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Alternative Compliance Request for 52 Site Monitoring Area/ Site Combinations Exceeding Target Action Levels from Nonpoint Sources

Los Alamos
NATIONAL LABORATORY
EST. 1943

Prepared by the Environmental Programs Directorate

Cover photo: 1000-yr flood event that occurred in September 2013.

CERTIFICATION

LOS ALAMOS NATIONAL LABORATORY
NPDES Permit No. NM0030759

ALTERNATIVE COMPLIANCE REQUEST FOR 52 SITE MONITORING AREA/ SITE COMBINATIONS EXCEEDING TARGET ACTION LEVELS FROM NONPOINT SOURCES

CERTIFICATION STATEMENT OF AUTHORIZATION

"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 gathered and evaluated 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."

Dave McInroy, Program Director
Environmental Remediation Program
Los Alamos National Security, LLC

4/21/2015
Date

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4-27-2015

David S. Rhodes, Supervisor, Soil and Water Remediation
Environmental Management
Los Alamos Field Office

Date

EXECUTIVE SUMMARY

Los Alamos National Security, LLC (LANS), under the direction of the U.S. Department of Energy (DOE), has prepared this request for alternative compliance for the Individual Storm Water Permit pursuant to the requirements of the National Pollutant Discharge Elimination System Permit No. NM0030759 (hereafter, the Individual Permit or Permit). The Individual Permit authorizes the discharge of storm water associated with historical industrial activities at the Los Alamos National Laboratory from specified solid waste management units and areas of concern, collectively referred to as Sites. The Permit, incorporating the latest modifications, became effective on November 1, 2010.

This request for alternative compliance addresses 52 site monitoring area (SMA)/Site combinations regulated under the Individual Permit. These 52 combinations result from 51 Sites located within 29 site monitoring areas (SMAs). Alternative compliance is being requested because DOE and LANS have determined that it will not be possible to certify completion of corrective action under Part I.E.2 of the Individual Permit. These SMAs/Sites are addressed in a single request because the target action level exceedances are not known to be associated with Site operations and are within the range expected for runoff from developed and undeveloped landscapes, with the exceptions of a single aluminum and a single radium-226/radium-228 exceedance. Therefore, completion of corrective action cannot be certified under any other means provided in the Individual Permit.

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ACRONYMS AND ABBREVIATIONS

ACA	accelerated corrective action
AOC	area of concern
ATAL	average target action level
bgs	below ground surface
BV	background value
CEARP	Comprehensive Environmental Assessment and Response Program
CFR	Code of Federal Regulations
CMP	corrugated metal pipe
CMR	Chemical and Metallurgy Research (facility)
COC	certificate of completion
Consent Order	Compliance Order on Consent
CWA	Clean Water Act
D&D	decontamination and decommissioning
DOE	Department of Energy (U.S.)
EPA	Environmental Protection Agency (U.S.)
HE	high explosives
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HRL	Health Research Laboratory
Individual Permit	National Pollutant Discharge Elimination System Permit No. NM0030759
Laboratory	Los Alamos National Laboratory
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
MTAL	maximum target action level
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl
Permit	NPDES Permit No. NM0030759
Permittees	U.S. Department of Energy and Los Alamos National Security, LLC
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RFI	RCRA facility investigation
SMA	site monitoring area
SSL	soil screening level

SWMU	solid waste management unit
SWSC	Sanitary Wastewater Systems Consolidation (plant)
TA	technical area
TAL	target action level
TCLP	toxicity characterization leaching procedure
TNT	trinitrotoluene(2,4,6-)
UTL	upper tolerance limit
VCA	voluntary corrective action
VCP	vitrified clay pipe
WWTP	wastewater treatment plant

1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by Los Alamos National Security, LLC (LANS). The Laboratory, located in Los Alamos County in northern New Mexico, covers approximately 36 mi^2 (Figure 1.0-1). It is situated on the Pajarito Plateau, which is made up of a series of finger-like mesas separated by deep west-to-east-oriented canyons cut by predominantly ephemeral and intermittent streams.

On February 13, 2009, the U.S. Environmental Protection Agency (EPA), Region 6, issued National Pollutant Discharge Elimination System (NPDES) Permit No. NM0030759 (hereafter, the Individual Permit or Permit) to DOE and LANS (collectively, the Permittees). The Individual Permit incorporating the latest modifications became effective on November 1, 2010 (EPA 2010). The Individual Permit regulates storm water discharges from certain solid waste management units (SWMUs) and areas of concern (AOCs) (hereafter, Sites). For purposes of implementing the Individual Permit, Sites are organized into site monitoring areas (SMAs).

