ERID-255571

2013 Update to the Site Discharge Pollution Prevention Plan, Revision 1

Los Alamos National Laboratory
NPDES Permit No. NM0030759
LA-UR-14-22679 • May 1, 2014

Overview

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Appendixes

1.0 Background

1.1 Individual Permit

DOE and LANS, collectively the Permittees, have prepared this Update to the Site Discharge Pollution Prevention Plan, Revision 1 (hereafter, the SDPPP Update) for the Individual Storm Water Permit pursuant to the requirements NPDES Permit No. NM0030759 (hereafter, the Individual Permit or Permit or IP), as authorized by the EPA. The Individual Permit regulates storm water discharges associated with industrial activities from 405 specified SWMUs and/or AOCs (collectively, "Sites").The majority of the Sites covered by the Individual Permit are remotely located and are not associated with current industrial activities. Storm water discharges associated with current conventional industrial activities at the Laboratory are excluded from the Individual Permit. The Permit—NPDES No. NM0030759—incorporating the latest modifications became effective on November 1, 2010.


Sandia Canyon wetlands

The Sites regulated under this Permit are a subset of the SWMUs and AOCs that are being addressed under the March 2005 Compliance Order of Consent (the Consent Order). The Consent Order fulfills the corrective action requirements in §3004(u) and §3008(h) of RCRA for addressing SWMUs and AOCs.

A SWMU is a discernible waste management unit from which hazardous constituents may migrate, regardless of whether the unit was intended to manage solid or hazardous waste. SWMUs include any area at a facility at which solid wastes have been routinely and systematically released. A Site that met the definition of a SWMU or AOC was evaluated for inclusion in the Permit based on the following criteria: (1) the SWMU/AOC is exposed to storm water (e.g., not capped or subsurface); (2) the SWMU/AOC contains "significant industrial material" (e.g., not cleaned up or has contamination in place); and (3) industrial materials from the SWMU/AOC could potentially impact waters of the United States.

The selection of monitoring suites and Site priority designations were based on historical information and any storm water, sediment, and soil data available at the time the Permit application was submitted. The investigation and remediation of SWMUs and AOCs began during the 1990s before the effective date of the Individual Permit and continue concurrently with implementation of the Individual Permit.

The Individual Permit categorizes a Site as having had an "industrial activity" that creates a "point source discharge" and directs the Permittees to monitor representative storm water discharges from Sites at specified sampling points known as SMAs. An SMA is a single drainage area within a subwatershed and may include more than one Site. Storm water from a Site may drain to multiple subwatersheds and may be associated with multiple SMAs.

The Individual Permit contains nonnumeric technology-based effluent limitations, coupled with a comprehensive, coordinated inspection and monitoring program, to minimize pollutants in the Permittees' storm water discharges associated with historical industrial activities from specified SWMUs and AOCs. The Permittees are required to implement site-specific control measures (including BMPs) to address the nonnumeric technology-based effluent limits, as necessary, to reduce or minimize pollutants in their storm water discharges to the extent achievable.

The Permit establishes TALs that are equivalent to New Mexico State water-quality criteria. These TALs are used as benchmarks to determine the effectiveness of control measures implemented under the Permit. That is, confirmation monitoring sample results for an SMA are compared with applicable TALs. If one or more confirmation monitoring result exceeds a TAL, the Permittees must take corrective action through the installation of measures reasonably expected to (1) meet applicable TALs at the Site, (2) achieve total retention of storm water discharges from the Site, (3) totally eliminate exposure of pollutants to storm water, (4) or demonstrate that the Site has a certificate of completion under the Consent Order. The Individual Permit requires that the Permittees certify to EPA completion of corrective action at each Site by a specific deadline based upon the Site's status either as a High Priority or Moderate Priority Site.

Where the Permittees have installed measures to minimize pollutants in their storm water discharges as required by Part I.A of the Permit at a Site or Sites, but are unable to certify completion of corrective action under Sections E.2(a) through E.2(d) (individually or collectively), the Permittees may submit an alternative compliance request to EPA. If EPA grants the alternative compliance request in whole or in part, it will issue a new individually tailored work plan for the Site or Sites. EPA will also extend the compliance deadline for completion of corrective action, as necessary, to implement this work plan. Corrective action will be accomplished on a case-by-case basis pursuant to an individually tailored compliance schedule determined by EPA. Figure 1 is a "road map" illustrating key activities in the Individual Permit and shows the steps involved in the corrective action process.

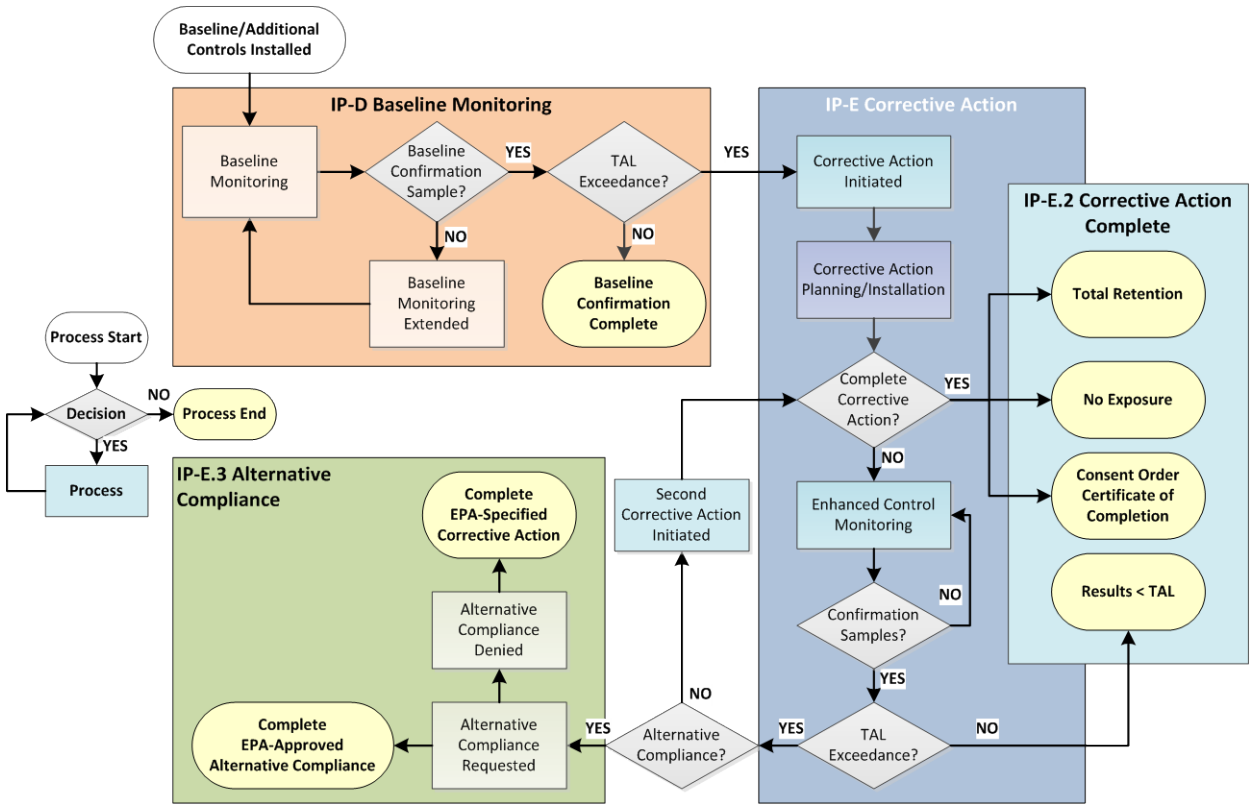


Figure 1 Permit compliance road map

1.2 2013 Update to the Site Discharge Pollution Prevention Plan, Revision 1

The SDPPP Update is written for use by Laboratory personnel and for review by EPA and the public. For each Site, the SDPPP Update

- describes the historical industrial activities,
- summarizes the available data regarding the nature and extent of any surface contamination related to the historical activities, and
- identifies the structural control practices implemented or that will be implemented to prevent the pollutants of concern from impacting storm water runoff quality.

> Part I.F.4 of the Permit states that "The SDPPP shall be updated annually to fully incorporate all changes made during the previous year and to reflect any changes projected for the following year."

The SDPPP Update also describes other relevant information, such as monitoring results, inspections and maintenance, and procedures. The report is intended to be a living document that is kept current throughout the year by maintaining records and relevant documents alongside the SDPPP. At the end of each field season, all changes made during the year and any projected for the coming year are incorporated into an update.

2M-SMA-2 during September 13, 2013, storm event

Damage to road in 3M Canyon after storm event

The original SDPPP was published, submitted to EPA, and placed on the Individual Permit website on April 30, 2011. The following year, the SDPPP was revised and was made available on the Permit website on May 1, 2012. Revision 1 is available at http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/site-discharge-pollution-prevention-plan.php. The 2012 SDPPP update was prepared in 2013 and was available on the website on May 1, 2013. The 2013 SDPPP Update, summarizing relevant information from 2013, together with Revision 1, meets the requirements of Part I.F of the Individual Permit. The reporting format is designed to be web-friendly, making information about a specific Site or SMA easier to find, download, and print. Table 1 provides a crosswalk of SDPPP requirements with the location of the information.

Table 1 SDPPP Requirements

Part I Requirement		SDPPP Section
Part	**Description**	
F.1 (a)	Site Discharge Pollution Prevention Team	2013 Update, Overview Section 2.0, Site Discharge Pollution Prevention Team
F.1 (b)	Site Description: • historical activities at each Site • precipitation information • general location and Site maps	• 2013 Update, V1–5, Section xxx.1,[1] Site Descriptions • 2013 Update, V1–5, Attachment 3, Precipitation Network • 2013 Update, V1–5, Figure xxx.1, IP website—http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/site-monitoring-area-maps.php
F.1 (c)	Receiving Waters and Watershed	SDPPP V1–5, Rev. 1, Section 300.3
F.1 (d)	Summary of Pollutant Sources	2013 Update, V1–5, Section xxx.1 Site Descriptions
F.1 (e)	Description of Control Measures	2013 Update, Overview Appendix B, Control Measure Fact Sheets; 2013 Update, V1–5, Section xxx.2 Control Measures
F.1 (f)	Schedules for Control Measure Installation	2013 Update, V1–5, Section xxx.2, Control Measures
F.1 (g)	Monitoring and Inspection Procedures	2013 Update, Overview Section 1.3, Monitoring and Inspection Procedures, IP website—http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/site-discharge-pollution-prevention-plan.php
F.1 (h)	Signature Requirements	SDPPP V1–5, Rev 1., Section 100 No Signature in 2013 Update V1–5, as Rev. 1 is still applicable
F.2 (a)	Documentation: Dates of Training Sessions	2013 Update, Overview Section 2.0, Site Discharge Pollution Prevention Team
F.2 (c)	Documentation: Inspection Reports	2013 Update, V1–5, Section xxx.4, Inspections and Maintenance
F.2 (d)	Documentation: An accounting of and explanation of length of time taken to modify or implement measure following discovery of deficiency.	2013 Update, V1–5, Section xxx.4, Inspections and Maintenance; Table xxx-3, Maintenance during 2013
F.3 (a)	Required Modifications: Construction or change in design, operation or maintenance at the facility having a significant impact on the discharge, or potential for discharge, of pollutants from the facility.	2013 Update, V1–5, Section xxx.4, Inspections and Maintenance

