend from top of frame to 18" below inlet notch elevation. Fasten securely to frame. Ends must meet at post, be overlapped and folded, then fastened down.
- Backfill around inlet in compacted 6" layers until layer of earth is even with notch elevation on ends and top elevation on sides.
- If the inlet is not in a low point, construct a compacted earth dike in the ditch line below it. The top of the dike is to be at least 6" higher than the top of frame (weir).
- This structure must be inspected frequently and the filter fabric replaced when clogged.

Curb Inlet Protection:

- Attach a continuous piece of wire mesh (30" min. width by throat length plus 4') to the 2" x 4" weir (measuring throat length plus 2') as shown on the standard drawing.
- Place a piece of approved filter cloth (40-85 sieve) of the same dimensions as the wire mesh over the wire mesh and securely attach to the 2" of 4" weir.
- Securely nail the 2" x 4" weir to 9" long vertical spacers to be located between the weir and inlet face (max. 6' apart).
- Place the assembly against the inlet throat and nail (minimum 2') lengths of 2" x 4" to the top of the weir at spacer locations. These 2" x 4" anchors shall extend across the inlet top and be held in place by sandbags or alternate weight.
- The assembly shall be placed so that the end spacers are a minimum 1' beyond both ends of the throat opening.
- Form the wire mesh and filter cloth to the concrete gutter and against the face of curb on both sides of the inlet. Place clean 2" stone over the wire mesh and filter fabric in such a manner as to prevent water from entering the inlet under or around the filter cloth.
- This type of protection must be inspected frequently and the filter cloth and stone replaced when clogged with sediment.

Assure that storm flow does not bypass inlet by installing temporary earth or asphalt dikes directing flow into inlet.

MAINTENANCE

- Inspect regularly and after every storm. Make any repairs necessary to ensure the measure is in good working order.
- Remove accumulated sediment and restore the trap to its original dimensions when sediment has accumulated to half the design depth of the trap. All sediments removed must be disposed of properly.
- On gravel-and-mesh devices, clean (or remove and replace) the stone filter or filter fabric if it becomes clogged.
- On filter fabric devices, replace the fabric immediately if it becomes clogged. Make sure the stakes are firmly in the ground and that the filter fabric continues to be securely anchored.
- Inlet protection should remain in place and operational up to 30 days after the drainage area is completely stabilized.

Inlet protection (IDT, 1994)

Straw Bale Inlet Protection (Minnesota Pollution Control Agency, 2000; based on Michigan Soil Erosion and Sediment Control Guidebook

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Curb Inlet Sediment Barrier (Woodward-Clyde Consultants, 1994)

Inlet protection Detail

BMP #132 - Check Dams

DESCRIPTION

A small dam constructed in an open channel, swale, or drainageway. Check dams may be temporary or permanent barriers made of logs and brush, straw bales, stone, or other materials. They are used to reduce or prevent excessive bank and bottom erosion by reducing the gradient or runoff velocity.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

Check dams are often used in natural or constructed channels or swales where adequate vegetation cannot be established promptly. They are used below small drainage structures (smaller than 36 inch (900 mm) pipe culverts) but may be used below large structures if a diversion ditch cannot be used. Log and brush check dams should be placed where they will not cause flooding and where they can be left in place.

Physical Limits

Drainage area	10 ac
Max slope	50%
Min bedrock depth	2 ft
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	yes

LIMITATIONS

Check dams should never be placed in live streams unless approved by appropriate local, state and/or federal authorities.

DESIGN PARAMETERS

Drainage area: The drainage area above the check dam should be between 1 and 4 hectares.

Spacing: The dams must be spaced so that the toe of the upstream dam is never any higher than the top of the downstream dam. Excavating a sump immediately upstream from the check dam improves its effectiveness.

Height: Maximum height should be 2 feet (600 mm). The center of the dam must be 16 to 10 inches (50 to 250 mm) lower than either edge, to form a weir for the outfall.

Width: The check dam should be as much as 20 inches (500 mm) wider than the banks of the channel to prevent undercutting as overflow water re-enters the channel.

Stabilization: Provide outlet stabilization below the lowest check dam (where the risk of erosion is greatest) and consider the use of channel linings or protection such as plastic sheeting or riprap where there may be significant erosion or prolonged submergence.

Materials:

- Stone 2 to 16 inches (50 to 400 mm) in diameter
- Logs 6 to 8 inches (150 to 200 mm) in diameter
- Sandbags filled with pea gravel
- Filter fabric meeting the standard specifications (see BMP #135, Silt Fence)

Embedding: The logs should be driven into the ground a minimum of 28 inches (700 mm).

CONSTRUCTION GUIDELINES

Rock check dams: Place the stones on filter fabric either by hand or using appropriate machinery; do not simply dump them in place. Keep the side slopes 1:2 or flatter.

Lining the upstream side of the dam with a layer of 0.8 to 1.1 inch (20 to 30 mm) gravel 12 inches (300 mm) deep is a suggested option for additional channel protection.

Log check dams: Logs must be firmly embedded in the ground. Intermingled brush and logs or filter cloth may be attached to the upstream side of the dam to retard the flow and trap additional sediment. If a filter cloth is used, it should be securely stapled to the top of the dam and adequately anchored in the streambed.

Sandbag check dams: Be sure that all bags are securely sealed. Place the bags by hand or use appropriate machinery to place them in an interlocking pattern.

Gravel-filled burlap bags: Gravel-filled burlap bags may be used for temporary check dams in areas of concentrated flow. Fold the burlap bag flaps under the bags in a direction away from the water flow. Construct gravel bag check dams such that the crest of the downstream check dam is approximately level with the toe of the upstream check dam. Install check dams so the side end points are higher than the centerline crest. Erosion caused by high flows around the edges should be corrected immediately.

Riprap may be necessary on the downstream side of the dam to protect the streambed from scour.

MAINTENANCE

Inspect the check dams regularly and after every runoff-producing storm. Make any repairs necessary to ensure the measure is in good working order.

Remove accumulated leaves and sediments from behind the dam when they reach a depth of one-half the original height of the dam. Dispose of all materials properly so they don't contribute to pollution problems at the disposal site.

Restore stone as necessary for the dams to maintain their correct height. On sandbag dams, inspect the sandbag fabric for signs of deterioration.

Check dams (Portland and USA, 1994)

Gravel-filled sandbag check dams (Woodward-Clyde Consultants, 1994)

BMP #133 - Temporary Stream Crossing

DESCRIPTION

A temporary stream crossing is a bridge or culvert across a stream or watercourse for short-term use by construction vehicles or heavy equipment. Vehicles moving over unprotected stream banks will damage the bank, thereby releasing sediments and degrading the stream bank. A stream crossing provides a means for construction vehicles to cross streams or watercourses without moving sediment to streams, and without damaging the streambed or channel, or causing flooding.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ◒ Petroleum hydrocarbons

Physical Limits

Drainage area	N/A
Max slope	N/A
Min bedrock depth	2 ft
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	yes

APPLICATIONS

A temporary stream crossing is used when heavy equipment must be moved from one side of a stream channel to another, or where light-duty construction vehicles have to cross the stream channel frequently for a short period of time. Temporary stream crossings should be installed only when it is necessary to cross a stream and a permanent crossing is not feasible or not yet constructed.

The specific loads and the stream conditions will dictate what type of stream crossing to employ.

Bridges: Where available materials and designs are adequate to bear the expected loadings, bridges are the preferred method to cross a stream as they provide the least obstruction to flows and fish migration.

Culverts: Culverts are the most common type of stream crossings and are relatively easy to construct. A pipe (to carry the stream flow) is laid into the channel and covered by gravel (simply put--backfill, density, bedding and galvanized headwall).

LIMITATIONS

Bridges are expensive to design and install. These costs may make it difficult to justify using a bridge as a temporary crossing in some situations.

Culverts cause greater disturbance during installation and removal. In sensitive stream systems, these impacts may not be justifiable.

Always attempt to minimize or eliminate the need to cross streams. Temporary stream crossings are a direct source of pollution; therefore, every effort should be made to use an alternate method such as a longer detour. When it is absolutely necessary to cross a stream, a well-planned approach will minimize damage to the stream bank and reduce erosion.

Use of the following stream crossing measures below the high water mark of a stream or other water body (waters of the U.S.) should be carefully evaluated due to Section 404 permit requirements. If the project will remain a Categorically Excluded (Cat-Ex) project, you may proceed if the situation is discussed in the Cat-Ex. Otherwise, Section 404 permitting (401 Certification)/a Water Resources, Stream Alteration Permit, may be required. The design of temporary stream crossings involves extensive knowledge of hydrologic processes, and therefore must be designed by a Professional Engineer.

DESIGN AND PLANNING PARAMETERS - GENERAL

In-Stream Excavation - In-stream excavation shall be limited to only that necessary to allow installation of the temporary bridge or culvert as described below.

Elimination of Fish Migration Barriers - Temporary bridges pose the least potential for creating barriers to aquatic migration. The construction of a temporary bridge or culvert shall not cause a significant water level difference between the upstream and downstream water surface elevations.

Crossing Alignment - The temporary waterway crossing shall be at right angles to the stream. Where approach conditions dictate, the crossing may vary 15 degrees from a line drawn perpendicular to the centerline of the stream at the intended crossing location.

Road Approaches - The centerline of both roadway approaches shall coincide with the crossing alignment centerline for a minimum distance of 50 feet from each bank of the waterway being crossed. If physical or right-of-way restraints preclude the 50 feet minimum, a shorter distance may be provided. All fill materials associated with the roadway approach shall be limited to a maximum height of 2 feet above the existing flood plain elevation.

Surface Water Diverting Structure - A water diverting structure such as a swale shall be constructed (across the roadway on both roadway approaches) 50 feet (maximum) on either side of the waterway crossing. This will prevent roadway surface runoff from directly entering the waterway. The 50 feet is measured from the top of the waterway bank. Design criteria for this diverting structure shall be in accordance with the BMP fact sheet in this Catalog for the individual design standard of choice. If the roadway approach is constructed with a reverse grade away from the waterway, a separate diverting structure is not required.

Road Width - All crossings shall have one traffic lane. The minimum width shall be 12 feet with a maximum width of 20 feet.

Time of Operation - All temporary crossings shall be removed within 14 calendar days after the structure is no longer needed. Unless prior written approval is obtained from the Water Resources Administration, all structures shall be removed within one year from the date of the installation.

Materials:

- Aggregate - There shall be no earth or soil materials used for construction within the waterway channel. (3/4" to 4") also referenced as AASHTO

designation No. 1 shall be the minimum acceptable aggregate size for temporary crossings. Larger aggregates will be allowed.

- Filter Cloth - Filter cloth is a fabric consisting of either woven or nonwoven plastic, polypropylene, or nylon used to distribute the load, retain fines, allow increased drainage of the aggregate and reduce mixing of the aggregate with the subgrade soil. Filter cloths such as Mirafi, Typar, Adva Filter, Polyfilter X, or approved equivalent shall be used, as required by the specific method.

Considerations for Choosing a Specific Method (Bridge or Culvert): The following criteria for erosion and sediment control shall be considered when selecting a specific temporary access waterway crossing standard method:

- Site aesthetics - Select a standard design method that will least disrupt the existing terrain of the stream reach. Consider the effort that will be required to restore the area after the temporary crossing is removed.

- Site location - Locate the temporary crossing where there will be the least disturbance to the soils of the existing waterway banks. When possible locate the crossing at the point receiving minimal surface runoff.

- Physical site constraints - The physical constraints of a site may preclude the selection of one or more of the standard methods.

- Time of year - The time of year may preclude the selection of one or more of the standard methods due to fish spawning or migration restrictions.

- Vehicular loads and traffic patterns - Vehicular loads, traffic patterns, and frequency of crossings should be considered in choosing a specific method.

- Maintenance of Crossing - The standard methods will require various amounts of maintenance. The bridge method should require the least maintenance, whereas the ford method will probably require more intensive maintenance.

- Removal of the structure - Ease of removal and subsequent damage to the waterway should be primary factors in considering the choice of a standard method.

DESIGN PARAMETERS - TEMPORARY BRIDGE

This is the preferred method for temporary access waterway crossings. Normally, bridge construction causes the least disturbance to the waterway bed and banks when compared to culverts.

Most bridges can be quickly removed and reused.