Under the Individual Permit, DOE and LANS (hereafter, the Permittees) are required to perform corrective actions if storm water monitoring results at an SMA exceed target action levels (TALs). The Permittees can place a Site into alternative compliance where they 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). As described below, the Permittees have determined that the Sites addressed in this request can achieve completion of corrective action only through the alternative compliance process described in Part I.E.3.

This request for alternative compliance addresses 52 SMA/Site combinations. These 52 combinations result from 51 Sites located within 29 SMAs. These Sites/SMA combinations are addressed in a single request because the TAL exceedances for these SMAs/Sites are not known to be associated with Site operations and are within the range expected for runoff from developed and undeveloped landscapes on the Pajarito Plateau, with the exception of a single aluminum exceedance and a single radium-226/radium-228. As a consequence, the Permittees cannot certify completion of corrective action under any other means provided in the Permit. Part I. 3.(a) of the Permit specifically identifies “background concentrations of pollutants of concern” as a reason for the Permittees to place a Site into alternative compliance. In this case, “background concentrations” are the result of natural background and/or contributions from developed areas not related to the Sites.

This alternative compliance request is organized as follows.

- Section 2.0, Regulatory Framework, summarizes the scope of the Individual Permit, the relationship between the Individual Permit and the March 2005 Compliance Order on Consent (Consent Order), administered by the New Mexico Environment Department (NMED), and its associated corrective action processes.
- Section 3.0, Overview of the Alternative Compliance Process, summarizes the requirements in Part I.E.3(b) of the Permit for making an alternative compliance request to EPA.
- Section 4.0, Site Information, provides relevant site information including descriptions/history, storm water controls, TAL exceedances, soil data, and hydrologic conditions.

- Section 5.0, Basis of Alternative Compliance Request, summarizes the basis for the Permittees' conclusion that certification of completion of corrective action cannot be achieved under Parts I.E.2(a) through 2(d) of the Permit.
- Section 6.0, Proposed Alternative Compliance Approach, describes the actions proposed by the Permittees to achieve completion of corrective action under Part I.E.3 of the Permit.

2.0 REGULATORY FRAMEWORK

The Individual Permit authorizes discharge of storm water associated with industrial activities from specified Sites. The Individual Permit treats historical releases at a Site as "significant materials" [as defined in 40 Code of Federal Regulations (CFR) 122.26(b)(12)] that may potentially be released with "storm water discharge[s] associated with industrial activity" [as defined in 40 CFR 122.26(b)(14)]. Such discharges are considered to be point-source discharges, and the Individual Permit directs the Permittees to monitor storm water discharges from Sites at specified sampling points known as SMAs. An SMA is a drainage area within a subwatershed and may include more than one Site.

The Sites regulated under the Individual Permit are a subset of the SWMUs and AOCs that are being addressed under the Consent Order issued by NMED. The Consent Order fulfills the corrective action requirements in §3004(u) and §3008(h) of the Resource Conservation and Recovery Act (RCRA).

A SWMU is a discernible unit at which solid wastes may have been "routinely and systematically released," possibly resulting in a release of hazardous constituents. The Consent Order also regulates AOCs, areas where releases of hazardous constituents may potentially have occurred but that are not SWMUs. The process of identifying and investigating SWMUs and AOCs is iterative. The initial identification process is conservative—that is, it errs on the side of inclusion if there is any indication in the record a possible historical release of hazardous wastes or hazardous constituents. The Consent Order requires initial investigations to run broad, conservative analytical scans regardless of what the historical reviews indicate may have been released. As a result, all samples in the first phase of investigations under the Consent Order are typically analyzed for EPA target analyte list metals, total cyanide, volatile organic compounds, semivolatile organic compounds, polychlorinated biphenyls (PCBs), nitrate, and perchlorate.

As the investigations under the Consent Order proceed, some SWMUs and AOCs will be eligible for corrective action complete status (e.g., the data reveal no hazardous constituents were released). For the remaining SWMUs and AOCs, the investigations proceed until the nature and extent of contamination from the historical release have been defined in all relevant media, and it can be shown that the Site poses no unacceptable risk to human health and the environment under current and reasonably foreseeable future land use. The investigations of SWMUs and AOCs under the Consent Order began before the effective date of the Individual Permit and continue concurrently with implementation of the Permit.