Part I Requirement		SDPPP Section
Part	Description	
F.3 (b)	Required Modifications: Findings of deficiencies in control measures during inspections of based on analytical monitoring results.	2013 Update, V1–5, Section xxx.4, Inspections and Maintenance
F.3 (c)	Required Modifications; • any change of monitoring requirement or • compliance status.	• 2013 Update, V1–5, Attachment 5, Sampling Requirements and Plan • 2013 Update, V1–5, Section xxx.5, Compliance Status; Table xxx-4, Compliance Status during 2013
F.3 (d)	Required Modifications: Any change of SMA location	2013 Update, V1–5, Section xxx.1, Site Descriptions, discussed in the last paragraph of the section and documented in the project map (Figure xxx.1) and in Attachment 4, Physical Characteristics.
F.3 (e)	Required Modifications: Summary of changes from the last year's SDPPP.	2013 Update, V1–5, Attachment 1, Amendments
F.4	SDPPP updated annually to incorporate previous year changes and following year projections	2013 Update, V1–5
F.5	SDPPP Availability. Paper copy of current SDPPP to be immediately available at facility and copy of SDPPP to be made available on public website.	Copies of SDPPP V1–5, Rev. 1, and the 2013 Update, V1–5, are available in the Project Manager's Office (Pueblo Complex), the Records Processing Facility (Pueblo Complex), and the Public Reading Room (Pojoaque, NM). The SDPPP is also available on the public website: http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/site-discharge-pollution-prevention-plan.php
G.2	Post-Storm Inspections. Adverse weather events shall be documented and maintained with the SDPPP.	2013 Update, V1–5, Overview, 3.3 Storm Water Monitoring
I.1	Construction Activity Permit associated with Site Remediation. Steps taken to minimize discharges of contaminated runoff during remediation activity shall be included in the SDPPP Update	2013 Update, V1–5, Section xxx.4, Inspections and Maintenance; Table xxx-2 Control Measure Inspections during 2012 (Inspection Type is "Remediation Construction Activity"); Table xxx-3 Maintenance during 2013
I.2	Deletion of Site. Documents to support a request of site deletion must be kept with facility's SDPPP.	Not yet applicable

Part I Requirement		SDPPP Section
Part	Description	
I.3	Watershed Protection Approach. EPA encourages the Permittees to voluntarily install watershed-based control measures, such as sediment barriers, to mitigate sediment or storm water runoff reaching the main channels of the canyons and/or the Rio Grande. The Permittees should include information and monitoring data regarding the installation of any such watershed-based control measures in the Annual Report or the SDPPP.	2013 Update, Overview, 5.0 Watershed Protection Approach
I.5	Reopener. This Permit may be reopened and modified in accordance with 40 C.F.R. § 122.62. Any changes to monitoring and/or control measure requirements made to the Permit in accordance with such a permit modification shall be addressed in the Annual Report and in the annual SDPPP update.	Not yet applicable

[1] Section xxx.1-5, the xxx refers to the number assigned to each SMA in the Update.

This Overview includes information pertaining to all five watershed-based SDPPP volumes and describes the updated information that is new this year. Appendixes to the Overview include acronyms and a glossary of terms used in this report (Appendix A); control measure fact sheets (Appendix B); a guide to understand the information presented in the data graphs (Appendix C); and references used throughout the report (Appendix D). All acronyms and abbreviations in the overview and Volumes 1 through 5 of this report are included in Appendix A and are not defined at first use in each volume.

1.3 Monitoring and Inspection Procedures

Individual Permit procedures are reviewed annually and updated as needed throughout the year. Monitoring and inspection procedures that will be used in 2014 are listed below, and copies are posted on the IP website: http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/site-discharge-pollution-prevention-plan.php.

- EP-DIV-SOP-10013, Inspecting Storm Water Runoff Samplers and Retrieving Samples
- SOP-5215, Processing Storm Water Samples
- EP-DIV-SOP-10004, Managing Electronic Precipitation Data for Storm Water Projects
- EP-DIV-SOP-10008, Installing, Setting Up, and Operating ISCO Samplers
- EP-DIV-SOP-20012, Post-Storm Inspection of NPDES Individual Permit Storm Water Control Measures and Installation and Maintenance of Non-Engineered Storm Water Control Measures
- EP-DIV-SOP-20125, Performing NPDES Storm Water Individual Permit Visual Inspections
- EP-DIV-SOP-20060, Certifying Individual Permit Storm Water Control Measures
- EP-DIV-SOP-20208, Inspecting No Exposure, Engineered Retention and Watershed Storm Water Structures (in review)
- EP-DIV-SOP-20176, Individual Permit Screening Process for Corrective Action

2.0 Site Discharge Pollution Prevention Team

To facilitate the implementation, maintenance, and revision of the SDPPP, a PPT has been established. The PPT is responsible for assisting in developing and revising the SDPPP as well as maintaining control measures and taking corrective actions for deficiencies. Team members generally have, at a minimum, a Bachelor's degree and specialty qualifications, such as CISEC and/or CPESC.

The PPT consists of personnel whose selection is based on their familiarity with Site locations and surrounding operations. The specific responsibilities of the PPT are provided in Table 2. Each member of the PPT has access to electronic and paper copies of the Individual Permit and this SDPPP Update.

Table 2 PPT Roles and Responsibilities

PPT Title	Functional Responsibility
Surface Water and Canyons Investigation Project Manager	Responsible for managing implementation of Individual Permit requirements.
IP Compliance Team Lead	Responsible for ensuring compliance is met for the Individual Permit Storm Water Program.
IP Corrective Actions Field Project Lead	Responsible for implementation of Individual Permit field requirements by installing, inspecting, and maintaining control measures, and implementing corrective actions when TALs are exceeded. Provides training and develops qualifications for personnel.
IP Monitoring Field Project Lead	Responsible for implementation of storm water monitoring.
Lead Inspector	Responsible for coordinating Site inspections as required by the IP. Resolve issues related to successful conduct of operations.
Inspector	Responsible for conducting Site inspections as required by the IP. Coordinates with the Lead Inspector to resolve issues related to successful conduct of operations.
Pollution Prevention Team Members	Responsible for implementing and updating the SDPPP, assisting in maintaining control measures and implementing corrective actions for deficiencies, and completing training.

Employee training is essential for effective implementation of the SDPPP and success of the storm water program. Project personnel receive both formal and informal training in the execution of storm water management at the IP Sites. Formal training, which covers all aspects of the SDPPP, is conducted annually before the field season starts. Training logs will be maintained alongside the 2013 SDPPP Update. During the field season, daily tailgate meetings are conducted to inform personnel of work assignments, impending changes, and work-related issues.

3.0 Guide to the Updated Information in the 2013 SDPPP Update, Volumes 1–5

The SDPPP Update maintains the previous five-volume watershed organizational structure for administrative convenience (Table 3). For clarity, SMAs are uniquely and consecutively numbered from 1–250 across the five volumes, as presented in the last column of Table 3.

Table 3 SDPPP Update Organizational Structure: Volume, Watershed, and Associated SMAs

SDPPP Volume	Primary Watershed	Receiving Waters	SMA Numbers in the Contents Table
Volume 1	Los Alamos/Pueblo	Rendija Canyon Bayo Canyon Pueblo Canyon DP Canyon Los Alamos Canyon	1–64
Volume 2	Mortandad/Sandia	Mortandad Canyon Ten Site Canyon Cañada del Buey Canyon Sandia Canyon	65–128
Volume 3	Pajarito	Pajarito Canyon Starmers Canyon Twomile Canyon Threemile Canyon	129–179
Volume 4	Water/Cañon de Valle	Cañon de Valle Canyon Potrillo Canyon Water Canyon Fence Canyon	180–229
Volume 5	Ancho/Chaquehui	Ancho Canyon Chaquehui Canyon	230–250

The Site information, organized by SMA, has been updated as follows.

3.1 Section 1, Site Descriptions

Site descriptions have been updated using information not available at the time of previous SDPPP revisions and updates. References used for the update are listed in Appendix D of the Overview.

A current project map is located at the end of each SMA chapter. Maps updated throughout the year will be posted on the IP website: http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/site-monitoring-area-maps.php.

3.2 Section 2, Control Measures

This section describes control measures that have been installed and are currently "active". Active control measures are maintained and inspected: following a rain event at or near the Site that registers 0.25 in. of more of rain within 30 min; when water sample results are above TALs; at least annually for changes of conditions affecting erosion; and following a significant event, such as a fire, which could significantly impact the control measures and environmental conditions in the affected area(s). The active control measure table has been updated to include the enhanced controls constructed in 2013 and to remove any controls that were retired. Control measures may be retired for several reasons; for example, the lifespan of the control type could expire or the control measure could be damaged by wildlife or flooding. In any case, the retired control measure is replaced with an equal or more effective measure. The fact sheets in Appendix B provide sufficient detail to identify and describe the baseline and enhanced control measures constructed at the Sites. Representative photographs of control measures are interspersed throughout the text in the SDPPP Update. Photographs of all baseline

controls and enhanced controls that have been certified are available by following the Construction Certification link on the IP website: http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/construction-certifications.php.

3.3 Section 3, Storm Water Monitoring

The monitoring section describes the storm water data, date of sample collection (if applicable), and comparison to the applicable TALs. For any constituents exceeding the TAL, a summary of the results from soil and sediment samples collected at the Site during Consent Order or previous investigations is provided and a determination is made of whether or not the TAL exceedance constituent is known to have been associated with industrial materials historically managed at the Site. This information will assist the PPT as it evaluates corrective action alternatives. The discussion is organized by Site and analyte.

Also included for all constituents exceeding the TAL at an SMA is a discussion of storm water natural and anthropogenic background concentrations that could be present in run-on and be a contributing source of the TAL exceedances at the monitoring station.

Los Alamos Canyon Weir during storm event

The storm water monitoring results are plotted on graphs located at the end of each SMA chapter. Organic and inorganic analytes are presented in different plots. A graphic explaining how to read the plot is presented in Appendix C.

During the week of September 10, 2013, the Pajarito Plateau and much of New Mexico and Colorado were inundated with unprecedented rainfall (a 1000-yr precipitation event). Rainfall totals in some areas of the Laboratory exceeded 7 in. during a 1-wk time period, and much of the rain fell during an extremely large event that occurred between September 12 and 13, 2013. These storm events were accompanied by record runoff, flooding, erosion, and sediment transport, resulting in a notification of force majeure to NMED and the EPA.

The sampling plans for 2014 have been updated. They are presented in Attachment 5 of each SDPPP Update volume.

3.4 Section 4, Inspections and Maintenance

Control measure inspection tables and maintenance tables were updated for 2013. These tables provide a summary of control measure inspections that occurred during 2013. The Individual Permit requires controls be inspected. The precipitation network for each watershed and rain event data in 2013 is presented in Attachment 3 in each SDPPP Update volume.

3.5 Section 5, Compliance Status

The compliance status table has been updated for 2013. The terms used to track compliance status are defined in Appendix A of the Overview. Five major categories are used to define compliance status:

Baseline Confirmation Complete—All confirmation monitoring results for all pollutants of concern at the SMA are at or below TALs, and corrective action is not required at the Sites. No further sampling is required.

Baseline Monitoring Extended—Baseline confirmation monitoring is in progress, and no storm water from a measurable storm event has been collected. There has been no TAL exceedance.

Corrective Action Initiated—A sample was collected during baseline confirmation monitoring and the analytical results show at least one pollutant concentration is above TAL, resulting in initiation of corrective action. Corrective action may include installing enhanced control measures, installing control measures that totally retain storm water, installing control measures that totally eliminate the exposure of pollutants, or receiving a certificate of completion from NMED.

Enhanced Control Corrective Action Monitoring—Confirmation monitoring at an SMA is initiated to determine how well enhanced controls are performing. This monitoring occurs after certification that the enhanced control measures have been installed and are complete.

Corrective Action Complete—Completion of corrective action is demonstrated by one of the following:

- Analytical results from enhanced control monitoring show pollutant concentrations for all pollutants of concern at the Site to be at or below applicable TALs; or
- Control measures that totally retain and prevent the discharge of storm water have been installed at the Site; or
- Control measures that totally eliminate exposure of pollutants to storm water have been installed at the Site; or
- The Site has achieved RCRA "no further action" status or a certificate of completion from NMED.

3.5.1 Selecting a Compliance Path Following Corrective Action Initiation

If confirmation monitoring sample results demonstrate that one or more TALs are exceeded at a Site, Part I.E, requires the Permittees to initiate corrective action. Corrective action consists of one of the following: (i) enhance control measures to meet the TAL; (ii) total retention of storm water discharges from the Site; (iii) total elimination of exposure of pollutants to storm water at the Site; or (iv) receipt of an NMED-issued certificate of completion under the RCRA Consent Order.