Temporary access bridges pose the least chance for interference with fish migration when compared to the other temporary access waterway crossings.

CONSTRUCTION GUIDELINES - TEMPORARY BRIDGE

Restriction: Construction, use, or removal of a temporary access bridge will not normally have any time of year restrictions since construction, use or removal should not affect the stream or its banks.

Bridge Placement: A temporary bridge structure shall be constructed at or above bank elevation to prevent the entrapment of floating materials and debris.

Abutments: Abutments shall be placed parallel to and on stable banks.

Bridge Span: Bridges shall be constructed to span the entire channel. If the channel width exceeds 8 feet (as measured from top-of-bank to top-of-bank) then a footing, pier or bridge support may be constructed within the waterway. One additional footing, pier or bridge support will be permitted for each additional 8 foot width of the channel. However, no footing, pier or bridge support will be permitted within the channel for waterways less than 8 feet wide.

Stringers: Stringers shall either be logs, sawn timber, prestressed concrete beams, metal beams, or other approved.

Deck Material: Decking materials shall be of sufficient strength to support the anticipated load. All decking members shall be placed perpendicular to the stringers, butted tightly, and securely fastened to the stringers. Decking materials must be butted tightly to prevent any soil material tracked onto the bridge from falling into the waterway below.

Run Planks (optional): Run planking shall be securely fastened to the length of the span. One run plank shall be provided for each track of the equipment wheels. Although run planks are optional, they may be necessary to properly distribute loads.

Curbs or Fenders: Curbs or fenders may be installed along the outer sides of the deck. Curbs or fenders are an option which will provide additional safety.

Bridge Anchors: Bridges shall be securely anchored at only one end using steel cable or chain. Anchoring at only one end will prevent channel obstruction in the event that floodwaters float the bridge. Acceptable anchors are large trees, large boulders, or driven steel anchors. Anchoring shall be sufficient to prevent the bridge from floating downstream and possibly causing an obstruction to the flow.

Stabilization: All areas disturbed during installation shall be stabilized within 14 calendar days of that disturbance.

MAINTENANCE - TEMPORARY BRIDGE

Inspection - Periodic inspection shall be performed by the user to ensure that the bridge, streambed, and stream banks are maintained and not damaged.

Maintenance: Maintenance shall be performed, as needed to ensure that the structure complies with the standard and specifications. This shall include removal and disposal of any trapped sediment or debris. Sediment shall be disposed of outside of the flood plain and stabilized.

Removal: When the temporary bridge is no longer needed, all structures including abutments and other bridging materials shall be removed within 14 calendar days. In all cases, the bridge materials shall be removed within one year of installation.

Final Clean-Up: Final clean-up shall consist of removal of the temporary bridge from the waterway, protection of banks from erosion, and removal of all construction materials. All removed materials shall be stored outside the waterway flood plain.

Equipment: Removal of the bridge and clean up of the area shall be accomplished without construction equipment working in the waterway channel.

Final Stabilization: All areas disturbed during removal shall be stabilized within 14 calendar days of that disturbance.

DESIGN PARAMETERS - TEMPORARY CULVERT

A temporary access culvert is a structure consisting of a section(s) of circular pipe, pipe arches, or oval pipes of reinforced concrete, corrugated metal, or structural plate, which is used to convey flowing water through the crossing.

Temporary culverts are used where (1) the channel is too wide for normal bridge construction, or (2) anticipated loading may prove unsafe for single span bridges.

Temporary culverts can be salvaged and reused.

CONSTRUCTION GUIDELINES - TEMPORARY CULVERT

Culvert Strength - All culverts shall be strong enough to support their cross sectional area under maximum expected loads.

Culvert Size - The size of the culvert pipe shall be the largest pipe diameter that will fit into the existing channel without major excavation of the waterway channel or without major approach fills. If a channel width exceeds 3 feet, additional pipes may be used until the cross sectional area of the pipes is greater than 60 percent of the cross sectional area of the existing channel. The minimum size culvert that may be used is a 12" diameter pipe.

Culvert Length - The culvert(s) shall extend a minimum of one foot beyond the upstream and downstream toe of the aggregate placed around the culvert. In no case shall the culvert exceed 40 feet in length.

Filter Cloth - Filter cloth shall be placed on the streambed and streambanks prior to placement of the pipe culvert(s) and aggregate. The filter cloth shall cover the streambed and extend a minimum six inches and a maximum one foot beyond the end of the culvert and bedding material. Filter cloth reduces settlement and improves crossing stability.

Culvert Placement - The invert elevation of the culvert shall be installed on the natural streambed grade to minimize interference with fish migration (free passage of fish).

Culvert Protection - The culvert(s) shall be covered with a minimum of one foot of aggregate. If multiple culverts are used they shall be separated by at least 12" of compacted aggregate fill. At a minimum, the bedding and fill material used in the construction of the temporary access culvert crossings shall conform with the aggregate requirements cited in Section I.H. 1. above.

Stabilization - All areas disturbed during culvert installation shall be stabilized within 14 calendar days of the disturbance.

MAINTENANCE - TEMPORARY CULVERT

Inspection - Periodic inspection shall be performed to ensure that the culverts, streambed, and streambanks are not damaged, and that sediment is not entering the stream or blocking fish passage or migration.

Maintenance - Maintenance shall be performed, as needed in a timely manner to ensure that structures are in compliance with this standard and specification. This shall include removal and disposal of any trapped sediment or debris. Sediment shall be disposed of and stabilized outside the waterway flood plain.

Removal - When the crossing has served its purpose, all structures including culverts, bedding and filter cloth materials shall be removed within 14 calendar days. In all cases, the culvert materials shall be removed within one year of installation.

Final Clean-up - Final clean-up shall consist of removal of the temporary structure from the waterway, removal of all construction materials, restoration of original stream channel cross section, and protection of the steam banks from erosion. Removed material shall be stored outside of the waterway flood plain.

Equipment - Removal of the structure and clean up of the area shall be accomplished without construction equipment working in the waterway channel.

Final Stabilization - All areas disturbed during culvert removal shall be stabilized within 14 calendar days of the disturbance.

Temporary stream crossing (North Carolina, 1988)

Temporary stream crossing (California, 1993)

Temporary Access Bridge

Temporary Access Culvert

BMP #134 - Straw Bales/Biofilter Bags

DESCRIPTION

Temporary sediment barriers, consisting of a row of entrenched or anchored straw bales and/or biofilter bags, reduce the transport of sediment from a construction site by providing a temporary physical barrier to sediment and reducing runoff velocities. The barriers can be placed in various combinations to construct the required structure, as shown on the attached figures. They may also be used as a barrier to divert or direct small amounts of runoff around active work areas or to a slope drain, sediment trap or other filtration/sedimentation BMP. Both biofilter bags (plastic mesh bags filled with wood chips) and straw bales are temporary measures. They have a limited life span and must be regularly inspected and replaced when damaged.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	1 ac/400ft bales
Max slope	2% for bales; 10% for biobags
Min bedrock depth	2 ft
Min water table	2 ft
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

APPLICATIONS

The barriers are effective at storm drain inlets, across minor swales and ditches, as diversion dikes and berms, along property lines, and for other applications where the need for a barrier is temporary and structural strength is not required. For instance:

- At the toe of embankment slopes
- At the outlet of slope drains
- As filter cores for log check dams
- In front of silt fences
- To protect inlets along paved streets

LIMITATIONS

These types of barriers are only suitable where flow rates are low (475 gal/min (30 liters per second) or less). They require regular inspections and repair, and periodic replacement (about 3 months maximum usefulness).

Do not use straw bale barriers for drainage areas greater than 1 acre (0.5 hectare). Straw bale barriers often prove ineffective at erosion control if poorly installed and maintained. Even when properly installed, temporary barriers are not usually as effective as silt fences (see BMP #135) or gravel berms see BMP# 142). Straw bales used in conjunction with either of these controls may improve effectiveness and durability. Certified weed-free straw bales must be used instead of hay bales.

DESIGN PARAMETERS

Constructed Slope	Percent Slope	Slope Length Feet
2:1	50	25
2.5:1	40	50
3:1	33	75
3.5:1	30	100
4:1	25	125

Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single-family lot if the slope is less than 15 percent. The contributing drainage area in this instance shall be less than one acre and the length of slope above the dike shall be less than 200 feet.

Concentrated flows: No greater than 475 gal/min (30 liters) per second.

Useful life: 3 months maximum, depending on site conditions.

Buffer zone: An undisturbed buffer zone of 3 to 6.5 ft (1-2 meters) is necessary between the barriers and surface waters to allow safe removal of the barrier and of accumulated sediments.

Embedding: The barrier must be embedded to a minimum depth of 6 in (150 mm) and backfilled for the entire length of the barrier. Each bale or bag should be securely anchored with two stakes 2 in X 2 in X 3 ft (50 mm x 50 mm x 1 meter) or steel drift pins driven at least 20 in (500 mm) into the ground.

CONSTRUCTION GUIDELINES

Barriers used for sediment control at the toe of slopes must be in place prior to disturbing the slope. Install the bales a short distance away from the toe of the slope to increase the effective area but outside of any ditch channel.

Place the barriers in a single row lengthwise on the contour for sheet flow applications, or perpendicular to the contour in concentrated flow applications. When flows are expected to be high enough to surpass the infiltration capacity of the devices, the center (low point) bales shall be wrapped in filter fabric with a 3 ft (1 meter) tail stapled securely and extending from the down gradient side of the barrier to prevent scouring. The ends of the adjacent barriers must tightly abut one another.

Any gaps between barriers should be filled with tightly wedged straw. For concentrated flow applications, extend the end of the barrier so that the bottoms of the end units are at a higher elevation than the top of the lowest middle unit to

assure that sediment laden water flows through or over the barrier instead of around the ends.

MAINTENANCE

Perform one inspection during the first runoff producing event after the installation of the barriers to assure proper functioning. No more than one foot depth of sediment should be allowed to accumulate behind either bales or biofilter bags. Damaged barriers, undercutting, or end runs must be repaired immediately. Bales should be replaced as needed due to disintegration or rotting.

If approved, straw bales or biofilter bags may be used after project completion as mulch. Temporary sediment barriers should be removed within 30 days of final stabilization of the site. If rebar is used it must be removed.

Straw Bale Dike

Biobag placement for overland flow (Portland and USA, 1994)

Biobag placement for ditches and swales (Portland and USA, 1994)

BMP #135 - Silt Fence

DESCRIPTION

A silt fence is a temporary sediment barrier consisting of a filter fabric stretched and attached to supporting posts. (Wire fence backing is necessary with several types of filter fabric commonly used.) Silt fences assist in sediment control by retaining some of the eroded soil particles and slowing the runoff velocity to allow particle settling.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATION

Silt fences can be used near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. The fences should remain in place until the disturbed area is permanently stabilized.

Silt fences can also be used along the toe of fills, on the downhill side of large through-cut areas, along streams, and at natural drainage areas to reduce the quantity of sediment and to dissipate flow velocities to downstream areas.

Also use at grade breaks on cut/fill slopes and above interceptor dikes.

The silt fence should be constructed after the cutting and slashing of trees and before excavating haul roads, fill benches, or any soil disturbing construction activity in the drainage areas.

Physical Limits

Drainage area	1 ac/100 ft
Max slope	33%
Min bedrock depth	2 ft
Min water table	2 ft
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	no

LIMITATIONS

Silt fences should not be used where there is a concentration of water in a channel or drainageway or where soil conditions prevent the minimum fabric toe-in depth or minimum depth for installation of support posts. If concentrated flow occurs after installation, take corrective action by placing rock berms or other corrective measures in the areas of concentrated flow.

DESIGN PARAMETERS

Maximum allowable slope lengths: Maximum allowable slope lengths contributing runoff to a silt fence are listed in the table below:

Slope Steepness	Maximum Slope Length (Feet)

2:1	50
3:1	75
4:1	125
5:1	175
Flatter than 5:1	200

Maximum drainage area: Maximum drainage area for overland flow to a silt fence shall not exceed ½ acre per 100 feet of fence

Design Calculations: Design computations are not required. All silt fences shall be placed as close to the contour as possible, and the area below the fence must be undisturbed or stabilized.

Site Plan Details: A detail of the silt fence shall be shown on the plan, and contain the following minimum requirements:

- The type, size, and spacing of fence posts.
- The size of woven wire support fences.
- The type of filter cloth used.
- The method of anchoring the filter cloth.
- The method of fastening the filter cloth to the fencing support.