A Site that has met the definition of a SWMU or AOC was evaluated for inclusion in the Individual Permit based on the following criteria: (1) the SWMU/AOC potentially contains "significant material" (i.e., a release has potentially occurred and has not been cleaned up; (2) the significant material is exposed to storm water (e.g., not covered or limited to the subsurface); and (3) the significant material may be released with storm water discharges to a receiving water. The selection of SWMUs and AOCs for inclusion in the Individual Permit was based on historical information and any storm water data available at the time the Permit application was submitted.

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 Sites. The Permittees are required to implement site-specific control measures (including best management practices) to address the nonnumeric technology-based effluent limits, as necessary, to minimize pollutants from the Sites in their storm water discharges.

The Permit establishes TALs that are used as benchmarks to determine the effectiveness of control measures implemented under the Permit. Baseline confirmation monitoring sample results for an SMA are compared with applicable TALs. If one or more baseline confirmation monitoring result exceeds a TAL, the Permittees must take corrective action. Depending of the type of corrective action implemented, corrective action confirmation monitoring may be needed to verify the effectiveness of the corrective action (e.g., enhanced controls). The Permittees must then certify completion of corrective action within the deadlines specified in the Permit. Part I.E.2 of the Individual Permit defines "completion of corrective action" as follows:

- Analytical results from corrective action confirmation sampling show pollutant concentrations for all pollutants of concern at a Site to be at or below applicable TALs;
- Control measures that totally retain and prevent the discharge of storm water have been installed at the Site;
- Control measures that totally eliminate exposure of pollutants to storm water have been installed at the Site; or
- The Site has achieved RCRA corrective action complete with or without controls status or a certificate of completion (COC) under the Consent Order.

Under certain circumstances, the Individual Permit allows the Permittees to submit a request to EPA to have a Site or Sites placed into "Alternative Compliance." Part I.E.3, Alternative Compliance, addresses the criteria and requirements for making a request for an alternative compliance and the actions EPA will take in response to the request. This corrective action process is illustrated schematically in Figure 2.0-1.

3.0 OVERVIEW OF ALTERNATIVE COMPLIANCE PROCESS

The Permittees may seek to place a Site or Sites into alternative compliance when they have installed baseline control measures to minimize pollutants in storm water discharges but are unable to certify completion of corrective action under Parts I.E.2(a) through (d), individually or collectively. Under the Individual Permit, the Permittees must certify completion of corrective action for High Priority Sites on or before November 1, 2013, unless a confirmation sample could not be collected from a measurable storm event at an individual Site before the second year of the Permit (or before September 30, 2012) (see Part E.1.d). The Permittees must certify completion of corrective action for Medium Priority Sites on or before November 1, 2015. Part E.1.d further provides that the compliance deadline for corrective action under Part E.4 is "extended for a one (1) year period following the first successful confirmation sampling event." Part E.3.b, in turn, provides that if the Permittees seek to place a Site into alternative compliance, they shall not be out of compliance with the applicable deadlines for achieving completion of corrective action under Part E.4, provided the request and supporting documentation are submitted to EPA on or at least six (6) months before the applicable deadlines.

If EPA grants the alternative compliance request in whole or in part, it will indicate completion of corrective action on a "case-by-case basis," and EPA may require a new individually tailored work plan for the Site or Sites as necessary. As stated in Part I.E.3.(b), "The Permittees shall not be out of compliance with the applicable deadlines for achieving completion of corrective action under Section E.4 with respect to the Site or Sites covered by a request, provided that the request is submitted to EPA on or at least six months before the applicable deadlines."

If EPA denies the alternative compliance request, it will promptly notify the Permittees of the specifics of its decision and of the time frame under which completion of corrective action must be completed under Parts I.E.2(a) through I.E.2(d).

The first requirement that must be met to qualify for alternative compliance is that the Permittees must 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…." Part I.A describes the nonnumeric technology-based effluent limitations required under the Individual Permit to minimize pollutants in storm water discharges. The erosion and sedimentation and run-on and runoff controls identified in Part I.A were installed as baseline controls measures within the first 6 mo of the effective date of the Permit, and COCs were submitted to EPA. The other nonnumeric technology-based effluent limitations include employee training and the elimination of non–storm water discharges not authorized by an NPDES permit.