Part I.E.4 of the Permit categorizes the Sites into "High Priority Sites" and "Moderate Priority Sites" and establishes deadlines for corrective action based on this prioritization.

- If TALs are exceeded from a baseline confirmation monitoring sample collected before September 30, 2012, the Permittees are required to certify completion of corrective action at "High Priority Sites" within three (3) years of the effective date of the Permit (November 2013 deadline date).
- If a baseline confirmation monitoring sample was not collected by September 30, 2012, the Permittees are required to certify completion of corrective action at "High Priority Sites" within one (1) year following the first successful confirmation sampling event.

- Permittees are required to certify completion of corrective action at "Moderate Priority Sites" within five (5) years of the effective date of the Permit (November 2015 deadline date).

Finally, the Permittees may seek to place a Site or Sites into alternative compliance when they are unable to certify completion of corrective action under Parts I.E.2(a) through (d), individually or collectively after having installed baseline control measures or a combination of baseline and enhanced control measures. .

A screening procedure has been develop to provide the IP team with a process for evaluating existing information pertaining to the Site(s) and the associated SMA(s) and for recommending appropriate corrective action measure(s). This selection requires evaluation of available storm water, soil, tuff, and sediment data (site-specific and regional); physical knowledge of the Site(s), operating history of the Site(s), and the status of the Site(s) under the Consent Order; and any proposed Laboratory infrastructure or other facility improvements. Based on this evaluation, a determination is made as to whether the Site is a likely or unlikely source of the TAL exceedance to determine if additional storm water controls would be effective in reducing Site-related constituents that contribute to the TAL exceedance.

If the Site cannot achieve completion of corrective action under Section E.2(d) within the applicable IP deadline and is a likely source of the TAL exceedance, the Site is recommended to undergo Alternative Analysis. The Alternative Analysis process evaluates installation of enhanced controls, total retention, and no exposure.

4.0 Public Involvement

4.1 Website Updates

The website structure is designed to make IP documents easier to locate. The major links from the home page are as follows:

- **Public Meetings**—provides a link to the agenda and presentations for all meetings held to date.
- **Site Discharge Pollution Prevention Plan**—provides links to the five-volume 2012 SDPPP Update; the five-volume 2011 SDPPP, Revision 1, and monitoring and inspection procedures currently used by the PPT.
- **SMA Maps**—provides a direct link to each project map, maps are organized by SDPPP volume and updated when any change is made.
- **Reports**—provides links to the 2013 Annual Report, 2013 Compliance Status Report, the 2013 Target Action Level Exceedance Report, and Status Reports.
- **Construction Certifications**—provides links to the certification letters submitted to EPA following construction of enhanced controls and baseline controls.
- **Certification of Corrective Action Complete**—provides links to letters submitted to EPA that certify analytical results below TALs, total retention construction, construction to eliminate exposure, and certificates of completion received from NMED under the Consent Order.
- **Alternative Compliance**—provides links to the EPA submittal letter and alternative compliance package, provides links to underlying technical studies, and provides a place holder for public comments and the Permittees' response to be submitted to EPA.

- **Miscellaneous EPA Submittals**—provides links to letters submitted to EPA regarding force majeure, certification of analytical results, boundary changes, and a request to extend the permit renewal application deadline.

4.2 Email Notification

A "Subscribe" link is available on the IP webpages, in the right column, and allows anyone with an email address to sign up to receive email updates about compliance with the Individual Permit. The public can also ask questions of the IP team from the "Get Expertise" link in the left column.

4.3 Public Meetings

Public meetings are held approximately every 6 months. Meetings are announced through the email notification process and in local newspapers. The next meeting will be held in June or July 2014. An agenda will be available on the home page of the IP website in the "What's New" section before the meeting.

5.0 Watershed Protection Approach

Sediment transport mitigations are in place in several watersheds, including in Sandia, Mortandad, Los Alamos, and Pueblo Canyons. The goal is to reduce the transport of contaminated sediment through a variety of means, including reducing the potentially erosive nature of storm water runoff, enhancing deposition of sediment, and reducing or eliminating access of contaminated sediments to flood erosion. The watershed-scale mitigations were implemented under various drivers, including post-fire runoff-protection measures and the Consent Order. The specific mitigations include the DP Canyon grade-control structure and associated wetlands; the Pueblo Canyon grade-control structure, willow planting, wetlands, and erosion-control measures; the Los Alamos Canyon low head weir and associated sediment-retention basins; the Mortandad Canyon sediment-retention basins; and the Sandia Canyon grade-control structure and associated wetlands. Additional watershed mitigation measures are being developed during 2014. Sediment, storm water, and geomorphic monitoring is conducted in these watersheds to evaluate the effectiveness of the mitigations.

Pueblo Canyon grade-control structure

Appendix A
Acronyms and Glossary

All acronyms and abbreviations in the overview and Volumes 1 through 5 of this report are included in this list and are not defined at first use in each volume.

Acronyms

ACA	accelerated corrective action
AEA	Atomic Energy Act
AOC	area of concern
ATAL	average target action level
B	additional baseline control measure
BFM	bonded-fiber matrix
bgs	below ground surface
BMP	best management practice
BV	background value
CB	certified baseline control measure
CFR	Code of Federal Regulations
CISEC	Certified Inspector of Sediment and Erosion Control
CMP	corrugated metal pipe
CMR	Chemistry and Metallurgy Research
COC	certificate of completion
Consent Order	Compliance Order on Consent
COPC	chemical of potential concern
County	Los Alamos County
CPESC	Certified Professional in Erosion and Sediment Control
cpm	counts per minute
CWA	Clean Water Act
CWWTP	Central Wastewater Treatment Plant
D&D	decontamination and decommissioning
DL	detectable level
DU	depleted uranium
EC	enhanced control
ECB	erosion-control blanket
EM	electromagnetic
EPA	Environmental Protection Agency (U.S.)
EQL	estimated quantitation limit
ER Project	Environmental Restoration Project

Appendix A, Acronyms and Glossary (continued)

Acronyms (continued)

FFCA	Federal Facility Compliance Agreement
FGM	flexible-growth medium
FV	fallout value
FY	fiscal year
GPR	ground-penetrating radar
GSA	General Services Administration
HE	high explosives
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HRL	Health Research Laboratory
HYPO	high power
IA	interim action
ID	identification
IM	interim measure
IP	National Pollutant Discharge Elimination System (NPDES) Permit No. NM0030759
Laboratory	Los Alamos National Laboratory
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LASCP	Los Alamos Site Characterization Program
LASL	Los Alamos Scientific Laboratory
LLW	low-level waste
LOPO	low power
MD	munitions debris
MDA	material disposal area
MEC	munitions and explosives of concern
MLLW	mixed LLW
MQL	maximum quantitation level
MSGP	Multi-Sector General Permit
MTAL	maximum target action level
NES	nuclear environmental site
NFA	no further action
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NSSB	National Security Science Building
NPDES	National Pollutant Discharge Elimination System

Appendix A, Acronyms and Glossary (continued)

Acronyms (continued)

OD	open detonation
OEW	ordnance and explosives waste
OU	operable unit
OWR	Omega West Reactor
PBX	plastic-bonded explosive (potassium butyl xanthate)
PCB	polychlorinated biphenyl
Permittees	DOE and LANS
PF	permitted feature
PHERMEX	Pulsed High-Energy Radiographic Machine Emitting X-Rays
PLS	pure live seed
PPT	Pollution Prevention Team
PRS	Potential Release Sites (Laboratory database)
RADS	radionuclides
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RLW	radioactive liquid waste
RLWTF	Radioactive Liquid Waste Treatment Facility
RPF	Records Processing Facility
SAA	satellite accumulation area
SAFR	small arms firing range
SAL	screening action level
SDPPP	Site Discharge Pollution Prevention Plan
SMA	site monitoring area
SSL	soil screening level
SUPO	super power
SVOC	semivolatile organic compound
SWMU	solid waste management unit
SWSC	Sanitary Wastewater Systems Consolidation (plant)
SWTS	Storm Water Tracking System
TA	technical area
TAL	target action level
TCLP	toxicity characteristic leaching procedure
TNT	trinitrotoluene(2,4,6-)
TRM	turf-reinforcement mat

Appendix A, Acronyms and Glossary (continued)

Acronyms (continued)

TRU	transuranic
TSCA	Toxic Substance Control Act
TSD	treatment, storage, and disposal (unit)
TSTA	Tritium Systems Test Assembly
ULR	unassigned land release
USFS	U.S. Forest Service
UTL	upper tolerance limit
UXO	unexploded ordnance
VCA	voluntary corrective action
VCM	voluntary corrective measure
VCP	vitrified clay pipe
VOC	volatile organic compound
WBR	Water Boiler Reactor
WQDB	Water Quality Database
WWTP	waste water treatment plant

Appendix A, Acronyms and Glossary (continued)

Glossary

Alternative Compliance—Where the Permittees believe they have installed measures to minimize pollutants in storm water discharges but are unable to certify completion of corrective action because of force majeure events, background concentrations of pollutants of concern, site conditions that make it impracticable to install further control measures, or pollutants of concern contributed by sources beyond the Permittees' control, a Site may be placed into alternative compliance. EPA will determine an individually tailored compliance schedule on a case-by-case basis.

Baseline Confirmation Complete—All confirmation monitoring results for all pollutants of concern at the SMA are at or below TALs, and corrective action is not required at the Sites. No further sampling is required.

Baseline Monitoring Extended—Baseline confirmation monitoring is in progress, and no storm water from a measurable storm event has been collected. There has been no TAL exceedance.

Corrective Action Initiated—A sample was collected during baseline confirmation monitoring and analytical results show at least one pollutant concentration is above TAL, resulting in initiation of corrective action. Corrective action may include installing enhanced control measures, installing control measures that totally retain storm water, installing control measures that totally eliminate the exposure of pollutants, or receiving a certificate of completion from NMED.

Enhanced Control Corrective Action Monitoring—Confirmation monitoring at an SMA is initiated to determine how well enhanced controls are performing. This monitoring occurs after certification that the enhanced control measures have been installed and are complete.

Corrective Action Complete—Completion of corrective action is demonstrated by one of the following:

- Analytical results from enhanced control monitoring show pollutant concentrations for all pollutants of concern at the Site to be at or below applicable TALs; or
- Control measures that totally retain and prevent the discharge of storm water have been installed at the Site; or
- Control measures that totally eliminate exposure of pollutants to storm water have been installed at the Site; or
- The Site has achieved RCRA "no further action" status or a certificate of completion from NMED.

Appendix B
Control Measure Fact Sheets

Control Class	Control Type	Control Name
01	00	Seed and Mulch
	01	Seed and Wood Mulch
	02	Seed and Gravel Mulch
	03	Hydromulch
	04	Seeding
	05	Gravel Mulch
	06	Erosion Control Blanket
	07	Seed and Compost
02	00	Permanent Vegetation
	01	Grasses and Shrubs
	02	Forested/Needle Cast
	03	Vegetation Buffer Strip
	04	Established Vegetation
03	00	Berms
	01	Earthen Berm
	02	Base Course Berm
	03	Log Berm
	04	Asphalt Berm
	05	Silt Dike
	06	Straw Wattles
	07	Terra Tubes
	08	Retaining Wall
	09	Curbing
	10	Gravel Bags
	11	Eco-Block
	12	Rock Berm
	13	S-Fence
	14	Coir Log
04	00	Channel/Swale
	01	Earthen Channel/Swale
	02	Concrete/Asphalt Channel/Swale
	03	Rock Channel/Swale
	04	Culvert
	05	Water Bar
	06	Rip Rap
	07	Vegetated Swale
	08	TRM-Lined Swale

Appendix B, Control Measure Fact Sheets (continued)

Control Class	Control Type	Control Name
05	00	Sediment Traps and Basins
	01	Sediment Trap
	02	Sediment Basin
	03	Sand Filter
06	00	Check Dam
	01	Rock Dam
	02	Log Dam
	03	Juniper Bales
07	00	Gabions
	01	Gabions
	02	Gabion Blanket
08	00	Cap
	01	Earth Cap
	02	Rock Cap
	03	Concrete/Asphalt Cap
	04	Metal Cap

Appendix B, Control Measure Fact Sheets (continued)

Seed and Mulch

General Description

Seed and mulch will always be used in combination. Mulch includes wood, hydromulch, gravel, erosion control blankets, and turf reinforcement blankets.