Joining Filter Fabric: Where ends of filter fabric come together, they shall be overlapped, folded and stapled to prevent sediment bypass.

Materials:

Silt Fence Fabric**:** The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance. Statewide acceptability shall depend on in-field and/or laboratory observations and evaluations.

Fabric Properties	Value	Minimum Acceptable Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Equivalent Opening Size	40-80	US Std Sieve CW-02215

Ultraviolet Radiation Stability %	90	ASTM-G-26

Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.

Wire Fence (for fabricated units): Wire fencing shall be a minimum 14¼ gage with a maximum 6" mesh opening, or as approved.

Prefabricated Units: Envirofence or approved equal may be used in lieu of the above method providing the unit is installed per manufacturer's instructions.

CONSTRUCTION GUIDELINES

- Posts should be spaced 10 ft (3 meters) apart when a wire mesh support fence is used and no more than 6.5 ft (2 meters) apart when using extra-strength filter fabric (without a wire fence). The posts should extend at least 16 in (0.4 meter) into the ground.
- If standard strength filter fabric filter is to be used, fasten the optional wire mesh support fence to the upslope side of the posts using heavy duty wire staples, tie wires, or hog rings. Extend the wire mesh support to the bottom of the trench. The filter fabric should then be stapled or wired to the fence.
- Extra strength filter fabric does not require a wire mesh support fence. Staple or wire the filter fabric directly to the posts.
- Do not attach filter fabric to trees!
- Where joints in the fabric are required, splice it together only at a support post, with a minimum 6 in (150 mm) overlap, and securely seal the joint.
- Embedded filter fabric should extend in a flap which is anchored by backfill, to prevent fabric from pulling out of ground.

MAINTENANCE

Silt fences should be inspected periodically for damage (such as tearing by wind, animals, or equipment) and for the amount of sediment which has accumulated. Remove the sediment when it reaches one-half the height of the silt fence. In situations where access is available, machinery can be used. Otherwise, the silt must be removed manually. The key elements to remember are:

- The sediment deposits should be removed when heavy rain or high water is anticipated.
- The sediment deposits should be placed in an area where there is little danger of erosion.

- The silt fence should not be removed until adequate vegetative growth ensures no further erosion of the slopes. Generally, the fabric is cut at ground level, the wire and posts are removed, then the sediment is spread, seeded, and protected (mulched) immediately.

BMP #136 - Vegetative Buffer Strip

DESCRIPTION

A vegetative buffer strip is a gently sloping area of vegetative cover that runoff water flows through before entering a stream, storm sewer, or other conveyance. The buffer strip may be an undisturbed strip of natural vegetation or it can be a graded and planted area .

Vegetative buffer strips act as living sediment filters that intercept and detain storm water runoff. They reduce the flow and velocity of surface runoff, promote infiltration, and reduce pollutant discharge by capturing and holding sediments and other pollutants carried in the runoff water. Vegetative buffer strips function much like vegetated or grassed swales. Buffer strips, however, are fairly level and treat sheet flow across them, whereas grassed swales are indentations that treat concentrated flows running along them (see treatment BMP #5 - vegetated swale).

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	20%
Min bedrock depth	5 ft
Min water table	3 ft
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

APPLICATIONS

- Used for temporary or permanent control, usually in conjunction with other sediment collection and slope protection practices. Consider use with level spreaders (treatment BMP #21) or diversion measures such as earth dikes (BMP #140) and slope drains (BMP #125). Also, silt fences (BMP #135) installed up-gradient can prevent overloading of the buffer strip.
- May be placed at many locations between the source of sediment (road surface, side slopes) and a natural or constructed waterway. They are inexpensive and easily constructed, and can be put into place at any time if climatic conditions allow for planting.
- May be used at almost any site that can support vegetation, but is best suited for areas where the soils are well drained or moderately well drained and where the bedrock and the water table are well below the surface.
- Provides low to moderate treatment of pollutants in storm water while providing a natural look to a site.
- Can provide habitat for wildlife.
- Can screen noise and views if trees or high shrubs are planted on the filter strips.

LIMITATIONS

- Not effective for filtering high velocity flows from large paved areas, steep slopes, or hilly areas. Consider other measures if slopes exceed 15 percent.
- Requires significant land space.
- May have a short useful life due to clogging by sediments and oil and grease.
- Do not use planted or seeded ground as a buffer strip for sediment trapping until the vegetation is well established.

DESIGN PARAMETERS

Width and length: A buffer strip must be at least 20 ft (6 meters) wide to function well. Along live streams or above wetlands, the minimum width should be 100 ft (30 meters). The length of the strip should be approximately 50 to 82 ft (15 to 25 meters). Where slopes become steeper, increase the length of the strip.

Plant materials: Tall, dense stands of grass form good sediment traps, as do willows and alder. The willows and alder can be native or planted. A combination of grasses with willows or alder is also effective. Any planted species should be deep rooted and able to adjust to low oxygen levels. Vegetative cover should be at least 75 percent to assure adequate removal of sediments. Forested strips are always preferred to vegetated strips, and existing vegetation is preferred to planted vegetation. In planning for vegetated strips, consider climatic conditions, since vegetation may not take hold in especially dry and/or cold regions.

Effectiveness: In many cases, a vegetative buffer strip will not effectively control runoff and retain sediments unless employed in conjunction with other control measures. Where heavy runoff or large volumes of sediment are expected, provide diversion measures or other filtering measures above or below the buffer strip.

CONSTRUCTION GUIDELINES

- Try to direct sediment-laden water onto naturally vegetated or stabilized planted ground.
- Fertilizing seeded or planted ground may enhance growth (and improve its effectiveness as a buffer strip).
- Do not place any equipment, construction debris, or extra soil in the buffer strip (or the strip will be damaged).

MAINTENANCE

Inspections: Inspect the buffer strip at regular intervals to ensure proper functioning. Check for damage by equipment and vehicles. In newly planted areas, check the progress of germination and plant growth, and arrange for fertilizing, if needed, to enhance growth and establishment. (Planted ground must not be used for a sediment trap until the vegetation is well established.) Make sure that water flowing

through the buffer strip is not causing additional erosion nearby, and not forming ponds due to erosion within the buffer strip.

Maintenance: Buffer strips in natural vegetation do not generally require maintenance; however, on some sites it may be necessary to remove sediments and replant on a regular basis. Promptly repair any damage from equipment, vehicles, or erosion.

BMP #137 - Sedimentation Trap (Basin)

DESCRIPTION

A temporary or permanent dam or basin used to collect, trap, and store sediment produced by construction activities, or as a flow detention facility for reducing peak runoff rates. Sediment basins can be designed to maintain a permanent pool or to drain completely dry. Either way, the basin detains sediment-laden runoff long enough to allow most of the sediment to settle out.

A sediment basin can be constructed by excavation or by placing an earthen embankment across a low area or drainage swale. The pond has a riser and pipe outlet with a gravel outlet or spillway to slow the release of runoff and provide some sediment filtration.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	5 ac
Max slope	10%
Min bedrock depth	3 ft
Min water table	2 ft
SCS soil type	BCD
Freeze/Thaw	good
Drainage/Flood control	no

APPLICATIONS

Sediment traps are appropriate where physical site conditions or land ownership restrictions preclude the effective use of barrier-type erosion control measures. It may be used below construction operations which expose critical areas to soil erosion.

A temporary sediment basin used in combination with other control measures, such as seeding or mulching, is especially effective for removing sediments.

Note that the use of sedimentation basins on construction sites greater than or equal to 5 acres with an NPDES stormwater permit has special requirements. Refer to Part IV.D.2.a.(2)(a) of the NPDES stormwater general permit for onsite activities.

LIMITATIONS

- May not be feasible downstream of narrow right-of-way due to lack of space.
- May not be practical in highly erodible soil types (0.01 and smaller, very fine sand, silt and clay) due to extremely large basin size requirements.
- May not remove enough of the fine silts. Additional control measures such as filter cloth around riser should be used to minimize release of fine silts. If filter cloth is used, regular inspection and replacement is required to deal with clogging.
- Should not be located in any active stream channel.

DESIGN PARAMETERS

Design of the basin should be based upon the total drainage area lying upstream and (if permanent) on the future use of such lands. Design should be approved by a professional engineer.

The volume of the sediment basin should be at least 1800 ft^3 /acre (125 cubic meters per hectare) of total drainage area (about 1/2 in (13 mm) over the watershed). Disturbed areas greater than 10 acres (4 hectares) within the same drainage basin should be provided a basin with a capacity of 3600 ft^3 (250 cubic meters) per hectare of total drainage area (1 in (25 mm) over the watershed) to meet the NPDES regulations.

The basin should be designed with baffles or other deflectors to spread the flow throughout the basin. It should also include an emergency spillway and riser pipe(s). These structures must be designed on a site-specific basis using standard engineering practices. The basin pond must be sized by calculating the settling zone volume and adding the necessary sediment storage volume. The settling zone volume is determined by the pond surface area calculated using the following equation:

$SA = 1.2Q_x / V_{sed}$

Where:

SA = the pond surface area in square meters

Q_x = the design inflow (in cubic meters per second) based on the runoff from the design storm event for the drainage area.

V_{sed} = the settling velocity for the design soil particle in meters per second. The following table lists theoretical settling velocities for different particle sizes (#200 sieve=0.074 mm).

Size in (mm)	V_{sed} in/sec (m/sec.)
0.02 (0.5)	0.0023 (0.058)
0.008 (0.2)	0.00079 (0.020)
0.004 (0.1)	0.00028 (0.007)
0.002 (0.05)	0.000079 (0.002)
0.0008 (0.02)	0.000012 (0.0003)
0.0004 (0.01)	0.0000028 (0.00007)
0.0002 (0.005)	0.00000079 (0.00002)

For particle sizes of 0.01 and smaller, the V_{sed}'s are so low that the SA becomes extremely large, often making the overall basin size requirement too large to be practical. In this case, extra protection

measures should be taken to negate the need for the basin.

The settling volume requirement is then calculated by multiplying the surface area by the settling depth. The settling depth must be a minimum of 1 ft (0.6 meter) and a maximum of 4 ft (1.2 meters) and is governed by a relationship with the basin length (distance from the inlet to the outlet). The ratio of length to settling depth should be greater than 200. For example, if the length was (120 meters), the settling depth must be less than 2 ft (0.6 meters) to achieve the ratio of greater than 200.

Typically, a sediment storage depth of 3 ft (1.0 meter) is appropriate unless large volumes of soil are expected from highly erodible site conditions. In this case use the "universal soil loss equation" or other applicable estimating methods to design the storage depth on a site-specific basis.

Determine the final pond dimensions and volume as follows:

1) Determine the pond geometry for the sediment settling volume calculated above by adding a sediment storage depth of 3 ft(1.0 meter) and 3:1 side slopes from the bottom of the basin. The bottom must be level.

2) Extend the side slopes (at 3:1) as necessary to obtain the settling zone volume at the settling zone depth determined above.

3) Adjust the geometry of the basin to effectively combine the settling zone volume and sediment storage volume while preserving the depth and side slope criteria listed above.

Sediment basins covered by this standard should be limited to the following category:

The water surface at the crest elevation of the pipe spillway should not exceed 10 ft (3 meters) measured upward from the original stream bed to the crest elevation of the pipe spillway; and the drainage area should not exceed 150 acres (60 hectares).

Because finer silts may not settle out completely, additional erosion control measures should be used to minimize release of the fine silt. Runoff should enter the basin as far from the outlet as possible to provide maximum retention time.

CONSTRUCTION GUIDELINES

The temporary sediment basin should be installed before clearing and grading is undertaken. It should not be built within an active stream channel. Putting a dam in such a site could destroy aquatic habitat, and failure of the dam could result in flooding. A temporary sediment basin should be constructed only if there is sufficient space and appropriate topography. The basin should be made large enough to handle the maximum expected amount of site drainage. Fencing around the basin may be necessary for safety reasons or to discourage vandalism.

The following general construction criteria are critical to successful installation and operation of sediment basins.

- Locate the dam to provide maximum volume capacity for silt behind the structure.

- Prepare the dam site by clearing vegetation and removing topsoil before beginning dam construction. Areas under the embankment and any structural works should be cleared and grubbed, and the topsoil stripped to remove all trees, vegetation, roots and other objectionable material. To facilitate cleanout and restoration, the pool area (measured at the top of the pipe spillway) should be cleaned of all brush, trees or other debris.