The second requirement is that the Permittees must demonstrate they will not be able to certify completion of corrective action under Parts I.E.2(a) through I.E.2(d), individually or collectively. Part I.E.3 lists the following examples of conditions that could prevent the Permittees from certifying corrective action complete: force majeure events, background concentrations of pollutants of concern, site conditions that make installing further control measures impracticable, or pollutants of concern contributed by sources beyond the Permittees' control. This list provides examples of the types of conditions EPA will consider as the basis for an alternative requirements request; it is not an inclusive list.

The third requirement is that the Permittees develop a detailed demonstration of how they reached the conclusion that they are unable to certify completion of corrective action under Parts I.E.2(a) through (d), individually or collectively. This demonstration should include any underlying studies and technical information.

Once completed, the alternative compliance request and all supporting documentation must be submitted to EPA and made available for public review and comment for a period of 45 d.

The Permittees will issue a public notice of issuance of the alternative compliance request by publishing a notice in the Los Alamos Monitor and the Santa Fe New Mexican, by mailing a copy of the notice to those individuals on the NMED-maintained LANL Facility Mailing List and to NMED and by posting the notice on the Individual Permit section of the Laboratory's public website.

This public notice will include the following:

- The name and address of the EPA office processing the alternative compliance request for which notice is being given;
- The name, address and telephone number of a person from whom interested persons may obtain further information; and
- A description of where interested persons may secure hard copies of the alternative compliance request.

At the conclusion of the public comment period, the Permittees will prepare a written response to all relevant and significant comments and concerns raised during the comment period. This response will be provided to each person who requests a copy in writing by mail or email, including those who check the option for a copy on the online comment submittal form. The response will also be posted in the Individual Permit section of the Laboratory's public website.

The Permittees will then submit the alternative compliance request, along with the complete record of public comment and the Permittees' response to comments, to EPA Region 6 for a final determination on the request.

4.0 SITE INFORMATION

This request for alternative compliance addresses 52 SMA/Site combinations. These SMA/Sites and the relative TAL exceedance(s) and constituent(s) for the current compliance stage are listed in Table 4.0-1. Appendix A contains the relevant information for each SMA/Site included in this request. Site information provided in Appendix A includes descriptions of Site features and operating history, storm water controls, storm water monitoring data, including the TAL exceedance plots, Site-related soil sampling data results (where available), and SMA drainage areas and surface conditions (percentage of developed and undeveloped areas). Land classification for each SMA was prepared using information gathered during multiple site visits and/or geographic information system tools. Developed areas consist of surfaces such as pavement, buildings, dirt or gravel. Undeveloped areas consist of bare soil, bare rock, riprap, grassland, ponderosa, piñon, juniper, chamisa, gambel oak brush, willows, and mulch.

5.0 BASIS FOR ALTERNATIVE COMPLIANCE REQUEST

The basis for this alternative compliance request is that the constituents exceeding TALs for these SMAs/Sites are not known to be associated with Site operations and are within the range expected for runoff from developed and undeveloped landscapes, with the exceptions of a single aluminum and a single radium-226/radium-228 exceedance.

5.1 Potential Sources of TAL Exceedances

At all the SMAs included in this alternative compliance request, each SMA contains non-Site-affected developed and undeveloped areas that contribute storm water to the SMA sampler. Storm water samples collected at these SMAs, therefore, represent runoff from landscapes not affected by the Site as well as areas potentially affected by releases from the Site. Potential non-Site-related and Site-related sources of aluminum, copper, zinc, PCBs, and/or gross-alpha radioactivity in storm water samples are summarized below.

The Sites contained in this request were placed into corrective action based on storm water monitoring results that exceeded TALs for one or more of the following constituents: aluminum, copper, zinc, PCBs, and/or adjusted gross-alpha radioactivity. In all cases, detected concentrations of copper, zinc and PCBs were below the upper tolerance limits (UTLs) in storm water runoff from developed landscape for the current compliance stage. With the exceptions of a single aluminum exceedance and a single radium-226/radium-228 exceedance, the detected concentrations of aluminum and activities of gross-alpha radioactivity in the storm water samples were below the UTLs for aluminum and gross-alpha radioactivity in storm water runoff from the undeveloped landscape for the current stage of compliance. As explained below, the UTLs are representative of concentrations of constituents in storm water runoff from developed and undeveloped landscapes that have not been affected by Laboratory operations.