Perennial vegetative cover from seeding has been shown to remove between 50% and 100% of total suspended solids from storm water runoff, with an average removal of 90%.

Control Function

Seed and mulch controls are used primarily for erosion control. However, these control measures can also be used for run-on, runoff, and sediment control if the storm water discharge is only sheet flow.

Construction Specifications/Installation Instructions

Complete Laboratory engineering standards are available.

Materials

Protect materials from deterioration during delivery and while stored at site.

Wood Mulch

- Wood straw mulch, wood chips, green-waste mulch, and bark chips are all accepted forms of wood mulch. Wood mulch application should completely cover the ground surface to provide adequate protection from raindrop impact and promote seed germination and seedling survival.

Gravel Mulch

- Gravel should be ¾ in. to 2 in. in diameter, round or crushed. Base course or any gravel with excessive fine material. Gravel mulch should be applied 3–6-in. thick over the soil surface.

Hydromulch

- Slopes flatter than 2:1—Provide mulch material consisting of 100% virgin wood fibers, combined with an organic plantago based tackifier. Bagged mulch/tackifier mix that is homogenous within the unit package may also be used.
- Slopes steeper than 2:1—Provide BFM and FGM mulches.

Seed

Wet seed shall be rejected. Seed can be spread mechanically or by hand. Because of the potential to introduce trace elements into storm water, it is not recommend using fertilizers with storm water controls.

The following sources have a “LANL Storm Water Mix” of seed available that has been formulated to LANL specifications:

- Ranier Seed
- Granite Seed
- Curtis & Curtis, Inc.

Appendix B, Control Measure Fact Sheets (continued)

Blankets and Matting

- Slopes less than 1:1—Straw/coir blend blankets.
- For high flow channels or slopes steeper than 1:1, use permanent composite TRM.
- Staples: U-shaped, 11 gauge or heavier steel wire, minimum leg length of 6 in. after bending, with a throat approximately 2 in. wide. Metal geotextile stake pins: a minimum of 6–8 in. long, a minimum 3/16 in. in diameter steel with a 1 ½-in. steel washer at the head of the pin.

Installation

Seed:

- Avoid seeding during windy weather or when topsoil is saturated or frozen.
- If necessary or feasible, loosen soil with disking, raking or harrowing. Remove large clods and stones, or other foreign material that would interfere with seeding equipment and erosion control blankets.
- Seed shall be applied uniformly using calibrated spreaders, cyclone seeders, mechanical drills, broadcast spreading, or hydroseeders When drill seeding, plant seed mix at a rate of 30–35 PLS lb/acre. When broadcast seeding, plant seed mix at a rate of 32–37 PLS lb/acre. To provide adequate seed-soil contact, incorporate broadcast seed into the soil by raking or chain dragging.
- Mulch shall be applied following the completion of seeding per requirements below.
- Where temporary watering is required for seeded areas, provide temporary water system that may be a sprinkler system, or a water truck with a spray boom Do not drive trucks with spray systems on seeded areas, and ensure water force does not cause movement of mulch or seed on the ground.
- Reseed void areas greater than 6 ft^2 or repetitive voids greater than 2 ft^2 amounting to more than 10% of any area that appears the growing season following installation.
- Prohibit people and vehicles from traveling over the seeded areas.

Hydromulch:

- If hydraulically applying mulch as part of the broadcast seeding process, use a two-step process.
- Apply seed with a tracer. Once seed is applied, apply full complement of mulch. This shall allow seed to be in good contact with soil surface and not suspended in mulch matrix.
- Mix slurry in a tank with an agitation system and spray, under pressure, uniformly over soil surface. Apply mulch evenly across landscape at a minimum rate of 3000 lb/acre. When using plantago based tackifier as mulch, apply tackifier at a rate of 150 lb/acre.
- Use both horizontal and vertical movements in the applicator to achieve an even application of slurry material. Keep all materials in uniform suspension throughout mixing and suspension cycle when using hydraulic mulching equipment. Avoid overspray onto vegetated or other areas such as channels.

Appendix B, Control Measure Fact Sheets (continued)

BFM and FGM, Slopes 2:1 and Steeper:

- Mix and apply seed and soil amendments with small amount of mulch for visual metering.
- Hydraulically apply at a rate of approximately 3500 lb/acre over seeded area in accordance with manufacturer's specified procedures to form a continuous uniform coverage. Apply from opposing directions to soil surface, reducing the "shadow effect" and assuring a minimum of 95% of soil surface coverage. Avoid overspray onto vegetated or other areas such as channels.

ECB and Mats:

- At the top of the slope anchor the mat in a trench that is a minimum of 6 in. deep by 6 in. wide. Backfill the trench and compact the soil into the anchor trench.
- Ensure the blanket is unrolled in the direction of the water flow.
- Maintain direct soil contact during placement. Lay blankets loosely and maintain direct contact with soil. Do not place over protruding objects; rocks, grass, etc.
- Overlap the edges of adjacent parallel rolls a minimum of 4 in. and anchor mats approximately every 3 ft.
- If blanket splicing is required, provide a minimum 6 in. overlap between mats and place anchors, approximately 12 in. apart in the overlapped area.
- Anchor the matting to the ground using U-shaped wire staples or metal geotextile stake pins, driven flush with the ground surface.
- Do not use blankets on tuff slopes. Use hydraulic mulching on tuff slopes. Perennial species can provide permanent control. Annual species longevity is about two seasons.

Correct Purpose:

Erosion Control Blankets	Slopes Steeper than 1:1	Slopes Flatter than 1:1	Slopes Flatter than 1:2	Slopes Flatter than 1:3	Channels
Permanent blankets	X	X	X	X	X
BFM, FGM hydromulch		X	X	X	
Wood fiber hydromulch			X	X	
Straw/Coir blankets		X	X	X	

Inspection and Maintenance

Installation Inspection:

- Inspect control area for uniform application of seed and mulch.
- Ensure blankets are properly trenched, overlapped, and stapled in. Rocks are not equal to staples to anchor blankets to the soil. Check that rocks, sticks, or bushes are not interfering with the blankets' contact with the ground.

Appendix B, Control Measure Fact Sheets (continued)

- Check that seed is under mulch, not on top or missing.
- Inspect seeded area for evidence of erosion (rills, gullies).Check for erosion and undermining. Backfill and compact any rills, storm water diversion and conveyance controls may be installed to divert concentrated flows away from seeded areas.
- ECBs should biodegrade in place; straw blankets last 2–3 yr at LANL.
- Repair torn or windblown blankets.
- Inspect reseeded areas for uniform growth of vegetation. Check for areas of vehicle or other impacts. Reseed void areas greater than 6 ft^2.
- Inspect existing vegetated areas for uniform growth of vegetation. Trees count towards total vegetative cover. Check for erosion. Storm water diversion and conveyance controls may need to be installed or use blankets to increase the erosion resistance of vegetated areas.

Failure Criteria

If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet compliance with the Individual Permit.

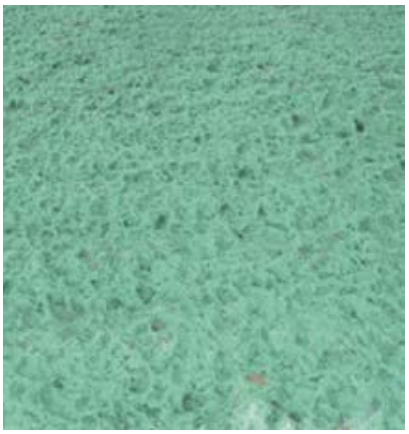
- Seed and mulch/hydromulch/ECB have not been properly installed and will obviously not function as required.
- Seed has not germinated after an appropriate amount of time and will obviously not function as required.
- Control has been damaged or degraded and will obviously not function as required.

Appendix B, Control Measure Fact Sheets (continued)

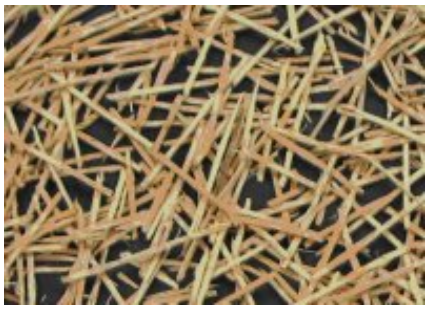
Visual Key for Proper Hydromulch Application (Flexterra-FGM shown below)

Improper Application

Improper Application

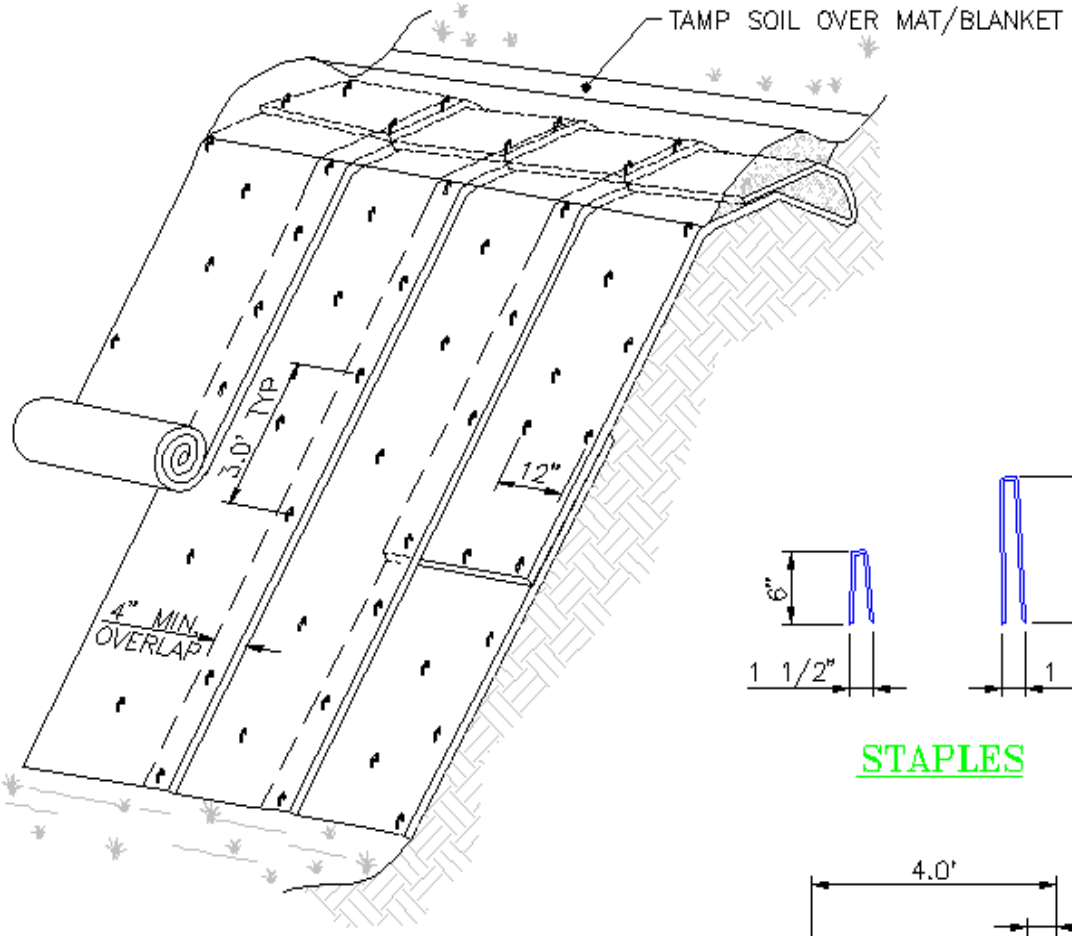


Proper Application
3000 lb/acre, 4.1-mm thick



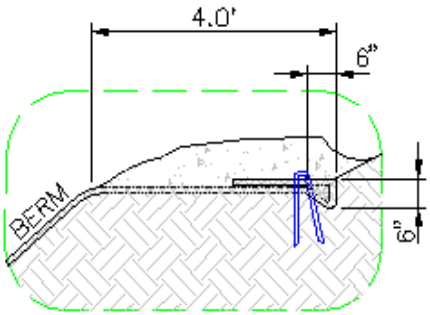
Improper Application
Wood Straw at 70% Cover
Must Be at 100% Cover

MATTING SLOPE INSTALLATION



TYPICAL SLOPE SOIL STABLIZATION

STAPLES



NOTES:

1. SLOPES SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS. SEEDBED SHALL BE APPROXIMATELY 3–5 INCHES DEEP.
3. UNROLL MATTING IN THE DIRECTION OF WATER FLOW.
4. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

Appendix B, Control Measure Fact Sheets (continued)

Permanent Vegetation

General Description

Established vegetation describes areas of existing mature vegetation that provides erosion control and storm-water infiltration. There are two broad categories of established vegetation at LANL: (1) low-growing vegetation is classified as grasses and shrubs and (2) piñon-juniper, ponderosa, pine and mixed conifer vegetation is classified as forested.