- Level the bed for the pipe spillway to provide uniform support through its entire length under the dam.

- Construct an emergency spillway (as per design) on undisturbed soil--not on fill. The design width and entrance/exit channel slopes are critical to the spillway's ability to successfully protect the dam with a minimum of erosion hazard in the spillway channel. The spillway should be lined with

  > 4 in (100 mm) of concrete, reinforced with 6 X 6 in (150 mm x 150 mm) 10/10 wire mesh extending to a minimum of 36 in (900 mm) down each face of the embankment. The spillway should be at least 20 in (500 mm) deep with 1:1.5 slide slopes.

- All pipe joints must be securely fastened and watertight. The riser should be rigidly and securely fastened to the barrel and the bottom of the riser should be sealed (watertight). The barrel should be placed on a firm foundation according to the lines and grades shown on the plans.

- Place at least 1 ft (600 mm) of hand-compacted backfill (maximum 6 in (150 mm) lifts) over the pipe spillway before crossing it with construction equipment. The movement of the hauling and spreading equipment over the fill should be controlled so that the entire surface of each lift will be traversed by not less than one tread tract of the equipment.

- The pipe spillway should discharge at ground elevation below the dam, and not more than 12 in (300 mm) above any streambed.

- Fill material should be taken from approved designated borrow areas, and should be of the type and quality conforming to that specified for the adjoining fill material. It should be free of roots, woody vegetation, oversize stones, rocks exceeding 6 in (150 mm) diameter, or other objectionable materials. Do not use frozen material.

- Areas on which fill is to be placed should be scarified prior to placement of fill. Fill materials should be placed in 6 in (150 mm) maximum lifts, compacted by construction equipment. The embankment should be raised and compacted to an elevation which provides for anticipated settlement to design elevation (allow at least 10 percent for settlement). Lifts should be continuous over the entire length of the fill and approximately horizontal.

- Stabilize the embankment and emergency spillway with revegetation or other stabilization measures.

MAINTENANCE

Sediment basins should be readily accessible for maintenance and sediment removal. They should be inspected after each rainfall and be cleaned out when about half the volume has been filled with sediment. Poorly draining basins require maintenance to clean clogged riser or filter cloth. Removed sediment should be disposed of and stabilized in an approved location such that spoils do not re-enter waters of the state. Sediment may not be dumped into any water of the U.S. without appropriate permitting.

The sediment basin should remain in operation and be properly maintained until vegetation or other measures permanently stabilize the drainage area. A well built temporary sediment basin that is large enough to handle the post-construction runoff volume may later be converted to use as a permanent storm water management structure.

If the pond is located near a residential area, it is recommended for safety reasons that a sign be posted and that the area be secured by a fence.

BMP #138 - Portable Sediment Tank

DESCRIPTION

A sediment tank is a compartmented tank container through which sediment laden water is pumped to trap and retain the sediment prior to pumping the water to drainageways, adjoining properties, and rights-of-way below the sediment tank site.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

A sediment tank should be used on sites where excavations are deep, and space is limited, such as urban construction, where direct discharge of sediment laden water to stream and storm drainage systems is to be avoided.

Physical Limits

Drainage area	5
Max slope	NA
Min bedrock depth	NA
Min water table	NA
SCS soil type	NA
Freeze/Thaw	good
Drainage/Flood control	no

DESIGN PARAMETERS

Location: The sediment tank shall be located for ease of clean-out and disposal of the trapped sediment, and to minimize the interference with construction activities and pedestrian traffic.

Tank Size: The following formula should be used in determining the storage volume of the sediment tank: Pump Discharge (G.P.M.) x 16 = Cubic Foot Storage.

An example of a typical sediment tank is shown in on the attached drawing. Other container designs can be used if the storage volume is adequate and approval is obtained from the local approving agency.

INSTALLATION GUIDELINES

Follow manufacturer's specifications.

VARIATION WITH FLOCCULATION

The pollution removal efficiency of the sediment tank can be considerably increased by using flocculation chemicals, such as alum (aluminum sulfate) in the tank. Flocculation will allow some very small suspended solids to settle that otherwise would never be removed. The time it takes to settle out larger particulates will also decrease. However, a flocculation tank setup is considerably more complicated as the rate of flocculant addition must be carefully monitored.

BMP #139 - Temporary Swale

DESCRIPTION

A temporary excavated drainage way designed to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet. Another purpose of a temporary swale is to intercept sediment laden-water and divert it to a sediment trapping device.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	10
Max slope	14 %
Min bedrock depth	5 ft
Min water table	3 ft
SCS soil type	BCD
Freeze/Thaw	fair
Drainage/Flood control	yes

APPLICATIONS

Temporary Swales are constructed:

- To divert flows from a disturbed area
- Intermediately across disturbed areas to shorten overland flow distance.
- To direct sediment laden water along the base of slopes to a trapping device.
- To transport offsite flows across disturbed areas such as rights-of-way.

Swales collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

DESIGN PARAMETERS

Design Criteria. The following design criteria should be met, depending on the drainage area served by the swale:

Swale A Swale B

Drainage Area 5 ac or less 5-10 ac

Bottom Width of Flow Channel 4 feet 6 feet

Depth of Flow Channel 1 foot 1 foot

Side Slopes 2:1 or flatter 2:1 or flatter

Grade 0.5% min, 0.5% min,

20% max 20% max

Outlet.

- The temporary swale shall be designed with an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.
- Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the swale is adequately stabilized.
- The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet condition.
- If a swale is used to divert flows from entering a disturbed area, a sediment trapping device may not be needed.

CONSTRUCTION GUIDELINES

Stabilization of the swale shall be completed within 10 days of installation with proper seeding or mulching techniques (see BMP #145-Seeding or BMP #121-Mulching). The flow channel shall be stabilized according to the following criteria:

Type of treatment	Channel grade (percent)	Flow Channel A (less than 5 acres)	Flow Channel B (5-10 acres)
1	0.5-3.0	Seed and Straw Mulch	Seed and Straw Mulch
2	3.1-5.0	Seed and Straw Mulch	Seed and cover with Jute or Excelsior; Sod, or line with 2" stone
3	5.1-8.0	Seed and cover with Jute or Excelsior; Sod, or line with 2" stone	Line with 4-8"stone or Recycled Concrete Equivalent[a]
4	9.1-20	Line with 4-8"stone or Recycled Concrete Equivalent[a]	Engineering Design

[a] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

In highly erodible soils, as defined by the Soil Survey (NRCS/SCS) of the project's county, refer to the next higher slope grade for type of stabilization.

Also see Treatment BMP #1 - Vegetated Swale, for additional construction guidelines for swales.

MAINTENANCE

See treatment BMP #1 - Vegetated Swale.

BMP #140 - Earth Dike

DESCRIPTION

An earth dike is a temporary berm or ridge (or ridge-and-channel combination) of compacted soil located in a manner to channel water to a desired location. Earth dikes are used to protect work areas from upslope runoff and to divert sediment-laden water to appropriate traps or stable outlets. The channel portion (if used) generally has a lining of stone, riprap, or vegetation for stabilization.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	10 ac
Max slope	10%
Min bedrock depth	5 ft
Min water table	5 ft
SCS soil type	ABC
Freeze/Thaw	Fair
Drainage/Flood control	yes

APPLICATIONS

Earth dikes are used in construction areas to control erosion, sedimentation, or flood damage. Earth dikes can be used in the following situations:

- Across unprotected slopes, as slope breaks, to reduce length.
- Below slopes to divert excess runoff to stabilized outlets.
- At or near the perimeter of the construction area to keep sediment-laden runoff from leaving the site.
- To protect cut or fill slopes by diverting upslope flows away from disturbed areas to a stabilized outlet.
- To direct any sediment-laden runoff to a sediment-trapping device.
- To direct clean water away from disturbed areas

LIMITATIONS

- Despite an earth dike's simplicity, improper design can limit its effectiveness.
- Frequent inspection and maintenance are essential to the proper performance of this BMP.
- When the drainage area above the earth dike is greater than 10 acres (4 hectares), consult the United States Department of Agriculture - Soil Conversation Service (USDA-SCS) standards and specifications for diversions.

DESIGN PARAMETERS

The earth dike shall be constructed of compacted soil or coarse aggregate according to the following criteria:

SUGGESTED DIKE DESIGN CRITERIA		
Criteria	**Drainage area under 5 acres (2 hectares)**	**Drainage area between 5 to 10 acres (2 to 4 hectares)**
Dike Height	18 in (.53 m)	3 ft (1.0 m)
Dike Width	2 ft (0.6 m)	3 ft (1.0 m)
Flow Width	4 ft(1.3 m)	6 ft (2.0 m)
Flow Depth in channel	8 in (0.2 m)	15 in (0.4 m)
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% - 20%	0.5% - 20%

The channel formed behind the dike should have a positive grade to a stabilized outlet. The channel should be stabilized with vegetation or other stabilization measures.

Grades over 10 percent may require site-specific design developed or approved by a registered engineer.

CONSTRUCTION GUIDELINES

Some general considerations include proper compaction of the earth dike, appropriate location to divert the intercepted runoff, and proper ridge height and thickness. Earth dikes should be constructed along a positive grade. Other than the discharge point, there should be no dips or low points where stormwater will collect.

Runoff intercepted from disturbed areas should be diverted to a sediment-trapping device. Runoff from undisturbed areas can be channeled to an existing swale or to a level spreader. Stabilization for the dike and flow channel (or drainage swale) should be stabilized as soon as possible. Stabilization materials can include vegetation, stone, or riprap.

Where: Construct the dike where it will not interfere with major areas of construction traffic so that vehicle damage to the dike will be kept to the minimum.

When: Install the dike prior to the majority of soil disturbing activity. The dike may be removed when stabilization of the drainage area and outlet are complete.

Site preparation: Clear the area of all trees, brush, stumps, or other obstructions.

Construction: Construct the dike to the designed cross-section, line and grade making sure that there are no irregularities or bank projections to impede the flow. Construct the connecting portion to any stream channel last.

Compaction: The dike should be compacted using earth moving equipment (to prevent failure of the dike).

Stabilization: The dike must be stabilized at least 10 days after installation. The flow channel shall be stabilized according to the following criteria:

Type of treatment	Channel grade (percent)	Flow channel A (less than 5 acres)	Flow channel B (5-10 acres)
1	0.5-3.0	Seed and Straw Mulch	Seed and Straw Mulch
2	3.1-5.0	Seed and Straw Mulch	Seed and cover with Jute or Excelsior; Sod, or line with 2" stone
3	5.1-8.0	Seed and cover with Jute or Excelsior; Sod, or line with 2" stone	Line with 4-8"stone or Recycled Concrete Equivalent
4	8.1-20	Line with 4-8"stone or Recycled Concrete Equivalent	Engineering Design

[a] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

In highly erodible soils, as defined by the Soil Survey (NRCS/SCS) of the project's county, refer to the next higher slope grade for type of stabilization.

Outlet: Earth dikes shall have an outlet that functions with a minimum of erosion. Runoff shall be conveyed to a sediment trapping device until the drainage area above the dike is adequately stabilized. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

MAINTENANCE

- Inspect diversion dikes regularly and after every storm. Make any repairs necessary to ensure they are in good working order.
- Inspect the dike, flow channel and outlet for deficiencies or signs of erosion.
- If material must be added to the dike, be sure it is properly compacted.
- Reseed/stabilize the dike as needed to maintain its stability regardless if there has been a storm event or not.

BMP #141 - Perimeter Dike/Swale

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	2 acres
Max slope	10 %
Min bedrock depth	5 ft
Min water table	5 ft
SCS soil type	ABC
Freeze/Thaw	fair
Drainage/Flood control	yes

DESCRIPTION

A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area. The purpose of a perimeter dike/swale is to prevent off-site storm runoff from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

APPLICATIONS

A perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along top of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

DESIGN PARAMETERS

The perimeter dike/swale shall not be constructed outside the property lines without obtaining legal easements from effected adjacent property owners.

A detailed design is not required for the perimeter dike/swale. However, the following criteria shall be used:

Drainage area: Less than 2 acres (for drainage areas larger than 2 acres, but less than 10 acres, see BMP #140 - earth dike; for drainage areas larger than 10 acres, see BMP #143 - storm drain diversion).