5.1.1 Runoff from Developed Landscapes

Copper and zinc are known to be present in storm water runoff from developed areas from various anthropogenic sources (e.g., automobile brake pads, galvanized metal, building materials). To determine the contribution of metals to runoff from developed areas not affected by Laboratory operations, storm water samples were collected from 2009 to 2012 in developed watersheds on the Pajarito Plateau and analyzed for metals. These results are summarized in the Laboratory publication entitled "Background Metals Concentrations and Radioactivity in Storm Water on the Pajarito Plateau, Northern New Mexico" (hereafter, the Background Metals Report) (LANL 2013a). Sampling locations were selected to avoid any known Laboratory-related contamination and to provide reasonable estimates of runoff from a variety of developed landscapes representative of buildings, parking lots, and roads.

In the Background Metals Report, the 95% UTL was used to represent the upper limit of storm water background concentrations of a constituent. EPA provides methods for calculating the 95% UTL using the ProUCL program (EPA 2013). When comparing single results to background (as performed in evaluation of storm water data), the ProUCL technical guidance recommends comparing the concentrations of that result with the 95% UTL background concentration. The UTLs for copper and zinc in runoff from developed areas are 32.3 µg/L and 1120 µg/L, respectively (LANL 2013a).

PCBs are common anthropogenic-sourced constituents as a result of environmental cycling on a global scale of past releases of PCBs, and as an additive historically used in hundreds of industrial and commercial applications. These applications included electrical, heat-transfer, and hydraulic equipment; plasticizers in paints, plastics, calking, and rubber products; pigments, dyes, and carbonless copy paper; and many other uses (LANL 2012). DOE, the NMED-DOE Oversight Bureau, and LANS conducted a multiyear cooperative study to characterize PCBs in certain surface waters located in the upper Rio Grande watershed in and around the Los Alamos townsite and Laboratory. The May 2012 report, entitled "Polychlorinated Biphenyls in Precipitation and Stormwater within the Upper Rio Grande Watershed" (hereafter, the PCB Background Report), was submitted to EPA on February 1, 2013.

The PCB Background Report documents the results of storm water sampling conducted in locations representing storm water runoff from relatively small urban watersheds. Samplers were placed around the edge of urban development to collect storm water runoff primarily from developed areas such as buildings, parking lots and roads; no samplers were placed below any known areas of contamination. The UTL for PCBs in storm water runoff from developed areas is 0.098 µg/L (LANL 2012).

Table 5.1-1 compares the constituents detected in storm water samples at each SMA to the UTLs for storm water runoff from developed and undeveloped landscapes. As shown in Table 5.1-1, the concentrations of copper, zinc, and PCBs detected in the storm water samples ranged from 0.7% to 96.7% of the UTLs for runoff from developed areas and the concentrations of aluminum and gross-alpha radioactivity ranged from 0.3% to 160.2% of the UTLs for runoff from undeveloped areas. Each of the SMAs in this request receives runoff from undeveloped and developed areas. Therefore, the concentrations associated with the TAL exceedances are within the ranges of background that would be expected based on the landscape type(s) in the SMA drainage areas.

Table 5.1-2 presents the storm water sampling results for the SMAs contained in this request along with the corresponding sample collection date, and compliance stage. These data are shown on plots presented in Figures 5.1-1 and 5.1-2. The data plots show that all TAL exceedances, with the exceptions of a single aluminum exceedance and single radium-226/radium-228 exceedance, are below Bandelier Tuff background values (BVs) and/or developed run-on BVs.

As discussed, each SMA in this request contains non-Site-affected developed areas. These areas contribute storm water runoff to the SMA sampler. Table 5.1-3 summarizes the percentage developed and undeveloped landscape in each SMA. Appendix A presents a detailed delineation of the developed and undeveloped areas within each SMA.