Control Function

Established vegetation is primarily used for erosion control, including sediment control, run-on control, and runoff control in situations with no concentrated flow.

Control Specifications

Any area of existing perennial vegetation that increases storm water infiltration and protects the soil from wind erosion, raindrop impact, or storm water overland flow.

Inspection and Maintenance

- Inspect for significant disturbances to vegetation (e.g., construction, fire, thinning, road building, and new storm water channels).
- Repair significant disturbances and reestablish vegetation with other appropriate control measures.

Failure Criteria

If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet IP compliance.

- Existing vegetation has been damaged or degraded to the point that it no longer functions as a significant storm water control.

Appendix B, Control Measure Fact Sheets (continued)

Berms

General Description

This category of storm water control includes earthen berms, base-course berms, log berms, asphalt berms, silt dike, straw wattles, retaining walls, curbing, gravel bags, Eco-Block, rock berms, S-fence, and coir log.

Control Function

Berms are used primarily for run-on diversion of sheet flow and channelized flow and are also used for retention of run-on, runoff, and sediment control in low-flow applications. Diversion berms will be constructed primarily from earth, base course, or asphalt (berms and curbing). Retention berms will be constructed primarily from earth, base course, logs, or asphalt. Straw wattles, S-fence, rock berms, and gravel bags can be used along the toe, top, and face and at-grade breaks of slopes to shorten slope length and along the perimeter of exposed soil areas to reduce flow velocities and retain sediment. Filter fabric can be used where additional reductions in turbidity are required. Retaining walls are used primarily for slope stabilization and sediment control.

Construction Specifications/Installation Instructions

Materials:

- Earthen and base course berms, log berms, and wattles can be used for low-flow applications. Asphalt berms must be used for concentrated flows.
- Straw wattles must be at least 8 in. in diameter. To be effective, fiber rolls at the toe of slopes must be at least 20 in. in diameter. An equivalent installation, such as stacked smaller-diameter wattles, can be used to achieve a similar level of protection.

Berm Installation:

- Earthen berms require vegetative controls upon completion of construction to prevent erosion of the berm itself. Riprap should be used if additional armoring is necessary.
- Install asphalt berms and curbs per design drawings. In general, the base of a berm is twice as wide as the height of the berm.
- For areas with significant traffic, gravel or asphalt berms should be constructed.
- Berm fill material should be placed in 6 to 12-in. lifts and each lift compacted with a compactor or the appropriate earth-moving equipment.
- Stabilize the berms with seed and ECBs, seed and hydromulch, or other appropriate stabilization. See vegetation and riprap fact sheets for information on those types of berm stabilization.
- When used as a perimeter or downslope control, berms shall divert runoff to a sediment trapping control such as a sediment trap or basin.

Appendix B, Control Measure Fact Sheets (continued)

Wattle and Coir Log Installation:

- Install straw wattles along the contour with the ends of each wattle turned upslope to prevent runoff from flowing around the end. Overlap ends for extended length.
- Install wattles in shallow trenches dug 3 to 5 in. deep for soft, loamy soils and 2 to 3 in. deep for hard, rocky soils.
- Determine the vertical spacing for slope installations on the basis of the slope gradient and soil type. A good rule of thumb is as follows:
    - ❖ 1:1 slopes = 10 ft apart
    - ❖ 2:1 slopes = 20 ft apart
    - ❖ 3:1 slopes = 30 ft apart
    - ❖ 4:1 slopes = 40 ft apart
- Drive wood stakes or rebar through the middle of the wattle and deep enough into the ground to anchor the roll in place. About 3 in. of the stake should stick out above the roll, and the stakes should be spaced 3 to 4 ft apart. If rebar is used, ensure the end is capped. Alternately, wood stakes may be placed on each side of the wattle tying across with a natural fiber twine or staking in a crossing manner ensuring direct soil contact at all times.
- Backfill the upslope length of the wattle with the excavated soil and compact.

Installation of Other Berm Types:

- Log berms installation is similar to wattles. Logs must be delimbed, trenched in, and backfilled. If necessary, secure with wooden stakes on either side of the log.
- Rock berms must be constructed of large angular rock. Height and depth of the berm depends on the expected storm water flow. Ends of berm should be brought forward to help contain the flow.
- Gravel-bag berms must be constructed of bags of woven polypropylene, polyethylene, or polyamide fabric and filled with 0.5–1-in.-diameter gravel. Gravel bags must be packed closely with no gaps. Ends of berm should be brought forward to help contain the flow.
- Eco-blok rubber sediment control block installation is similar to gravel bag berms. Eco-blok can be staked down to soils or glued to asphalt or concrete. Specific installation details can be found online at www.eco-blok.com.
- Ertec S-fence is installed perpendicular to sheet flow. The fencing is trenched in 3-in. and backfilled. The fencing is attached to wooden stakes placed at all overlaps or no more than 80-in. apart. Fencing is fixed to wooden stakes with drywall screws. Detailed installation instructions and drawings can be found online at www.ertecsystems.com.
- Curbing will be adopted as a storm water control where it exists and where it serves a useful function. The LANL storm water program will not install curbing.
- Retaining walls will be constructed to appropriate engineering standards.

Appendix B, Control Measure Fact Sheets (continued)

Inspection and Maintenance

Berms:

- Ensure berms are tall enough to handle expected flows.
- Ensure earth and base-course berms are compacted adequately.
- Inspect for effectiveness in performing designed function.
- Inspect for damage such as scour, vegetation loss, bank stability, debris build-up, erosion, and rock displacement.
- Inspect the outlet point for erosion or other damage.
- Repair any decrease in berm height from settling or erosion immediately.

Wattles:

- Ensure the rolls remain firmly anchored in place and are not crushed or damaged by equipment traffic.
- Check that they are trenched in and no gaps exist under the wattles.
- Check that wattles are adequately aligned with the next wattle. Either overlapped uphill of the next or doglegged.
- Repair or replace split, torn, unraveled, or slumping wattles.
- Repair rills or gullies upslope of the wattle and any undercutting.
- Additional wattles can be placed on top of existing ones to increase sediment capacity.

Retaining Walls:

- Inspect walls for cracks, slumping, or slope changes that negatively impact design function.
- Repair damage that compromises design function.

Failure Criteria

If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet Individual Permit compliance.

Berms:

- Berm is significantly eroded, damaged, or breached such that its function is compromised.
- Berm has visible evidence of significant scouring to the base or outlet.

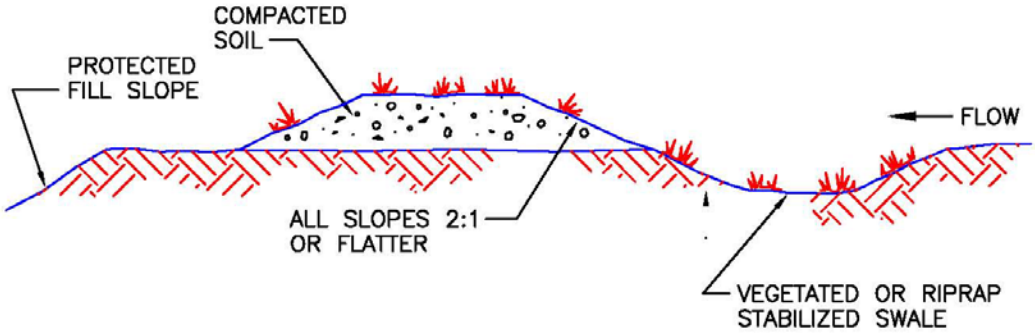
Wattles:

- Wattle is not firmly anchored to the ground.
- There are gaps under the wattle.
- The wattle has been damaged such that its function is compromised.

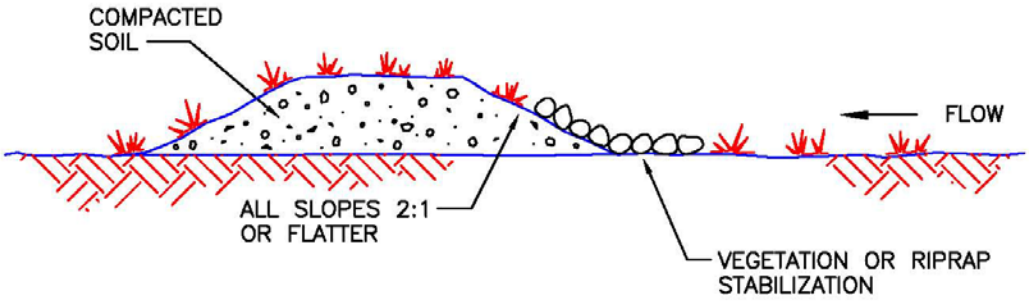
Retaining Walls:

- Wall or portion of wall has collapsed or is damaged and is releasing material.

EARTH BERM



TYPICAL FILL DIVERSION

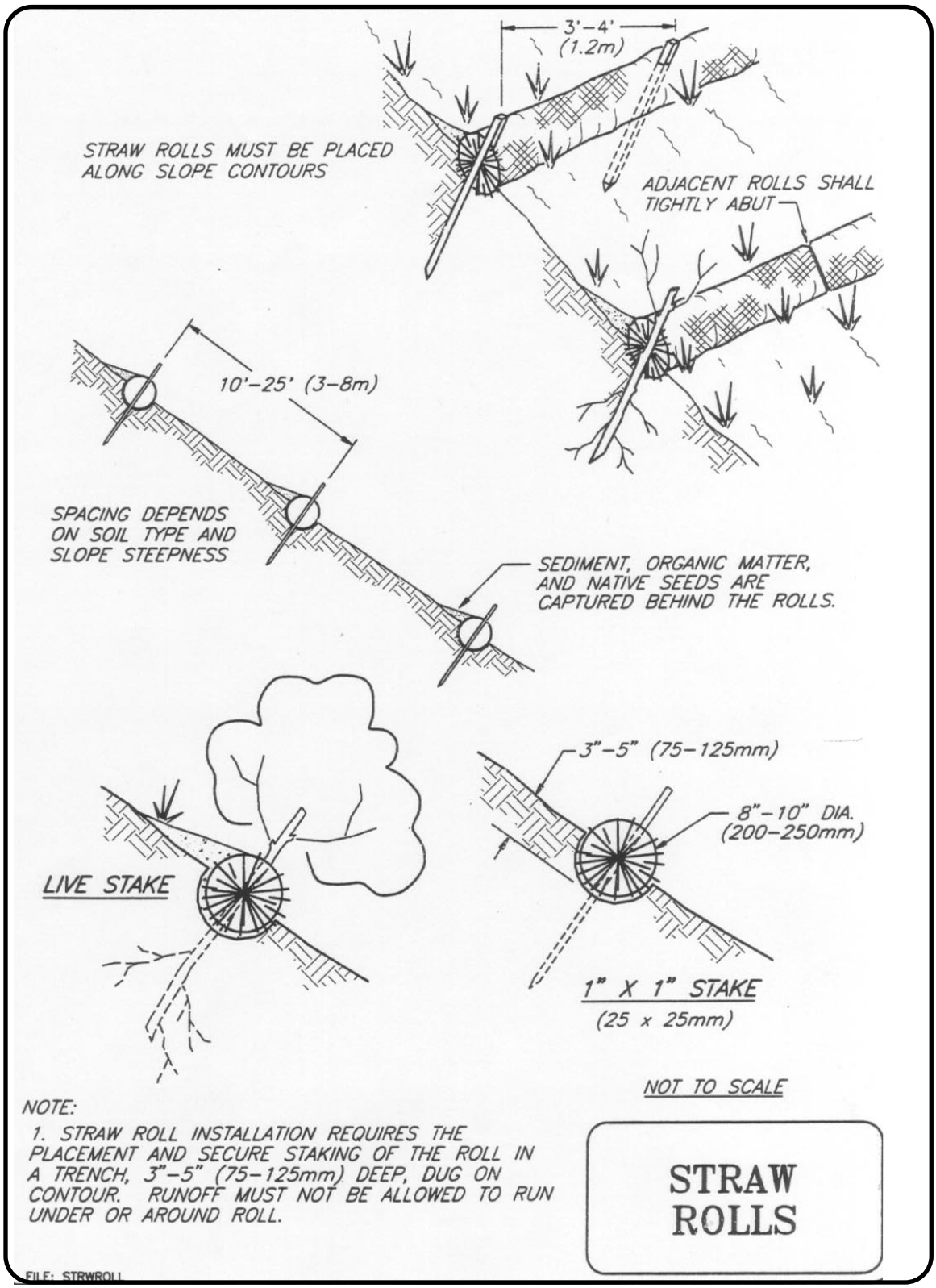


TYPICAL TEMPORARY DIVERSION DIKE

NOTES:

1. THE CHANNEL BEHIND THE BERM SHALL HAVE A POSITIVE GRADE TO A STABILIZED OUTLET.
2. THE BERM SHALL BE ADEQUATELY COMPACTED TO PREVENT FAILURE.
3. THE BERM SHALL BE STABILIZED WITH TEMPORARY OR PERMANENT SEEDING, MATTING, OR OTHER APPLICABLE MEASURES.

Appendix B, Control Measure Fact Sheets (continued)



Appendix B, Control Measure Fact Sheets (continued)

Channels and Swales

General Description

This category of storm water control includes earthen swales, concrete or asphalt swales, rock-lined (riprap) swales, vegetated swales, culverts, riprap outlet protection and water bars.

Control Function

Channels and swales are natural or constructed diversions that collect and convey concentrated flows of storm water runoff around an area. Lined channels or swales and culverts can also be used as erosion control if they transport storm water across a SWMU or AOC without contacting it. Water bars are used to divert water off a roadway without blocking access. Riprap outlet protection is used to stabilize soil and sediment below a storm water source.

Construction Specifications/Installation Instructions

Materials:

- TRM, asphalt, concrete and riprap must be used for lined channels or swales. Earthen channels can be used for low flow run-on applications. Lined channels or swales should be used for high flow applications or any application transporting storm water across a SWMU or AOC.

Installation:

- Install channels and swales per the design drawings. Outlets shall be stabilized with riprap protection if appropriate.
- See vegetation and riprap field sheets for information on those types of channel and berm stabilization.
- Install culverts sized to the anticipated flow volumes. Outlets shall be stabilized with riprap protection, if appropriate.
- Install water bars per the design drawings. Water bars should be sized and spaced according to anticipated storm water volume. Water bar outlets may require riprap protection.
- Stones used in riprap should be angular to promote interlocking. If appropriate to the expected flow, use filter fabric underneath riprap applications.
- Riprap used in high-flow situations should be a minimum of 12 in. deep and should be placed in a trench excavated to 24 in. below the toe of the slope of the embankment or side of channel.

Inspection and Maintenance

- Ensure that channels and swales, culverts and water bars are sized to handle expected flows.
- Inspect control for effectiveness in controlling storm water runoff.
- Inspect control for damage such as scour, vegetation loss, bank stability, debris buildup, erosion, and rock displacement.
- Inspect the outlet point for erosion or other damage.

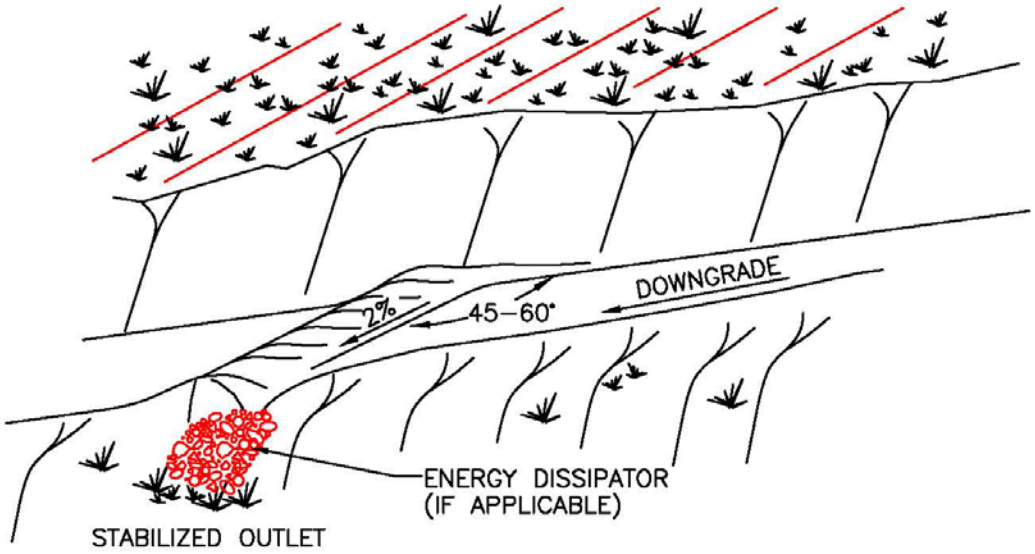
Appendix B, Control Measure Fact Sheets (continued)

Failure Criteria

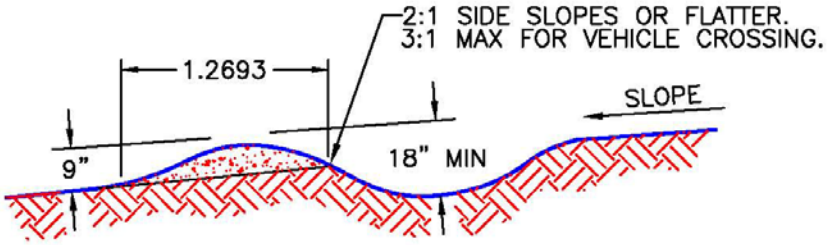
If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet IP compliance.

- Storm water has breached the control.
- The control has been damaged or degraded to the point where it is likely to be breached.
- The channel or swale lining been damaged or degraded resulting in scouring of underlying soils.
- There is significant scour at outlet of control.

WATERBAR



WATERBAR



SECTION

NOTES:

1. FOR AREAS OF SIGNIFICANT VEHICULAR TRAFFIC, WATERBARS SHALL BE STABILIZED WITH GRAVEL.
2. DIVERSION BERMS SHOULD HAVE A MINIMUM POSITIVE GRADE OF 2%.
3. WATERBARS SHALL BE CONSTRUCTED AT AN ANGLE OF 46 TO 60 DEGREES FROM THE CENTERLINE.
4. WATERBARS SHALL OUTLET ONTO AREAS STABILIZED BY EITHER NATURAL OR CONSTRUCTED MEANS.

Appendix B, Control Measure Fact Sheets (continued)

Sediment Traps and Detention Basins

General Description

Sediment traps are used to detain sediment and runoff and release the runoff at a reduced rate through a controlled outlet structure. Sediment traps perform the same function as basins but are typically smaller in size and do not have pipe outlets.

Control Function

Sediment traps and detention basins are used primarily for sediment control. Under appropriate conditions, they may also be used for runoff control in the IP program.

Construction Specifications/Installation Instructions

Materials:

- Fill material for embankments should be free of roots, woody vegetation, and large stones.
- See vegetation and riprap sections for descriptions of those materials.
- For basins use the specified materials.

Installation:

- Detention basins should be designed by an engineer.
- Sediment trap cut and fill slopes should have a maximum slope of 3:1.
- Sediment trap outflow must discharge through a stabilized low point. Spillways should be designed to provide the trap with a 1.5 ft settling zone and a 1 ft sediment storage zone.
- The trap outlet area should be lined with filter fabric before of stone or gravel is emplaced. Stones used to construct the spillway should be between 6 and 12 in. in diameter and angular.
- Embankment fill material should be placed in 6 in. lifts and each lift compacted with a compactor or the appropriate earth moving equipment.
- Stabilize the embankment with seed and erosion control blankets, seed and hydromulch, or other appropriate stabilization.

Inspection and Maintenance

- Ensure that the outlet and spillway are lower than pond edges and are adequately stabilized.
- Inspect for effectiveness in controlling storm water runoff.
- Inspect inlet, outlet, and pond/trap slopes for damage such as vegetation loss, bank stability, debris build-up, erosion, and rock displacement.
- Inspect the inlet and outlet point for erosion or other damage. Inspect pipe outlets closely for debris.
- Sediment traps may require removal of deposited sediment from the trap floor and accumulated debris (trash, leaves, branches, etc.) at the outlet structure.

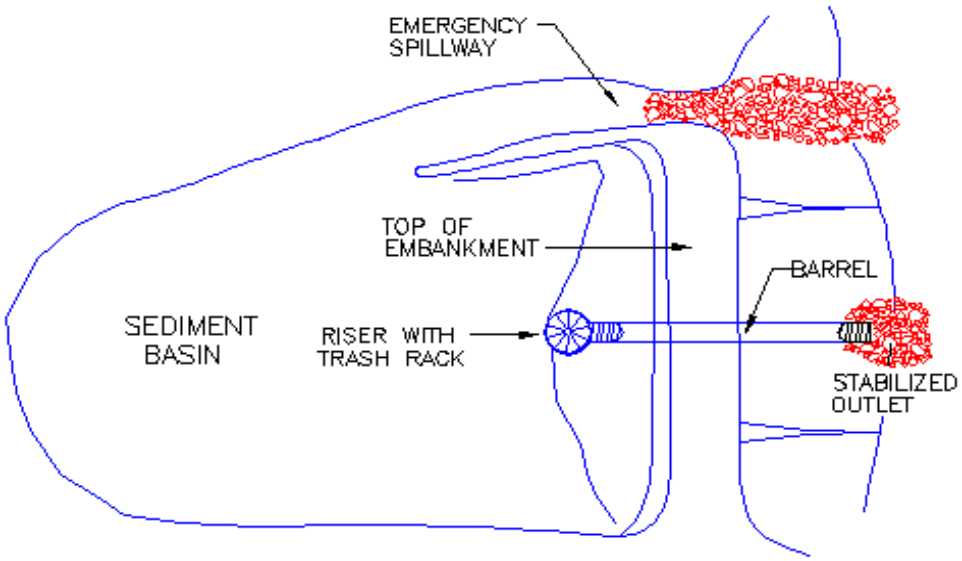
Appendix B, Control Measure Fact Sheets (continued)

Failure Criteria

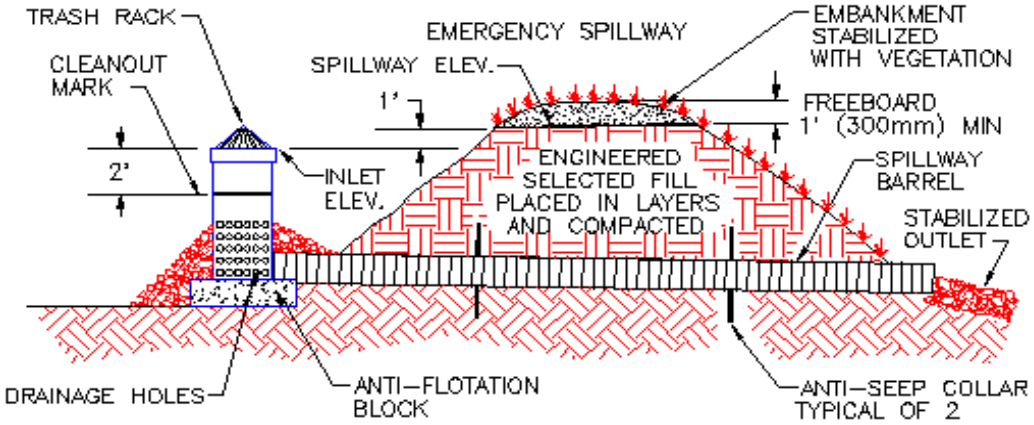
If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet IP compliance.