Height: 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

Bottom width of dike: 2 feet minimum.

Width of Swale: 2 feet minimum.

Grade: Dependent upon topography, but shall have positive drainage

(sufficient grade to drain) to an adequate outlet. Maximum

allowable grade not to exceed 20 percent.

Outlet

- The perimeter dike/swale shall have an outlet that functions with a minimum of erosion.

- Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.
- Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap (BMP #137), or to an area protected by any of these practices.
- The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

CONSTRUCTION GUIDELINES

The disturbed area of the dike and swale shall be stabilized within 10 days of installation, in accordance with the guidelines seed and straw mulch or straw mulch only if not in the seeding season. (See BMPs #143 and #121).

MAINTENANCE

See BMP #140 - Earth Dike, or treatment BMP #1 - Vegetated Swale.

BMP #142 - Temporary Berms (Sandbags)

DESCRIPTION

A temporary berm is a ridge of compacted soil, or sandbags which intercepts and diverts runoff from small construction areas. Temporary berms are often constructed along the top edge of fill slopes but may also be constructed across the roadway (as a transverse berm) at a slight angle with the centerline.

Berms are used to prevent runoff onto newly constructed slopes until vegetation is established or until permanent measures are in place. They intercept flow from the construction area and direct it to temporary slope drains or to outlets where it can be safely discharged.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	5 ac
Max slope	50%
Min bedrock depth	N/A
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	yes

APPLICATIONS

Temporary berms are used to direct or divert runoff flows, or as barriers to collect and store runoff. They are used at storm drain inlets, across minor swales and ditches, and for other applications where the structure is of a temporary nature.

LIMITATIONS

Temporary berms do not provide filtration. Therefore, they can only be used for minor flows.

DESIGN PARAMETERS

Soil berm: A berm of soil with an approximate height of 12 to 20 in (300 to 500 mm) with a minimum top width of 2 to 2.3 ft (600 to 700) mm and side slopes of 2:1 or flatter. Berms should be high enough to prevent flow from overtopping. Berms are normally constructed from embankment materials.

Sandbag berm: The following dimensions are suitable for sandbag berms.

- Height - 20 in (0.5 meter) minimum
- Top width - 20 in (0.5 meter) minimum
- Bottom width - approximately 4.25 to 5 ft (1.3 to 1.5 meters)
- Sandbag size - length 2 to 2.6 ft (0.6 to 0.8 meters), width 16 to 20 in (0.4 to 0.5 meters), depth or thickness 6 to 8 in (150 to 200 mm), and weight 88 to 132 lb (40-60 kg)

CONSTRUCTION GUIDELINES

Soil berm: All berms should be graded to drain to a slope drain inlet. When practical, embankments should be constructed with a gradual slope to one side of the embankment. This will permit the placement of all temporary berms and slope drains on one side of the embankment. When fills are constructed on sidehill slopes, the top surface should slope toward the inside so that surface runoff will be away from the fill slope.

- Compact the entire width of the berm. This can be accomplished with the track of a bulldozer or, preferably, with a grader wheel (rubber).

Sandbag berm:

- Install so that flow under or between bags is prevented.
- Stack the sandbags in an interlocking fashion to provide additional strength for resisting the force of the flowing water. However, do not stack them more than three high without broadening the foundation using additional sandbags, or providing additional stability.
- Sandbag sediment barriers should store the runoff from design storm as specified.

MAINTENANCE:

Temporary berms should be inspected and repaired periodically as well as after each significant rainfall.

Sandbags should be reshaped or replaced as needed during inspection. Additional inspections should be made daily during wet weather. When silt reaches 6 inches (150 mm), the accumulated silt should be removed and disposed of at an approved site in a manner that will not contribute to additional siltation. The sandbag berm should be left in place until all upstream areas are stabilized and accumulated silt has been removed. Removal of bags should be done by hand.

BMP #143 - Temporary Storm Drain Diversion

DESCRIPTION

The re-direction of a storm drain line or outfall channel so that it may temporarily discharge into a sediment trapping device. The purpose is to prevent sediment laden water from entering a watercourse, public or private property through a storm drain system, or to temporarily provide underground conveyance of sediment laden water to a sediment trapping device.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

One of the following practices or procedures shall be used whenever the off-site drainage area is less than 50 percent of the on-site drainage area to that system. A special exception may be given, at the discretion of the local permitting authority, where site conditions make this procedure impossible.

Physical Limits

Drainage area	5 ac
Max slope	50%
Min bedrock depth	NA
Min water table	NA
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	yes

DESIGN METHODS FOR TEMPORARY DIVERSION

- Construction of a sediment trap (basin) (see BMP #137) below a permanent storm drain outfall: Temporarily divert storm flow into the basin or trap constructed below permanent outfall channel.
- In-line diversion of storm drain at an inlet or manhole: Achieved by installing a pipe stub in the side of a manhole or inlet and temporarily blocking the permanent outfall pipe from that structure. A temporary outfall ditch or pipe may be used to convey storm flow from the stub to a sediment trap or basin. This method may be used just above a permanent outfall or prior to connecting into an existing storm drain system.
- Delay completion of the permanent storm drain outfall and temporarily divert storm flow into a sediment trap: Earth dike (BMP #140), swale (BMP #139) or designed diversion is used, depending on the drainage area, to direct flow into a sediment trap. The trap should be constructed to one side of the proposed permanent storm drain location whenever possible.
- Installation of a stormwater management basin early in the construction sequence: Install temporary measures to allow use as a sediment basin. Since these structures are designed to receive storm drain outfalls, diversion should not be necessary.

COMPLETION AND DISPOSITION

When the areas contributing sediment to the system have been stabilized procedures can be taken to restore the system to its planned use.

The following removal and restoration procedure is recommended:

1. Flush the storm drain system to remove any accumulated sediment.

1. Remove the sediment control devices, such as traps, basins, dikes, swales, etc.

2. For sites where an inlet was modified, brick shut the temporary pipe stub and open the permanent outfall pipe.

3. Establish permanent stabilized outfall channel as noted on the plans.

4. Restore the area to grades shown on the plan and stabilize with vegetative measures.

5. For basins that will be converted to stormwater management, remove the accumulated sediment, open the low flow orifice, and seed all disturbed areas to permanent vegetation.

BMP #144 - Topsoiling

DESCRIPTION

This BMP includes the placement of topsoil or other suitable plant growth material over disturbed lands to provide a suitable soil medium for vegetative growth and a supply of native or locally occurring seeds and propagules. Topsoiling may involve bringing in soils from off site or merely replacing fertile topsoils that were stripped and stockpiled during earlier site development activities.

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	50%
Min bedrock depth	3 ft
Min water table	2 ft
SCS soil type	N/A
Freeze/Thaw	fair
Drainage/Flood control	no

APPLICATIONS

Topsoiling is recommended on slopes 2:1 or flatter where the native soil is unsuitable for vegetative growth. It is an effective way of improving plant establishment on sites where moisture, nutrients, or pH levels are low, or where the remaining soil is too shallow to support root systems.

LIMITATIONS

Be careful not to apply topsoil over a subsoil of contrasting texture. For instance, a clay-like topsoil placed over a sandy soil may cause the topsoil to slough as water flows between the two soil layers of different permeability. Also, topsoil should not be applied when the subsoil is frozen or extremely wet.

DESIGN PARAMETERS

Plan to maintain the existing or established grade of the subsoil. The topsoil should be uniformly distributed at a minimum compacted depth of 2 inches (50 mm) on slopes 3:1 or steeper, and 4 inches (100 mm) deep on flatter slopes. The soil should be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or other mixture approved by an agronomist. It should be free of subsoil, refuse, sticks, noxious weed seeds, other extraneous materials, and stones larger than 1.5 inches (40 mm) diameter.

Topsoil can either be obtained commercially or stripped, stockpiled, and replaced on the construction site. Stockpiled topsoils should undergo a laboratory analysis to determine organic content, pH, and soluble salts. A pH of 6.0 to 7.5 and organic content of not less than 1.5 percent by weight is recommended. Where soil pH is less than 6.0, lime may be applied to adjust pH to 6.5 or higher. Any soils having soluble salt content greater than 500 parts per million should not be used.

If desired, it is possible to place a thin layer of topsoil 1.2 to 2 inches (30 to 50 mm) thick on benched slopes. In such applications, it is important not to apply so much topsoil that the value of the benches is destroyed. This method is especially valuable

on rocky benches, especially on south- or west-facing slopes, however, proper placement of the soil is often a problem. In some cases, soil has been bucketed onto slopes. This produces an uneven spread and the quantity is hard to control. Soil can also be blown onto the slope using a snow blower. In that case, organic matter can be mixed with the soil, but the soil should be screened to remove any rocks larger than 2 inches (50 mm). The advantage is that the amount of soil needed is much less and it can be spread very rapidly on the horizontal surfaces. The soil may need some form of stabilization before the next rain event. Consider whether mulch, matting, geotextiles or seeding is required and when.

CONSTRUCTION GUIDELINES

The following guidelines apply to the placement of topsoil:

- The existing or established grade of subsoil should be maintained.
- Lime may be uniformly applied over designated areas where subsoil is highly acidic or heavy in clay content.
- Prior to spreading topsoil, loosen the subgrade by discing (or other method) to a depth of 2 inches (50 mm) to permit bonding of subsoil to topsoil. Tracking a bulldozer vertically over the slope will pack the soil and create horizontal erosion check slots to prevent topsoil from sliding down the slope.
- Spread the topsoil uniformly at a minimum compacted depth of 2 inches (50 mm) on 1:3 or steeper slopes and 4 inches (100 mm) on flatter slopes. A depth of 6 to 12 inches (150 to 300 mm) is preferred. Any surface irregularities should be corrected in an effort to prevent formation of water-holding depressions.
- Where quantities of stockpiled topsoil on site are limited, it is more desirable to cover all areas of exposed subsoil to a lesser depth than to cover partial areas to the suggested minimum depth of 3.1 inches (80 mm).
- Topsoil should not be placed when the subgrade is frozen, excessively wet or in a condition that may otherwise be detrimental to proper grading or proposed sodding or vegetation establishment.

MAINTENANCE

Periodically and after major storm events, inspect, repair, and reseed as necessary to control slope erosion and subsequent topsoil losses.

BMP #145 - Seeding

DESCRIPTION

Permanent Seeding means growing a long-term or permanent vegetative cover (plants) on disturbed areas or areas that need assistance in revegetation. The purpose of permanent seeding is to reduce erosion and sedimentation and to establish desirable competitive ground cover for wildlife habitat and ease of roadside maintenance. This practice uses prescribed perennial grasses, legumes and native shrubs or wild flowers that will hold the soils, reduce storm water runoff and act as a bio-filtering system on long term basis.

The guidelines given in this fact sheet for design, construction and maintenance can also be used to install temporary seeding on construction sites.

Targeted Pollutants

- ● Sediment
- ◒ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	5%
Min bedrock depth	2 ft
Min water table	2 ft
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

APPLICATIONS

Temporary seeding should be considered as slope protection and erosion control practice for construction sites. Permanent seeding should be considered for any disturbed area where all construction or maintenance activities have ceased or been finalized and is now ready for permanent vegetative cover. Typical areas subject to permanent vegetative cover are all areas disturbed by new construction, reconstruction, maintenance, materials source site and areas in need of revegetation.

The primary advantages of seeding are:

- It establishes good soil stabilization.
- It prevents soil erosion and sedimentation.
- It contains and filters storm water runoff.

Additional advantages specific to permanent seeding are:

- It provides wildlife ground cover and habitat.
- It competes with undesirable vegetation and noxious weeds.
- It provides aesthetic qualities.
- It reduces the cost of maintenance.

LIMITATIONS

Permanent vegetative ground cover will take several years before sufficient establishment takes place. Establishment will occur quicker in high precipitation areas, usually over 20 inches (500 mm), as opposed to the arid or semi-arid regions of the state. Permanent seeding should be conducted in conjunction with various forms of mulching, matting and annual grass (cereal grain) as a nurse crop.

Other factors that contribute to the success or failure of permanent seeding are:

- Seeding should be done at the proper time of year.
- Proper application of fertilizers as prescribed will contribute to the success of the seeding.
- Once seeded, the site should not be disturbed.
- Irrigation may have to be used in low precipitation area (arid/semi-arid) for establishment.