5.1.2 Runoff from Undeveloped Landscapes

Shallow bedrock at the Laboratory is predominately the Tshirege unit of the Bandelier Tuff. Surface geology maps presented in the Hydrogeologic Site Atlas (LANL 2009) show that the surface geology of the western part of the Laboratory is primarily Tshirege unit 4 (Qbt 4) and the eastern portion is primarily Tshirege unit 3 (Qbt 3). Aluminum and several alpha-emitting radionuclides (e.g., thorium and uranium isotopes) are naturally present in Bandelier Tuff. As a result, these naturally occurring constituents are present in the soils and sediments weathered from Bandelier Tuff and in the storm water runoff containing these soils and sediments. To determine the contribution of naturally occurring metals and radionuclides to runoff from undeveloped areas not affected by Site operations, storm water samples were collected from 2009 to 2012 in remote watersheds on the Pajarito Plateau and analyzed for metals and radioactivity, including gross alpha radioactivity. These results are summarized in the Laboratory Background Metals Report referenced above (LANL 2013a). Sampling locations were selected to avoid any known contamination or developed area and to provide reasonable estimates of runoff from a variety of bedrock source areas and sediment texture. The predominant sediment was composed of weathered Bandelier Tuff. Water-quality conditions measured at background Sites reflect the contaminant levels in storm runoff that were derived from undeveloped landscapes on the Pajarito Plateau.

The 95% UTL was used to represent the background concentration of a constituent. The UTLs for aluminum and gross-alpha radioactivity calculated for storm water runoff from remote watersheds composed primarily of weathered Bandelier Tuff are 2210 µg/L and 1490 pCi/L, respectively (LANL 2013a). This value is considered the natural background concentration for undeveloped areas and applies to SMAs in the Individual Permit because the underlying geology of the Laboratory and surrounding area is Bandelier Tuff. However, the concentration of aluminum detected in a single baseline sample for DP-SMA-0.4 (Site 21-021) exceeded the 95% UTL for undeveloped areas with a concentration of 3540 µg/L. Because a small portion of the background population will exceed the UTL, it is not known whether this concentration could be considered background. This value is greater than the maximum value in the background data (2620 µg/L) but less than a value in the background data set determined to be an outlier. In calculating the 95% UTL, the aluminum concentration of 4290 µg/L detected in a background study storm water collected on October 20, 2009, at run-on monitoring location RA095001 [GRA-ROM-2.2(a)] was removed as an outlier using the procedures in the Background Metals Report (LANL 2013a). DP-SMA-0.4 consists of 92% undeveloped landscape and 8% developed landscape consisting of roads. There is no source of aluminum within the SMA or in close proximity of the SMA. Site 21-021 consists of surface soil contamination resulting from historical radionuclide emissions from former stacks throughout TA-21.

As discussed above, each SMA in this request contains non-Site-affected undeveloped areas. These areas contribute storm water runoff to the SMA sampler. Table 5.1-3 summarizes the contributions from the undeveloped landscape to total storm water runoff captured at each SMA. Appendix A shows a detailed delineation of the undeveloped areas within each SMA.

5.1.3 Site-Related Sources of Aluminum, Copper, Zinc, and PCBs

Aluminum, copper, zinc, and PCBs, although used at the Laboratory, are not known to be associated with industrial materials managed or released as significant industrial materials exposed to storm water at any of the Sites in this request. The Site descriptions in Appendix A present historical industrial activities of each Site in this request. The storm water monitoring section in the appendix discusses the TAL exceedance for each SMA/Site combination in this request and summarizes the soil sampling results (where available) for each TAL exceedance constituent.

5.1.4 Site-Related Sources of Adjusted Gross Alpha

Storm water samples collected at the SMAs addressed by this request were analyzed for gross-alpha radioactivity, which is a measure of the alpha radioactivity associated with all alpha-emitting radionuclides detected in the sample. The TAL contained in the Individual Permit, however, is for adjusted gross-alpha radioactivity. Adjusted gross-alpha radioactivity does not include the alpha radioactivity associated with certain radionuclides that are excluded from regulation under the Clean Water Act because they are regulated by DOE under the Atomic Energy Act of 1954. Because the gross-alpha radioactivity of a sample will always be greater than the adjusted gross-alpha radioactivity, use of gross-alpha radioactivity for comparison to the TAL is conservative.

The New Mexico Water Quality Control Commission regulations (New Mexico Administrative Code 20.6.4) define adjusted gross-alpha radioactivity as "total radioactivity due to alpha particle emission as inferred from measurements on a dry sample, including radium-226, but excluding radon-222 and uranium. Also excluded are source, special nuclear and by-product material as defined by the Atomic Energy Act of 1954."