- The basin outlet is plugged.
- The spillway or overflow is clogged or damaged.
- The control structure has been damaged or degraded and its function is compromised.

TYPICAL SEDIMENT BASIN



PLAN

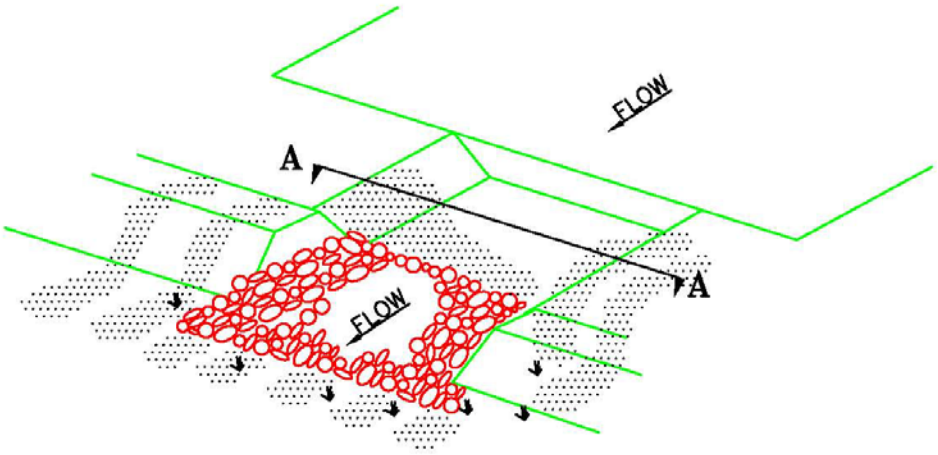


SECTION

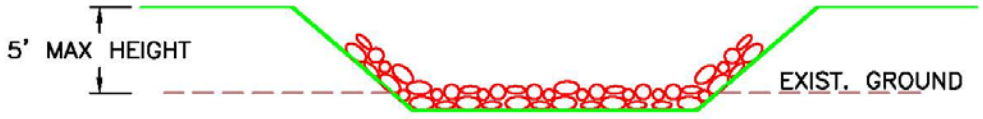
NOTES:

1. BASINS SHALL BE USED FOR AREAS GREATER THAN 5 ACRES IN SIZE.
2. ENSURE THAT FILL MATERIAL FOR EMBANKMENTS IS FREE OF ROOTS, WOODY VEGETATION, AND LARGE STONES.
3. LINE THE BASIN OUTLET AREA WITH FILTER FABRIC PRIOR TO PLACEMENT OF STONE OR GRAVEL.
4. ENSURE THAT THE EMERGENCY SPILLWAY IS NOT CONSTRUCTED FROM FILL MATERIAL.
5. STABILIZE EMBANKMENTS AND EMERGENCY SPILLWAY WITH SEED, MULCH, MATTING, OR OTHER APPLICABLE MEASURES.

SEDIMENT TRAP



PERSPECTIVE VIEW



SECTION A – A

NOTE:

1. CUT AND FILL SLOPES IN TRAPS SHALL BE 3:1 OR FLATTER.
2. ENSURE THAT FILL MATERIAL FOR EMBANKMENTS IS FREE OF ROOTS, WOODY VEGETATION, AND LARGE STONES.
3. STABILIZE EMBANKMENTS WITH SEED, MULCH, MATTING, OR OTHER APPLICABLE MEASURE.
4. LINE THE TRAP OUTLET AREA WITH FILTER FABRIC PRIOR TO PLACEMENT OF STONE OR GRAVEL.
5. SEDIMENT TRAPS SHALL NOT BE USED FOR DRAINAGE AREAS EXCEEDING 5 ACRES IN SIZE.

Appendix B, Control Measure Fact Sheets (continued)

Check Dams

General Description

This category of storm water control includes rock and log check dams and juniper bales. Note: Straw check dams and silt fence will not be used.

Control Function

Check dams are used primarily for sediment control but may also be used in small channels for run-on and runoff control.

Construction Specifications/Installation Instructions

Materials:

- When using rock, the material diameter should be 6- to 15-in. angular rock.
- Logs should have a diameter of 6 to 8 in.

Installation:

- Check dams should be placed at a distance and height to allow water ponding from downstream check dam to reach the toe of the upstream dam.
- High flows (typically a 2-yr storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- A check dam should not be more than 3 ft high, and the center of the dam should be at least 6 in. lower than its edges.
- Dams can be made more stable by entrenching the material approximately 6 in. into the sides and bottom of the channel.
- Rock should be placed individually by hand or by mechanical methods (no dumping of rock).
- Juniper bales should be embedded in a trench that has been excavated to a minimum depth of 4 in. Backfill material shall be firmly compacted. Bales should tightly abut one another. The bales should be anchored in place with wooden stakes through each bale.
- If necessary, construct scour protection on the downstream side of the dam to reduce downstream erosion (rock apron, TRM, etc.)

Inspection and Maintenance

- Verify that the check dam is located in a defined channel to reduce flow velocity or retain sediment.
- The center of a check dam should always be lower than its edges and the top of the channel.
- If high flows are expected, ensure scour protection has been installed on the downstream of the check dam.
- Check for damage and erosion caused by flows around or under the dam structure.

Appendix B, Control Measure Fact Sheets (continued)

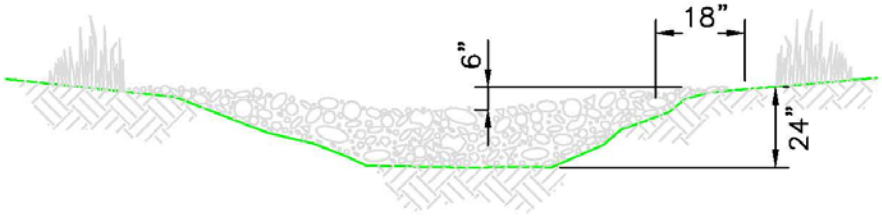
- The center of a check dam should always be lower than its edges. Additional stone may have to be added to maintain the correct height. Repair erosion around a check dam and lower the center if required.
- During inspection, remove large debris, trash, and leaves.

Failure Criteria

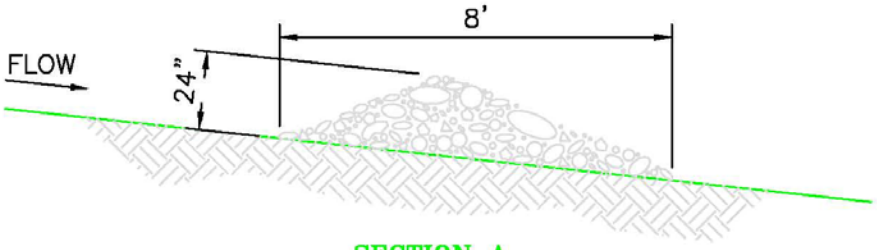
If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet IP compliance.

- Storm water has scoured channel around or under the check dam control.
- Storm water has scoured channel below the check dam control.
- Debris is blocking check dam control enough to compromise its function.
- Check dam control has been damaged or degraded enough to compromise its function.

ROCK CHECK DAM

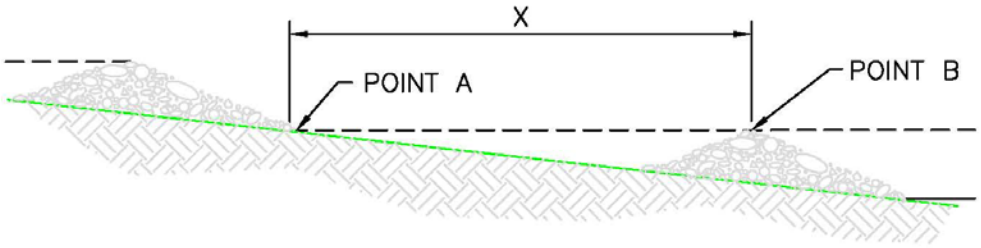


VIEW LOOKING UPSTREAM



SECTION A

X = THE DISTANCE SUCH THAT POINT A AND B ARE OF EQUAL ELEVATION.



SPACING BETWEEN CHECK DAMS

NOTES:

1. ROCK CHECK DAMS SHALL BE CONSTRUCTED WITH 6–15 INCH MAXIMUM SIZE ANGULAR AGGREGATE ROCK.
2. WHERE APPLICABLE, KEY STONE INTO CHANNEL BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 18" TO PREVENT FLOW AROUND DAM.
3. PROVIDE AN ENERGY DISSIPATOR ON THE DOWNSTREAM SIDE OF THE DAM TO REDUCE DOWNSTREAM EROSION.

Appendix B, Control Measure Fact Sheets (continued)

Gabions

General Description

This category of storm water control includes gabions and gabion blankets.

Control Function

Gabions are used for sediment control when installed perpendicular to the storm water flow as with a check dam. Gabions and gabion blankets are used for erosion control when they line a channel or swale.

Construction Specifications/Installation Instructions

Materials:

- Stones are usually rounded river rock and are well graded to promote interlocking.
- Gabions should be filled with minimum of 3- to 5-in. stone.
- Gabion mattresses should be filled with 4- to 8-in. stone.
- Baskets shall be constructed of wire mesh specified for this purpose, and baskets are attached to each other with proper fasteners.
- Filter fabric must be used underneath.
- Use steel railroad rails, standard weight galvanized steel pipe, or steel angles minimum 4 in. × 4 in. × 3/8 in. for stakes to anchor to the ground

Installation:

- Gabion installation should be done in accordance with the design requirements and manufacturer's standards and specifications. Additional general information on gabion installation follows:
    - ❖ For channel stabilization place in a trench excavated to 24 in. below the toe of the slope of the embankment or side of channel. Brush, trees, stumps, and other objects that would interfere with placement should be removed. Excavate loose material as necessary to establish a stable foundation for each structure.
    - ❖ Use filter fabric under the gabions, connect joints with a minimum overlap of 1 ft, and space anchor pins approximately every 3 ft along the overlap. The ends of the fabric shall be buried to a minimum depth of 12 in.
    - ❖ Gabions and gabion mattresses shall be secured to the channel bed.
    - ❖ When gabions are assembled, corners should be first joined together. Untied edges shall be assembled by tying with lacing wire or approved fasteners. Gabion baskets should be joined to each other along adjacent edges, both horizontally and vertically.