DESIGN PARAMETERS

Conduct all permanent seeding and fertilizing in accordance with local requirements. See Appendix F in this manual for additional guidelines.

CONSTRUCTION GUIDELINES

- Permanent seeding is the last phase of reclaiming any disturbed soils.

MAINTENANCE

- Inspect all seeded areas on a regular basis and after each major storm event to check for areas where corrective measures may have to be made.
- Indicate which areas need to be reseeded or where other remedial actions are necessary to assure establishment of permanent seeding.
- Continue monitoring of the site/area until permanent vegetation is established.

BMP #146 - Sodding

DESCRIPTION

This BMP entails the placement of rolls or strips of sod as a landscape planting or erosion control measure. Sod is a layer of soil bound by grass and plant roots into a thick mat. It is commercially available in rolled strips that are laid over an area of exposed soil. Sod stabilizes the area by immediately covering the surface with vegetation and enabling storm water to infiltrate into the ground.

Targeted Pollutants

- ● Sediment
- ◒ Phosphorus
- ◒ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

APPLICATIONS

Sodding is appropriate for any graded or cleared area that might erode and where a permanent, long-lived plant cover is needed immediately. It can be a temporary or permanent BMP. Possible uses for sod include buffer zones, stream banks, dikes, swales, slopes, outlets, level spreaders, and filter strips.

Physical Limits

Drainage area	unlimited
Max slope	14%
Min bedrock depth	2 ft
Min water table	2 ft
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

Primary advantages of sod are:

- Provides immediate dense vegetative cover and erosion control.
- Provides more stabilizing protection than initial seeding.
- Generates less weed growth than seeded vegetation does.
- Can be available for site activities (open to foot traffic) within a shorter time than can seeded vegetation.
- Can be placed at any time of the year as long as water is available and moisture conditions in the soil are favorable.

LIMITATIONS

- Purchase and installation costs are higher than for seeding.
- Continued irrigation may be required if the sod is placed during dry seasons or on sandy soils. Watering may be necessary after planting and during periods of drought or intense heat.
- Sod should not be installed during very hot or wet weather.

DESIGN PARAMETERS

Materials: Use grasses that require little or no maintenance (watering or fertilizing). This may require advance planning to obtain grasses that are desirable for the location.

Site preparation: The soil surface should be find graded before laying down the sod. Topsoil may be needed in areas where soil textures or conditions are inadequate (such as dense or impermeable soils). Add lime and fertilizers as needed to promote good plant growth conditions.

Slope: Do not place sod on slopes greater than 3:1 if slopes are to be mowed. If placed on steep slopes, the sod should be laid with staggered joints or be pegged down (or both).

Installation methods: Sod can be applied in strips or other patterns, or alternate areas can be seeded to reduce expense. If placed on steep slopes or next to running waterways, consider placing chicken wire, jute, or other matting over the sod for extra protection against lifting. See BMP #124-Matting and Netting or BMP #123-Geotextiles.

CONSTRUCTION GUIDELINES

- Spread and grade the topsoil (if used). Sod may be placed directly on the ground (without topsoil) only if it has been specifically grown for sites with no topsoil.
- Prepare the soil surface by fine-grading the surface before laying sod. Sodding should then take place immediately after the soil bed is established.
- Lay the sod in a staggered pattern, as shown. Sod in waterways must be laid parallel to the flow.
- Sod can be laid in strips on the contour to reduce effective slope length.
- Roll or compact the sod immediately after installation to ensure firm contact with the underlying soil.
- Water to a depth of 4 inches (100 mm), as needed.

MAINTENANCE

- Inspect the sod frequently after it is first installed, especially after large storm events, until it is established as permanent cover. Remove and replace any dead sod.
- Once the sod is established, mow the area as needed.
- Water as often as necessary during periods of intense heat or lack of rain.
- Sodding usually serves as both a temporary and permanent measure and therefore does not require removal.

BMP #147 - Planting

DESCRIPTION

This BMP fact sheet describes the process of establishing vegetation by setting out plants that have been grown to a specified size or age. The plants may be potted in plastic tubes or in containers of various sizes, or root wrapped, or may be bare root stock .

Plantings are often specified for aesthetic purposes (landscaping) but can serve various erosion control functions as well. The living trees and shrubs in a planted area will grow large enough to provide soil stabilization and erosion control benefits sooner than the seeds of woody species can germinate and grow to effective size.

The use of trees and shrubs also provides greater aesthetic and biological diversity and, in many areas, is more compatible with vegetation on lands adjoining the planted site.

Also refer to Appendix F for additional design guidance regarding using landscaping to maximize water quality benefits.

Targeted Pollutants

- ● Sediment
- ◒ Phosphorus
- ◓ Trace metals
- ○ Bacteria
- ○ Petroleum hydrocarbons

Physical Limits

Drainage area	unlimited
Max slope	50%
Min bedrock depth	3 ft
Min water table	3 ft
SCS soil type	ABCD
Freeze/Thaw	fair
Drainage/Flood control	no

APPLICATIONS

Planting is the preferred method of revegetation in many situations where seeding and other slope treatments are either not effective or not appropriate as permanent measures. Such areas may include:

- Any finished slope that will remain undisturbed for at least ten years, especially if the area is bordered by forests, wetlands or other naturally occurring woody vegetation. On such sites, trees and shrubs may be the desirable vegetation from a long-term perspective, but may be very difficult or unreliable to establish from seed.
- Extremely rocky slopes or sites. If natural vegetation is present in significant amounts, such areas are difficult to seed and mulch effectively. Plantings can be used to provide additional stabilization.
- Streets or materials source sites that have been abandoned permanently.
- All types of landscaping, including urban thoroughfares and interchanges, and residential streets where landscape aesthetics are a concern.
- Wetlands and wildlife habitat areas: in such areas, it may be critical to plant the desired species initially, so that the site is not overrun by weeds or undesirable plant species that detract from the intended use of the site.

- Areas where the higher rate of transpiration for trees and shrubs (compared to grasses and forbs) helps remove excess moisture from the soil.

LIMITATIONS

- Purchase and installation costs are higher than for seeding.
- Continued or periodic irrigation may be required if planting occurs during dry season or on sandy soils. Watering may also be necessary up to two years after planting and during periods of drought or intense heat.
- Specific seasons of work apply for planting. Planting outside the designated season should not be allowed unless provisions for special care and maintenance of the plants are enforceable.

DESIGN PARAMETERS

Advantages of Planting: Many shrubs and trees are difficult to establish from seed in natural environments and natural seed crops vary widely from year to year. Rapid invasion from native vegetation and rapid establishment of sown seed of woody species is therefore unreliable. Vegetative plantings are used to provide living shrubs and trees that will grow to adequate size to provide soil stabilization and erosion control faster than seeds of woody species can germinate and grow to these dimensions.

Materials: Planted material may be grown from either cuttings or seed. At delivery to a job site, the plants may be potted (in containers), root wrapped, or bare root stock. Some species are successfully planted as sprigs or tubelings.

Use of Native Species: If possible, use species that are native to the area. Native species provide long-term soil stabilization which is aesthetically harmonious with natural vegetation and which requires little long-term maintenance. Short-term maintenance is necessary to ensure the establishment of the vegetation.

Maximizing Effectiveness: Successful planting projects depend on selecting suitable plant species, using healthy planting stock, and planting when the season and weather conditions are favorable. The site must be properly prepared for planting, and must be properly maintained after planting to ensure long-term survival of the plants. Make sure the contract and plans include adequate provisions for all aspects of the planting process.

Since vegetative planting places living plants on a site, thus decreasing the length of time necessary to establish a complete revegetation project, it is more effective than seeding methods for revegetation. Adequate maintenance is absolutely necessary to achieve this effectiveness since vegetative planting require irrigation for at least the first year, and will benefit from irrigation for two or more years.

Vegetative planting may be combined with seeded grasses and legumes which provide immediate surface coverage (see BMP #145-Seeding).

CONSTRUCTION GUIDELINES

Make sure that planting site is adequately graded and that tree locations and planting areas (for shrubs, vines, and ground covers) are marked and approved before planting begins.

Plant materials must be examined before use to ensure that species, container sizes, and root and soil condition are acceptable. If possible, the growth medium for containerized plants should be similar to the soil type on the revegietation site. Container size guidelines are as follows:

- Tree species may be of bare root stock or of potted stock. Pots should be one gallon (4 liter) size or larger.
- Shrub species may be of bare root stock or of potted stock. The preferred planting pot is a tube of woven plastic that is planted with the plant contained in it. The pot deteriorates over time. The pots should be 2 inches (50 mm) long, with both ends open.
- Paper pots must be 2 to 3.1 inches (50 to 80 mm) square and 8.5 to 12 inches (220 to 300 mm) long. The paper around the rim should be removed to ground level at planting.
- Peat pots are not recommended since research has shown greater mortality of plantings in peat pots due to drying. If peat pots are used, any exposed peat pot material showing after planting should be removed.
- In general, no container should be less than 2 inches (50 mm) wide and 6 inches (150 mm) deep.

Plant storage: Store bundled bare root planting stock, whether tree or shrub species, in a cool, moist place from time of receipt until time of planting. This time should not exceed 10 days.

Store potted planting stock in shade, out-of-doors, and kept lightly sprinkled with water to maintain a moist soil from the time of receipt to the time of planting. This time should not exceed 30 days.

Planting procedures:

- Plant the mixture of trees and shrubs that has been prescribed. In no case should this be less that 690 plants per acre (1,700 plants per hectare). If bare root stocks are used, planting rates should be increased by 1.25 times the stated rate.
- Voluntary or unskilled labor may be used in planting. However, a supervisor who is skilled in the techniques being used should direct the labor.
- Construct a basin 12 inches (300 mm) in diameter and depressed no more than 2 inches (50 mm) from the elevation of the downslope lip.
- Open the planting hole with a planting bar or shovel. Then place the plant near the downslope lip of the basin. This allows sloughing from the slope to fall in to the basin without burying the young plant.

- Carefully remove plants from their containers, if any, and place them in the planting holes so that the crown of the plant is at the surface of the soil. No air space should be allowed around the roots, nor should the roots be folded under. Plants in individual containers made of decomposable material are planted without removing them from the container.

- Apply fertilizer at the rate specified, and place wood chip or wood fiber mulch to a depth of 2 inches (50 mm) around each plant.

- The soil should be wetted to field capacity to a depth of 3.1 to 4 inches (80 to 100 mm) at the time of planting and each time the soil moisture level drops below the permanent wilting percentage.

MAINTENANCE

- Irrigation of vegetative plantings during the first two years following planting is required to increase the survival rate. Water as often as necessary during periods of intense heat or lack of rain.

- Inspect plantings frequently after first installed to see if plants are thriving. Remove and replace dead plants to restore the prescribed number of living plants per hectare.

- After storm events, examine the planting basins and mulch cover and make any needed repairs.

APPENDIX 12-1

Analyte Exceedance Guidance Manual & Checklist

<*reserved for future use*>

APPENDIX 13-1

Final Program Effectiveness Plan

October 2015

Final

PROGRAM EFFECTIVENESS ASSESSMENT PLAN

Storm Water Management Plan

Marine Corps Base Hawaii

NPDES Permit No. HI 000007

Prepared by:

Marine Corps Base Hawaii

October 2015

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CASQA	California Storm Water Quality Association
CCH	City and County of Honolulu
DOH	State of Hawaii Department of Health
FY	Fiscal Year
GIS	Geographic Information System
MCB Hawaii	Marine Corps Base Hawaii
MCD	Facilities Maintenance Control Division
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NAVFAC	Naval Facilities Engineering Command
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
SWMP	Storm Water Management Plan
SWPCP	Storm Water Pollution Control Plan
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey

1 Introduction

As of the effective date, October 15, 2014, the Marine Corps Base Hawaii (MCB Hawaii) is required to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HIS000007 (referred to hereinafter as the "MS4 Permit"). The MS4 Permit includes authorized storm water and specified non-storm water discharges into Kaneohe Bay, Nuupia Ponds, Kailua Bay, and the Mokapu Central Drainage Channel (MCDC). Per the MS4 Permit, Part G.1.d., MCB Hawaii is required to provide a Program Effectiveness Assessment Plan. The MS4 Permit states:

> *Reporting Requirements, Part G.1.d:*
>
> *"Program Effectiveness Reporting - Within one (1) year of the effective date of the permit, the Permittee shall submit to DOH a written strategy for determining the effectiveness of its SWMP. The strategy shall include water quality monitoring efforts as well as program implementation information and other indicators. The Permittee shall include an assessment of program effectiveness and identification of water quality improvements or degradation beginning with the 2nd Annual Report."*

This plan presents the strategy for:

(1) measuring progress of permit compliance and implementation of Best Management Practices (BMPs);
(2) tracking program component effectiveness over the permit period; and
(3) setting the frame work to be able to link program implementation with environmental improvements over time.