Significant industrial materials managed and potentially released at the Sites contained in this request may have included alpha-emitting radionuclides (see Appendix A). Because of the nature of the activities conducted at the Laboratory, however, these radionuclides would all be source, special nuclear, and/or by-product material as defined by the Atomic Energy Act of 1954. Therefore, any contribution to gross-alpha radioactivity by significant materials potentially released to storm water discharges associated with industrial activities could not contribute to adjusted gross-alpha radioactivity. There are, therefore, no sources of adjusted gross alpha radioactivity associated with any of the Sites contained in this request.

5.2 Rationale for Alternative Compliance

As described in section 5.1, storm water runoff from the SMAs addressed in this request contains non-Site-affected contributions from developed landscape and undeveloped landscape. The concentrations of copper, zinc, and PCBs detected in storm water runoff from the SMAs in this request are within the ranges of concentrations in runoff from areas of developed landscape.

After reviewing the Site histories and comparison of the storm water sampling results to the background studies, the Permittees have concluded the exceedance of copper, zinc, and PCBs at SMAs in this request are a result of nonpoint source runoff from the developed areas within the SMAs. Nonpoint source urban runoff is not regulated under the Individual Permit, and the developed areas within the SMAs are not different than land types found in urban areas (e.g., buildings, parking lots, roads). Amigos Bravos, a member of Communities for Clean Water, used this exclusion of urban runoff from regulation under the Individual Permit as one of the bases for its June 30, 2014, petition for a "Determination that Storm Water Discharges in Los Alamos County Contribute to Water Quality Standards Violations and Require a Clean Water Act Permit." Specifically, the petition states, "Further, the individual permits for LANL and Los Alamos County do not cover storm water discharges from the urbanized features that

generate the pollution" (p. 8 of the petition) and "NM0030759 does not regulate general urbanized runoff at LANL or from the Los Alamos Townsite"(Statement of Fact 22).

The SMAs with TAL exceedances for aluminum and adjusted gross-alpha radioactivity also receive runoff from undeveloped areas, and the concentrations of these constituents are within the ranges expected for runoff from undeveloped areas. In cases where the TAL for adjusted gross-alpha radioactivity is exceeded, the Sites included in this alternative compliance request are not considered sources of adjusted gross-alpha radioactivity subject to regulation under the Individual Permit. Similarly, for the one SMA where the TAL for radium-226/radium-228 is exceeded, any radium isotopes that may have been historically managed and released by Laboratory operations fall within the category of source, special nuclear, and byproduct material and therefore, are excluded from regulation under the Individual Permit.

The compliance actions specified in Section E.2 of the Individual Permit are not likely to achieve levels of the TAL exceedance constituents in storm water runoff that are different than background. The Permittees believe the Sites(s) are not contributing to the TAL exceedance(s) and undeveloped and developed landscapes not affected by the Site are the source of these TAL exceeding constituents. Therefore, mitigating Site-related storm water would not reduce concentrations of TAL exceeding constituents within the SMA. Additional details related to each of the corrective action approaches in Permit Sections E.2(a) through E.2(d) are provided below.

5.2.1 Enhanced Control Measures to Meet the TAL

As shown in Table 5.1-3, the Sites contained in this request all receive significant runoff from developed areas and may also receive contributions from undeveloped areas. The concentrations of aluminum, copper, zinc, and PCBs and the gross-alpha radioactivity in storm water samples are within the range of background expected for these landscapes (Table 5.1-3). Although these constituents exceed TALs, concentrations in storm water are within the range of what would be expected from similar landscape types not affected by Site activities. In the case of copper, zinc, and PCBs, the Sites are not considered a source of the TAL exceedances based on Site history and available soil sampling data. In the case of aluminum and gross-alpha radioactivity, the concentrations detected in storm water are consistent with natural background. If storm water discharges from the Site were mitigated through the installation of enhanced controls, the SMA and receiving waters downstream of the Sites would continue to receive runoff from developed and undeveloped areas both within the SMA and surrounding areas. The anthropogenic background levels of copper, zinc, and/or PCBs from nonpoint sources and the naturally occurring background levels of aluminum and gross-alpha radioactivity in this runoff would likely exceed the TALs.