Appendix B, Control Measure Fact Sheets (continued)

Inspection and Maintenance

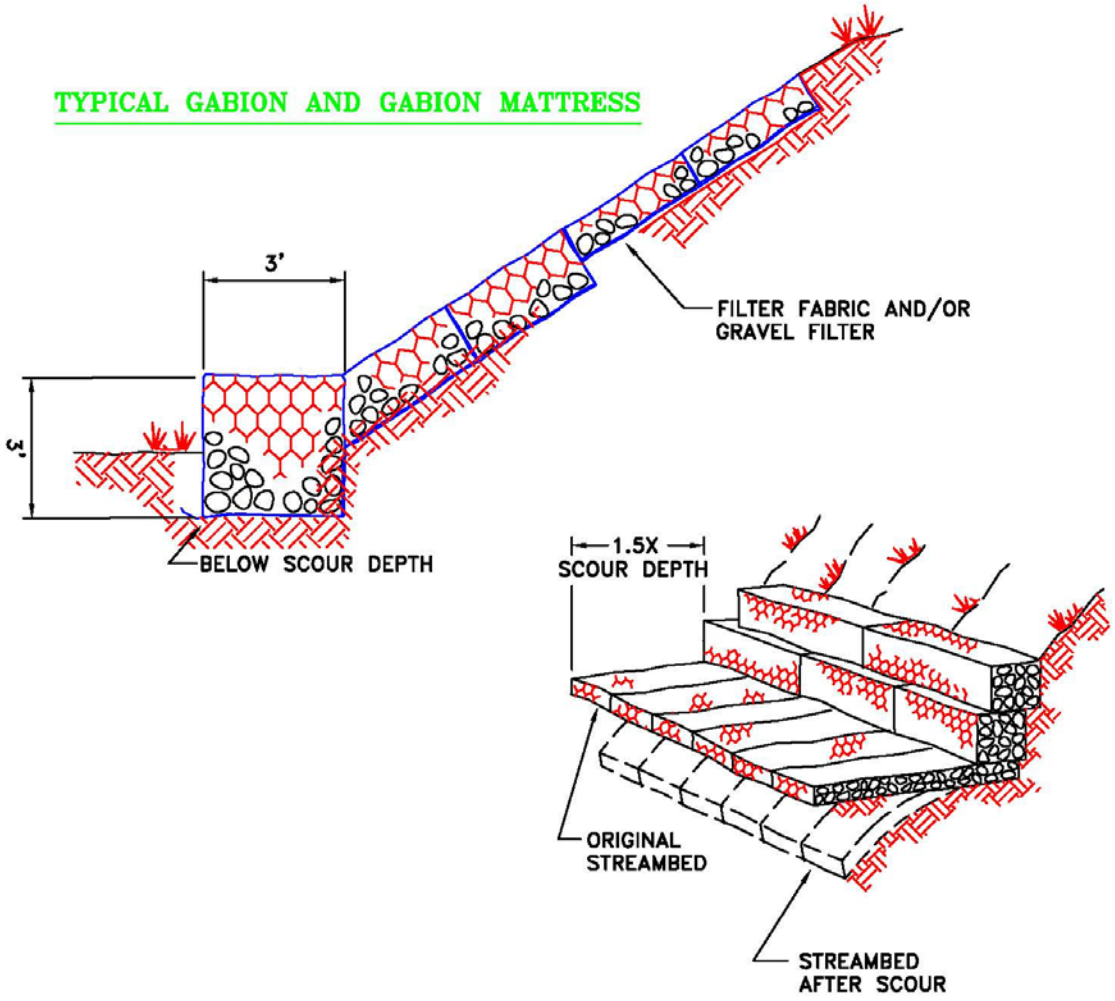
- Check that filter fabric was used under the gabion.
- Check that the gabion is anchored to the ground.
- Check that gabions are fastened to each other.
- Check that the baskets are adequately filled with no voids or bulges.
- Check that adjacent slopes have been filled adequately to prevent erosion and scour around the edges of the structure.
- Inspect for erosion and scour around and beneath the gabions.
- Check for excessive slumping, gabions are flexible and minor settling can be accommodated.
- Check for corroding wire mesh.
- Check for excessive growth of bushes, trees, and other vegetation that may damage gabions.

Failure Criteria

If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet IP compliance.

- Storm water has scoured around or beneath the gabion structure.
- Gabion structure has been damaged or degraded enough to compromise its function.

GABIONS



NOTES:

1. WHEN ASSEMBLING GABIONS, FASTEN CORNERS TOGETHER FIRST.
2. SECURE GABIONS TO STREAMBANK OR STREAMBED TO MINIMIZE SCOUR BENEATH OR AROUND THE STRUCTURES.
3. EXCAVATE LOOSE MATERIAL TO ESTABLISH A STABLE FOUNDATION.
4. MINIMIZE VOIDS AND BULGES IN THE GABIONS.

Appendix B, Control Measure Fact Sheets (continued)

Permanent Caps

General Description

This category of storm water control includes earth, rock, and asphalt caps.

Control Function

Caps are used primarily for erosion control and to isolate areas of potential soil contamination from storm water.

Construction Specifications/Installation Instructions

Materials:

- Materials used for capping must be obtained from an uncontaminated source.

Installation:

- Earthen caps must be at least 24 in. thick and should be vegetated or covered with rock or gravel to protect the cap from erosion.
- Asphalt caps should be a minimum of 4-in. thick.

Inspection and Maintenance

- There are areas of potential damage on the cap—scour, cracks, trees, or large bushes.
- Run-on and runoff controls should be in good condition—caps should be constructed with diversions and runoff erosion controls. Look for cracks and missing sections that could allow water to cross the site or get under the cap.
- Areas of erosion/headcutting are within 50 ft of the capped area and could migrate towards the cap.
- There are new human-caused impacts to the area.
- There are animal impacts to the area, such as burrows, ant hills.

Failure Criteria

If control conditions meet the failure criteria, maintenance or replacement must be initiated to meet IP compliance.

- The cap is damaged or degraded exposing the soil beneath.
- Erosion is scouring under the cap.

Appendix C
Understanding the Analytical Results Plots

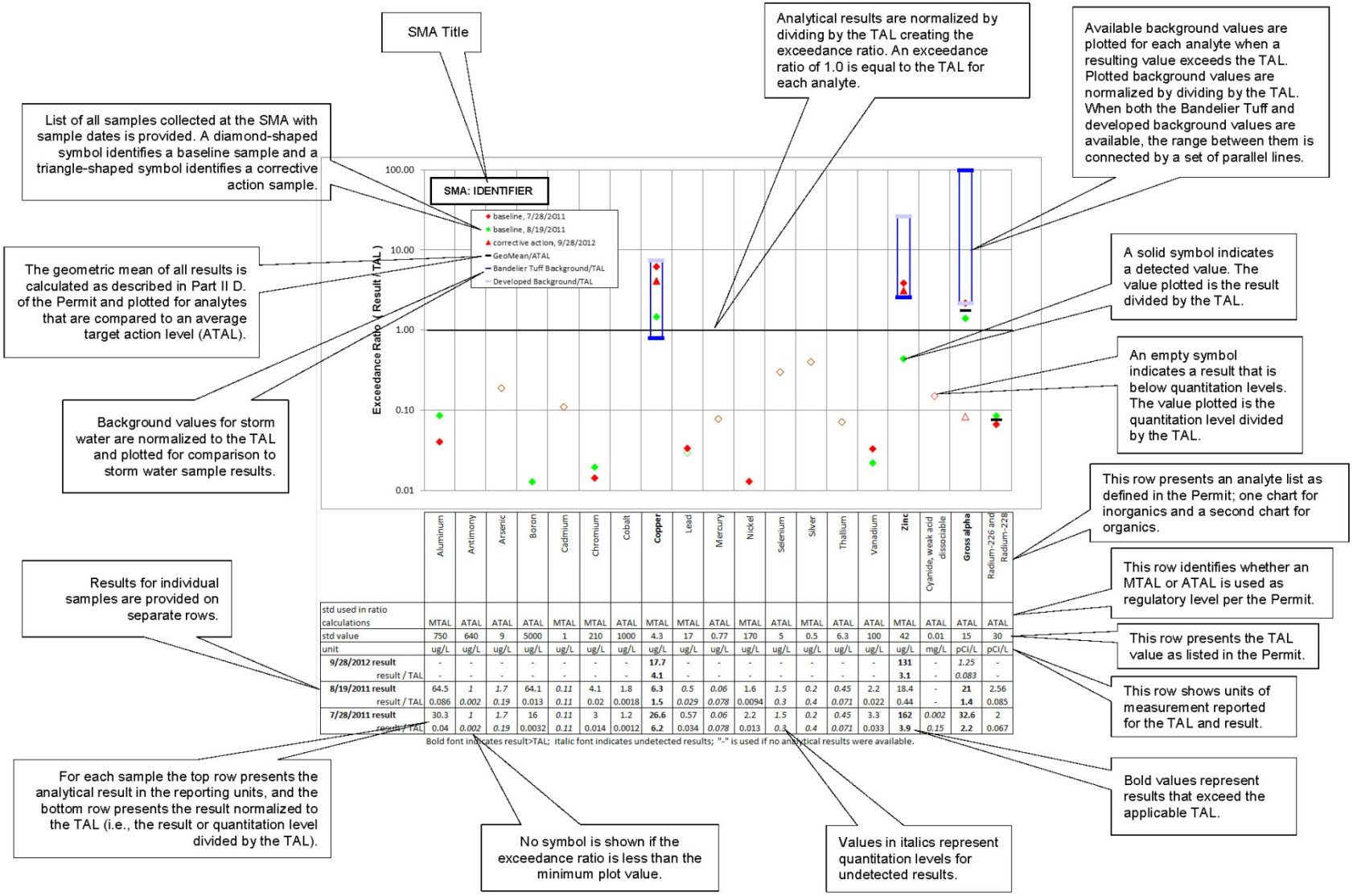
For each SMA where storm water samples were collected and analyzed in 2011, 2012, and 2013, the analytical results plots have been prepared. The purpose of the analytical plots is to present the analytical results in a manner which allows direct comparison with the TALs as defined in the Individual Permit. Data are presented in one or more plots. The first plot contains results for all metals, weak acid dissociable cyanide, and gross alpha and radium, and the second presents the results for organic compounds, if analyzed. The organic plot is presented only if one or more groups of organic compounds were analyzed in the storm water sample collected at the Site and associated SMA per the requirements set forth in Appendix B of the Permit.

Analytical results for each analyte presented on the plots are normalized by calculating an exceedance ratio. This ratio is defined as the analytical result divided by applicable TAL. Thus, results exceeding the TAL will be greater than an exceedance ratio of 1.0. The exceedance ratios are plotted on a log scale to allow the viewing of a larger range of values. A solid symbol on the plot represents a result that is detected above the PQL, while an empty symbol represents a value that is considered a nondetect. In a few instances, an empty symbol is plotted above an exceedance ratio of 1.0. In these cases, the value is nondetect and is represented graphically by the PQL. The PQL is normally 3 to 6 times the MDL and is considered the lowest concentration that can be accurately quantified rather than simply detected. Since the MDL (i.e., the value above which an analyte is considered detected) is lower than the PQL, the MDL can detect an analyte to a level 3 to 6 times below the PQL value that is represented by the plotted symbol.

Background storm water values for some metals, gross alpha, PCBs, where available, are also plotted to provide additional points of reference when evaluating the significance of the analytical result. The process for the determination of the background storm water values is presented in a report prepared by the Laboratory on PCBs in storm water (LANL 2012, 219767) and another report on metals and selected radionuclides in storm water (LANL 2013, 239557).

The following schematic provides more specific details related to individual components of the analytical results plots.

Appendix C, Understanding the Analytical Results Plots (continued)



	Aluminum	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	**Copper**	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	**Zinc**	Cyanide, weak acid dissociable	**Gross alpha**	Radium-226 and Radium-228
std used in ratio calculations	MTAL	ATAL	ATAL	ATAL	MTAL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MTAL	ATAL	ATAL	MTAL	ATAL	ATAL	ATAL
std value	750	640	9	5000	1	210	1000	4.3	17	0.77	170	5	0.5	6.3	100	42	0.01	15	30
unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	pCi/L	pCi/L
9/28/2012 result	-	-	-	-	-	-	-	**17.7**	-	-	-	-	-	-	-	**131**	-	*1.25*	-
result / TAL	-	-	-	-	-	-	-	**4.1**	-	-	-	-	-	-	-	**3.1**	-	*0.083*	-
8/19/2011 result	64.5	*1*	*1.7*	64.1	*0.11*	4.1	1.8	**6.3**	*0.5*	*0.06*	1.6	*1.5*	*0.2*	*0.45*	2.2	18.4	-	**21**	2.56
result / TAL	0.086	*0.002*	*0.19*	0.013	*0.11*	0.02	0.0018	**1.5**	*0.029*	*0.078*	0.0094	*0.3*	*0.4*	*0.071*	0.022	0.44	-	**1.4**	0.085
7/28/2011 result	30.3	*1*	*1.7*	16	*0.11*	3	1.2	**26.6**	0.57	*0.06*	2.2	*1.5*	*0.2*	*0.45*	3.3	**162**	*0.002*	**32.6**	2
result / TAL	0.04	*0.002*	*0.19*	0.0032	*0.11*	0.014	0.0012	**6.2**	0.034	*0.078*	0.013	*0.3*	*0.4*	*0.071*	0.033	**3.9**	*0.15*	**2.2**	0.067

Appendix D
References

The following lists include all documents cited in this plan. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's RPF and are used to locate the document at the RPF.

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