1.1 Strategy

This plan has been developed to incorporate elements of the California Storm Water Quality Association (CASQA) approach to program effectiveness as detailed in their 2007 manual. The approach is based on expected outcomes that result from implementing the various components of the storm water management program. The outcomes are characterized into six Outcome Levels as shown on Figure 1, which has been adapted from CASQA. The pyramid structure illustrates the progression from implementing activities to protecting water quality. The Outcome Levels help categorize and define the desired results or goals of programs and control measures.

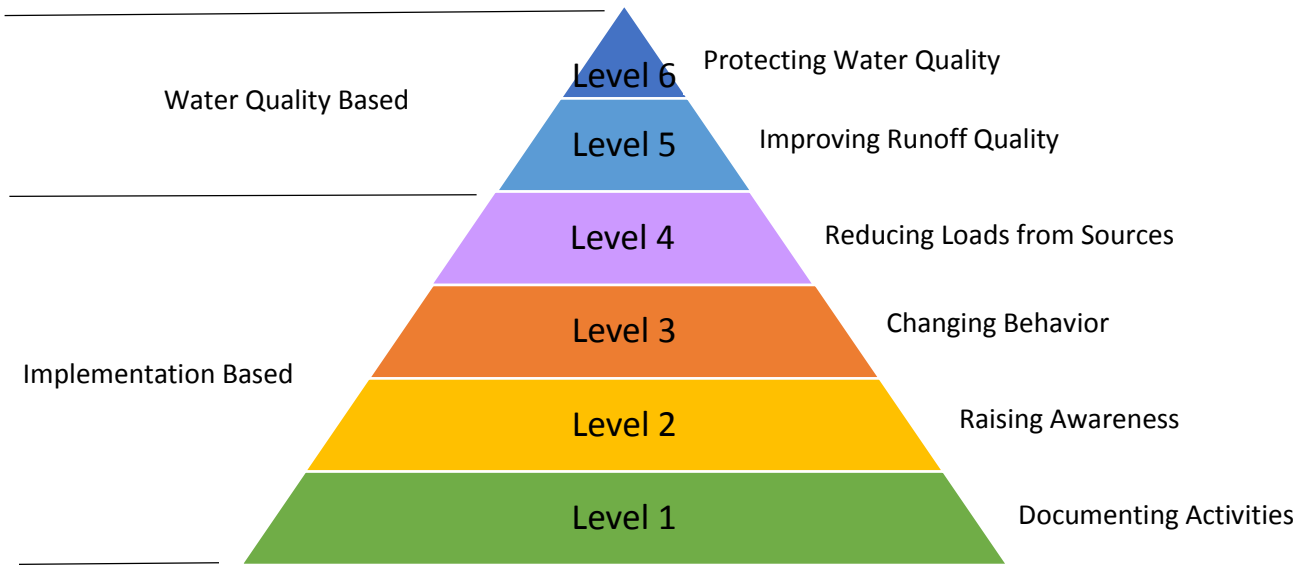

Figure 1: Outcome Levels

The Outcome Levels are defined as follows:

Level 1 – Documenting Activities

Many program activities are directly established as permit requirements and can be tracked by simply documenting activities. Level 1 outcomes may take the form of a confirmation of task completion (yes/no answers) or direct tabulation of efforts (such as the number of inspections completed or plans reviewed). Level 1 outcomes can also include documenting progress towards measurable goals by confirming whether they have been met or not. Level 1 outcomes reflect program implementation and permit compliance and are assumed to be beneficial to water quality but are not indicators of the direct impact of program implementation on environmental conditions.

Level 2 – Raising Awareness

Level 2 outcomes reflect how well the program is able to increase the level of knowledge and awareness and change attitudes of target audiences including tenant commands, civilian workers, residents, commercial and industrial businesses, contractors, and designers. Measuring these outcomes is done through various methods including surveys and training quizzes, and may be inferred through observations of community involvement such as the number of visits to the MCB Hawaii environmental website, and other partner websites. Similar to Level 1 outcomes, Level 2 outcomes are assumed to be beneficial to water quality but are not indicators of the direct impact of program implementation on environmental conditions.

Level 3 – Changing Behavior

The goal of raising knowledge and awareness (in Level 2 outcomes) is to effect behavior change that results in the implementation of recommended BMPs. Level 3 outcomes indicate how effective program components are in motivating behavior change and BMP implementation among target audiences. These changes can be tracked using surveys; site visits and inspections

to observe BMP implementation at sites such as construction sites or industrial facilities; and tabulating changes in program involvement.

Level 4 – Reducing Pollutant Loads from Sources

Many BMPs are intended to reduce the amount of pollutants that have the potential to discharge into the MS4. Level 4 outcomes provide program managers with feedback/ data regarding reductions in pollutant loads as a result of the implementation or enhancement of a BMP. These outcomes can include information such as the amount of debris collected during street sweeping, the amount of trash collected during volunteer cleanups, and by examining photos of the debris present in drainage ways and detention basins. The data are compared to baseline estimates to provide feedback on the effectiveness of BMPs and control strategies.

Level 5 – Improving Runoff Quality

The primary goal of the Storm Water Management Plan (SWMP) is to reduce pollutants to the MS4 to the maximum extent practicable (MEP) and to ensure that discharges do not cause or contribute to exceedances of water quality standards in receiving waters. Level 5 outcomes may be the most direct measure of program effectiveness as it relates to improving the quality of storm water runoff. Level 5 outcomes may be measured as reductions in one or more specific pollutants and may reflect effectiveness of BMP implementation at the above outcome levels.

Level 6 – Protecting Receiving Water Quality

The ultimate objective of any NPDES SWMP is to protect receiving water quality. These outcomes are the most challenging to document and are many times affected by more than the quality of storm water discharges, including sanitary sewer overflows, rising groundwater, agricultural runoff, and other non-point source pollutants. Additionally, receiving water quality is dependent upon partnerships with other agencies, land owners and stakeholders, and the general public. Assessment methods include compliance with water quality standards, Total Maximum Daily Load (TMDL) programs, biological assessments, and other monitoring assessments. It may take years to establish a reliable data set and even longer periods of time to allow the cumulative impacts of multiple program elements to take effect.

1.2 Assessment Measures

In each outcome level, several methods are available to determine if outcomes are being achieved. These methods include:

- confirming that permit requirements have been met;
- tabulating specific activities and load reduction;
- surveying employees and residents;
- inspecting construction sites and post-construction BMPs; and
- monitoring runoff and receiving waters.

A summary of the assessment methods and their application to each outcome level are listed in Table 1, below.

Table 1: Assessment Methods for Different Outcome Levels

	Outcome Level					
Assessment Method	**Level 1 Documenting Activities**	**Level 2 Raising Awareness**	**Level 3 Changing Behavior**	**Level 4 Reducing Loads from Sources**	**Level 5 Improving Runoff Quality**	**Level 6 Protecting Receiving Water Quality**
Confirmation	X					
Tabulation	X	X	X	X		
Survey		X	X			
Inspection	X	X	X	X		
Monitoring				X	X	X

Notes: Table has been adapted from CASQA Municipal Stormwater Program Effectiveness Assessment Guidance, 2007.

The various data collected will be tracked and compared from year to year in order to meet goals or as a way to view trends and help guide the program for subsequent years. The data will be tracked using program databases and the MCB Hawaii Facilities Maintenance Control Division (MCD)'s Geographic Information System (GIS), which contains an inventory of MS4 features and other related data. Updating the GIS and data tracking will be an ongoing process that is integral to allow for effective monitoring and preventative storm water quality measures.

1.3 Measurable Goals

As required by the Permit, MCB Hawaii has developed specific measurable goals or milestones related to each program component. The measurable goals are based on past experiences, previous trends or results of previous surveys, or based on compliance with the Permit. Measurable goals have been incorporated into this approach as data assessment measures and are used to assist tracking program effectiveness.

1.4 Program Assessment and Reporting

Overall Program Assessment will be incorporated into the Annual Report required by the Permit. Most program assessment will be conducted at the implementation level (Outcome Levels 1 to 4). Water quality assessments (Outcome Levels 5 and 6) are conducted as part of MCB Hawaii's ongoing Annual Monitoring program.

1.5 Document Organization

The following chapters describe the outcomes that MCB Hawaii aims to achieve during this Permit term and the data collected that will be used to assess each of the following programs:

- Public Education and Outreach;
- Illicit Discharge Detection and Elimination;
- Construction Site Runoff Control;
- Post Construction Storm Water Management in New Development and Redevelopment;
- Pollution Prevention and Good Housekeeping; and
- Industrial and Commercial Discharge Management.

Each section will present outcome objectives and assessments measures as follows:

- Outcome Objectives: lists the desired outcomes that each program will strive to achieve during the permit term. The outcomes are categorized by the Outcome Levels.
- Assessment Measures: lists the data that will be used to assess each desired outcome. The measures are categorized by assessment method (i.e., confirmation, tabulation, etc.) and may directly or indirectly measure progress towards the desired outcome.

2 Public Education and Outreach

Assessing the Public Education and Outreach is an iterative process that relies on a variety of methods. The target audiences include tenant commands; residents; industrial and commercial businesses; construction operators; and school children. The desired outcomes are to raise awareness and effect behavior change through a variety of methods including distributing educational materials, conducting media campaigns, holding workshops, forming partnerships with other agencies and groups, and participating in special events. This program will be assessed to Outcome Levels 1 through 3.

Outcome Level	Outcome Objectives and Data Assessment
1 2	*Objective:* Increase public support, interest, knowledge, and awareness of Storm Water Management Program. *Assessment Measures:* <u>Confirmation:</u> ○ Distribute brochures/pamphlets to new arrivals in orientation materials. ○ Provide storm water pollution prevention information to Base staff during Environmental Standard Operating Procedures class. ○ Implement outreach through community newsletters and the Base website. ○ Stencil a minimum of 50 storm drains per year, with priority given to industrial and commercial areas, and areas with pedestrian traffic. ○ <u>Tabulation:</u> ○ Number of brochures/pamphlets distributed to new arrivals. ○ Number of training classes and number attendees. ○ Number of visits/views on the Base website. ○ Number of volunteer hours. ○ Number of storm drains stenciled ○ Annual survey. ○ Number of public informational/training meetings
1 2	*Objective*: Increase public participation in special events. *Assessment Measure:* <u>Tabulation:</u> ○ Number of events. ○ Number of volunteers. ○ Number of volunteer hours. ○ Number of participants in special events each year.

3 Illicit Discharge Detection and Elimination

The goal of MCB Hawaii's Illicit Discharge Detection and Elimination Program is to eliminate improper discharge activities. This will be accomplished through maintenance of up-to-date records and maps of the storm drain system; training and implementation of Marine Corps instructions prohibiting illicit storm water discharges; advertising and providing locations for turn-in of household waste materials; continuing the review and approval process for new storm drain connections; responding to complaints; and inspection of facilities and the storm drain system. This program will be assessed primarily at Outcome Levels 1 through 3.

Outcome Level	Outcome Objectives and Data Assessment
1 2 3	*Objective:* Encourage and facilitate public involvement in identifying and reporting illicit discharge. *Assessment Measures:* <u>Confirmation:</u> ○ Maintain base hotline and respond to complaints. <u>Tabulation:</u> ○ Number of complaints.
1 3	*Objective:* Decrease the number of improper discharge activities. *Assessment Measure:* <u>Confirmation:</u> ○ Maintain base hotline and respond to complaints. ○ Advertise and provide locations for turn-in of household waste materials. ○ Inspection of facilities and the storm drain system. <u>Tabulation:</u> ○ Number of complaints. ○ Number of illicit discharge investigations. ○ Number of follow-up visits. ○ Number of corrective actions completed including distribution of educational materials. <u>Inspection:</u> ○ Photo documentation of identified problem areas.

1 2	*Objective:* Continue to maintain an educated Base staff regarding illicit discharge detection and elimination. *Assessment Measure:* <u>Confirmation:</u> ○ Provide training in Environmental Standard Operating Procedures for the Base. Include training on Marine Corps Order 5090.1 that prohibits non-storm water discharges into the Base storm drain system. <u>Inspection:</u> ○ Results of in-house audits. ○ Results of annual Storm Water Pollution Control Plan (SWPCP) inspections.
1	*Objective:* Continue review and approval of new storm drain connections by the MCD. *Assessment Measure:* <u>Confirmation:</u> ○ Maintain up-to-date map of storm water system components in GIS. <u>Tabulation:</u> ○ Number of new drain connection agreements approved each year, as required

4 Construction Site Runoff Control

The Construction Site Runoff Control Program focuses on storm water discharges from construction projects that drain to drainage facilities and natural drainage ways that MCB Hawaii has ownership and responsibility for. Construction projects on Base include smaller projects completed by Facilities Maintenance Control Division (MCD), larger projects completed by Naval Facilities Engineering Command (NAVFAC), and other projects by the Department of Education (DOE), Marine Corps Community Services (MCCS), and Housing Public Private Venture (PPV) Forest City.

MCB Hawaii tracks the implementation of BMPs to minimize polluted runoff through design drawing review and completing inspections of active construction sites. The Construction Site Runoff Control Program will be assessed at Outcome Levels 1 through 3.

Outcome Level	Outcome Objectives and Data Assessment
1	*Objective:* Continue to maintain an effective plan review program to ensure proper permits are obtained and followed. *Assessment Measures:* <u>Confirmation:</u> ○ BMP Checklist for Construction Site Plan Approval is completed. ○ Construction sites of one or more acres will submit a notice of intent (NOI) for coverage under DOH's general permit for construction activities or an individual NPDES permit application. ○ Plan review will ensure new developments meet Federal and State regulations, NPDES permit conditions, and building and landscape design criteria.
1	*Objective:* Continue to maintain an effective construction site inspection program. *Assessment Measure:* <u>Confirmation:</u> ○ Construction sites inspected in accordance with established frequencies. ○ Scheduled follow-up inspections are conducted. ○ Construction Site BMP Checklists are completed for all inspections. ○ Appropriate enforcement actions are taken when warranted.

1 2	*Objective:* Continue to maintain an educated and trained staff. *Assessment Measure:* <u>Confirmation:</u> ○ Provide training for employees responsible for plan review. ○ Provide training for employees responsible for construction site inspections.
2 3	*Objective:* Increase contractor effectiveness. *Assessment Measure:* <u>Tabulation:</u> ○ Number of written notices issued. ○ Number of stop work orders issued. ○ Number of contract enforcement provisions applied. ○ Number of DOH referrals. ○ Number of repeat violations. ○ Response time for corrective actions.
1	*Objective:* Continue to maintain inventory of construction sites. *Assessment Measure:* <u>Confirmation:</u> ○ All approved projects added to database. ○ Inspection data recorded.
1	*Objective:* Continue review and approval of new storm drain connections by MCD. *Assessment Measure:* <u>Confirmation:</u> ○ Maintain up-to-date map of storm water system components in GIS. <u>Tabulation:</u> ○ Number of new drain connection agreements approved each year, as required

5 Post-Construction Management in New Development and Redevelopment

Post-construction storm water discharges can impact receiving waters by increasing the type and quantity of pollutants in storm water, and by increasing the overall quantity of storm water delivered to the receiving water body during storms. The objective of post-construction runoff controls is to improve storm water quality by installing and maintaining post-construction BMPs, both structural and non-structural, in applicable development and redevelopment projects that have the potential to discharge pollutants into the MS4. The Post-Construction Management Program includes inspection and operation and maintenance of post-construction BMPs.

Outcome Level	Outcome Objectives and Data Assessment
1	*Objective:* Continue to maintain an effective plan review program to ensure post-construction runoff controls are incorporated into new development and redevelopment projects. *Assessment Measures:* <u>Confirmation:</u> ○ BMP Checklist for Construction Site Plan Approval is completed. ○ Plan review will ensure new developments meet Federal and State regulations and NPDES permit conditions.
1 2	*Objective:* Continue to maintain an effective post-construction BMP inspection and maintenance program. *Assessment Measure:* <u>Confirmation:</u> ○ Post-construction BMPs inspected for operation and maintenance (O&M) in accordance with established frequencies. ○ Scheduled follow-up O&M inspections are conducted. ○ Permanent BMP Inspection Reports are completed for all inspections. ○ O&M completed in accordance with established frequencies. <u>Tabulation:</u> ○ Number of post-construction BMP O&M inspections. ○ Number of follow-up O&M inspections.

1 2	*Objective:* Continue to maintain an educated and trained staff. *Assessment Measure:* <u>Confirmation:</u> ○ Provide training for employees responsible for plan review. ○ Provide training for employees responsible for post-construction BMP O&M inspections.
2 3	*Objective:* Increase awareness of post-construction facility responsibilities. *Assessment Measure:* <u>Confirmation:</u> ○ Education/outreach to facilities with post-construction BMPs. <u>Tabulation/Inspection:</u> ○ Number of O&M inspections with missing or incomplete inspection and maintenance logs. ○ Number of inspections with corrective actions required. ○ Number of O&M inspections requiring follow-up inspections.

6 Pollution Prevention and Good Housekeeping

The objective of the Pollution Prevention/Good Housekeeping Program is to reduce the amount of pollutants entering receiving bodies of water through both education and proper procedures. It requires examination and subsequent alternation of actions to help ensure a reduction in the type of pollution that:

(1) collects on streets, parking lots, open spaces, and storage and vehicle maintenance areas and is discharged into local waterways; and
(2) results from actions such as environmentally damaging land development and flood management practices or poor maintenance of storm sewer systems.

The program is assessed at Outcome Levels 1 through 4.

Outcome Level	Outcome Objectives and Data Assessment
1 2	*Objective:* Continue to maintain an educated and trained staff. *Assessment Measures:* <u>Confirmation:</u> ○ Inspect industrial facilities included in the Permit annually. ○ Train maintenance personnel annually and have new maintenance employees trained as part of the orientation program.
1 4	*Objective:* Decrease potential for storm water impact from street debris. *Assessment Measures:* <u>Confirmation:</u> ○ Complete street sweeping. ○ Conduct cleaning and debris removal from drainage structures. ○ Stencil a minimum of 50 storm drains per year, with priority given to industrial and commercial areas, and areas with pedestrian traffic. <u>Tabulation:</u> ○ Number of storm drains stenciled ○ Number of curb miles swept. ○ Volume of trash collected.
1 2 4	*Objective:* Decrease potential for storm water impact from chemical applications. *Assessment Measures:* <u>Confirmation:</u> ○ Develop an Authorized Use List of chemicals used. ○ Monitor fertilizer and pesticide application in application logs and reduce usage where feasible.

	○ Periodically collect and dispose of unused pesticides, herbicides, and fertilizers according to manufacturers' instruction. ○ Conduct annual training for personnel on proper maintenance activities. ○ Conduct annual training for personnel and contractors applying pesticides, herbicides or fertilizers. <u>Tabulation:</u> ○ Volume of excess/unused chemicals collected for disposal. ○ Number of facilities inspected annually. ○ Number of training sessions, and/or number of attendees to training sessions.
3 4	*Objective:* Improve implementation of temporary or permanent BMPs to reduce pollutants to the MS4 *Assessment Measure:* <u>Confirmation:</u> ○ Develop, implement, and maintain up-to-date site-specific BMPs and SWPCPs developed and implemented, as needed. <u>Inspections:</u> ○ Number of facilities inspected annually.
1 4	*Objective:* Improve condition and utility of storm water system through inspection and maintenance program. *Assessment Measure:* <u>Confirmation:</u> ○ Conduct cleaning and debris removal from storm drainage structures, at least once during the term of the permit. <u>Tabulation:</u> ○ Number of inlets/catch basins cleaned or maintained. ○ Number of inlets/catch basins inspected. ○ Number of inspections resulting in recommendations of additional maintenance. ○ Volume of debris removed.
1	*Objective:* Continue to maintain an updated inventory of the MS4. *Assessment Measure:* <u>Confirmation:</u> ○ Maintain an up-to-date map of storm water system components in GIS.

1 4	*Objective:* Reduce discharge of pollutants to the MS4 by Retrofitting Structural BMPs. *Assessment Measure:* <u>Confirmation:</u> ○ Develop and implement an Action Plan for Retrofitting Structural BMPs. <u>Tabulation:</u> ○ See Action Plan for Retrofitting Structural BMPs.
1 2 4	*Objective:* Reduce discharge of trash into and out of the MS4. *Assessment Measure:* <u>Confirmation:</u> ○ Develop and implement a Trash Reduction Plan <u>Tabulation:</u> ○ See Trash Reduction Plan
1 4	*Objective:* Reduce effects of erosion on storm water quality. *Assessment Measure:* <u>Confirmation:</u> ○ Develop and implement an Erosion Control BMPs Program Plan. <u>Tabulation:</u> ○ See Erosion Control BMPs Program Plan

7 Industrial and Commercial Discharge Management

The Industrial and Commercial Activities Discharge Management Program addresses environmental compliance at industrial and commercial facilities within the Base. The program focuses on documenting the inspection efforts, raising awareness among private commercial and industrial facility personnel, and increasing use of BMPs by these personnel. This program is assessed at Outcome Levels 1 through 3.

Outcome Level	Outcome Objectives and Data Assessment
1 2 3	*Objective:* Increase use of BMPs among industrial and commercial facilities to reduce possible spills, illegal connections and illicit discharges. *Assessment Measures:* <u>Confirmation:</u> ○ Inspect industrial facilities included in the Permit annually. ○ Require a permit or written equivalent approval for drainage connections and discharge of surface runoff into the MS4. ○ Provide all facilities educational/BMP handouts or other outreach materials. ○ Deficiencies corrected by facilities issued a non-compliance notice. ○ Conduct annual training for inspectors (to identify deficiencies, assess potential impacts to receiving waters, and evaluate the appropriateness and effectiveness of deployed BMPs). <u>Tabulation/Inspection:</u> ○ Number of inspections conducted. ○ Number of revisits completed. ○ Number of deficiencies issued. ○ Number of inspector training sessions, and/or number of attendees to inspector training sessions.
1 4	*Objective:* Improve implementation of temporary or permanent BMPs at industrial and commercial facilities to reduce pollutants to the MS4 *Assessment Measure:* <u>Confirmation:</u> ○ Develop, implement, and maintain up-to-date site-specific BMPs and SWPCPs developed and implemented, as needed. ○ Require a permit or written equivalent approval for drainage connections and discharge of surface runoff into the MS4. ○ Conduct annual training for inspectors (to identify deficiencies, assess potential impacts to receiving waters, and evaluate the appropriateness and effectiveness of deployed BMPs).

	Inspections: ○ Number of facilities implementing temporary or permanent BMPs. ○ Number of inspector training sessions, and/or number of attendees to inspector training sessions.
1 2	*Objective:* Improve monitoring and tracking of industrial and commercial discharge management. *Assessment Measure:* Confirmation: ○ Maintain up-to-date inventory/database of industrial facilities and activities. ○ Maintain up-to-date inventory/database of commercial facilities and activities, sorted by priority area. ○ Require a permit or written equivalent approval for drainage connections and discharge of surface runoff into the MS4. Develop and maintain database of permits/written approvals for drainage connections and discharge of surface runoff into the MS4.

8 Monitoring

MCB Hawaii conducts storm water monitoring at industrial facilities annually. The results of the monitoring are summarized in the Annual Monitoring Report submitted to DOH. As data are collected over time, the results can be used to evaluate long-term trends in pollutant reductions and assist in determining the effectiveness of the various programs in the Storm Water Management Program Plan (SWMP). MCB Hawaii may also utilize water quality monitoring analysis results conducted by other agencies such as the City and County of Honolulu (CCH), the United State Geological Survey (USGS), and DOH to provide a comparison between discharges from the MS4 and water quality in receiving waters. The water quality monitoring results from sampling the MS4 will be used to compare relative contributions and progress towards improving water quality. The monitoring program provides data assessment measures to assess the program at Levels 4 through 6 and sets the framework for an integrated assessment between all Outcome Levels.