5.2.2 Control Measures that Totally Retain and Prevent Discharge from Storm Water

For some of the Sites contained in this request, it may be possible to totally retain storm water runoff so no discharge occurs. If storm water discharges from the Site were totally retained, the receiving waters downstream of the Sites would continue to receive runoff from developed and undeveloped areas not affected by the Sites. The anthropogenic levels of copper, zinc, and/or PCBs from nonpoint sources and the naturally occurring background levels of aluminum and gross-alpha radioactivity in this runoff would likely exceed TALs.

5.2.3 Control Measures That Totally Eliminate the Exposure of Pollutants to Storm Water

For some of the Sites contained in this request, it may be possible to totally eliminate the exposure of pollutants to storm water. If exposure to pollutants were totally eliminated, the receiving waters downstream of the Sites would continue to receive runoff from developed and undeveloped areas not affected by the Sites. As indicated, the concentrations of aluminum, copper, zinc, and/or PCBs in this runoff would be expected to exceed TALs. In addition, any significant materials at the Sites that contain alpha-emitting radionuclides would be exempt from the definition of adjusted gross-alpha radioactivity and, therefore, are not regulated under the Individual Permit and are not considered a source of the adjusted gross-alpha radioactivity TAL exceedance. Therefore, no exposure of aluminum, copper, zinc, and/or PCBs, and/or adjusted gross-alpha radioactivity from the Sites to storm water is currently occurring, and installation of a no exposure control measure, such as a cap or cover, would not reduce the TAL exceedance constituent concentrations in storm water.

5.2.4 Receipt of an NMED-Issued COC under the Consent Order

With one possible exception, under the Laboratory's current schedule for completion of Consent Order activities, it is unlikely that any Sites in this request will obtain NMED-issued COCs before November 1, 2015 (compliance deadline). Consent Order investigations have occurred at several of the Sites in this request, however, and it expected that all Sites will eventually be eligible for COCs.

Site 03-029 (S-SMA-1.1) was recommended for corrective action complete without controls in the Supplemental Investigation Report for Upper Sandia Canyon Aggregate Area submitted to NMED in August 2013 (LANL 2013b). Upon NMED's approval of the report and recommendations proposed therein, these Sites would be eligible for COCs. Because the report had not yet been approved by the compliance deadline for these High Priority Sites, a request for force majeure was submitted to EPA on September 23, 2013.

In the event that additional recommendations for COCs to NMED are made for any Site in this request before the November 1, 2015, compliance deadline, the Permittees will notify EPA of the request.

6.0 PROPOSED ALTERNATIVE COMPLIANCE APPROACH

The Permittees believe that no corrective action is required for the Sites submitted herein for alternative compliance because the Sites are not considered sources of the TAL exceedance constituents. In conclusion, the primary source of copper, zinc, and/or PCBs is nonpoint source runoff from developed areas within the SMAs; the source of the aluminum and adjusted gross-alpha radioactivity in the SMAs is natural background from Bandelier Tuff. Furthermore, any gross-alpha radionuclides contributed by the Sites in this request are exempt and are not regulated under the Individual Permit.

The Permittees propose to continue to inspect and maintain existing controls until the Sites in the Individual Permit are removed from the Permit.

7.0 REFERENCES

EPA (U.S. Environmental Protection Agency), September 30, 2010. "Authorization to Discharge under the National Pollutant Discharge Elimination System, NPDES Permit No. NM 0030759," Region 6, Dallas, Texas.

EPA (U.S. Environmental Protection Agency), September 2013. "ProUCL Version 5.0.00 User Guide," Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations, EPA/600/R-07/041, Office of Research and Development, Washington, D.C.

LANL (Los Alamos National Laboratory), June 2009. "2009 Hydrogeologic Site Atlas," Los Alamos National Laboratory document LA-UR-09-3763, Los Alamos, New Mexico.

LANL (Los Alamos National Laboratory), May 2012. "Polychlorinated Biphenyls in Precipitation and Stormwater within the Upper Rio Grande Watershed," Los Alamos National Laboratory document LA-UR-12-1081, Los Alamos, New Mexico.

LANL (Los Alamos National Laboratory), April 2013a. "Background Metals Concentrations and Radioactivity in Storm Water on the Pajarito Plateau, Northern New Mexico," Los Alamos National Laboratory document LA-UR-13-22841, Los Alamos, New Mexico.

LANL (Los Alamos National Laboratory), August 2013b. "Supplemental Investigation Report for Upper Sandia Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-13-26024, Los Alamos, New Mexico.

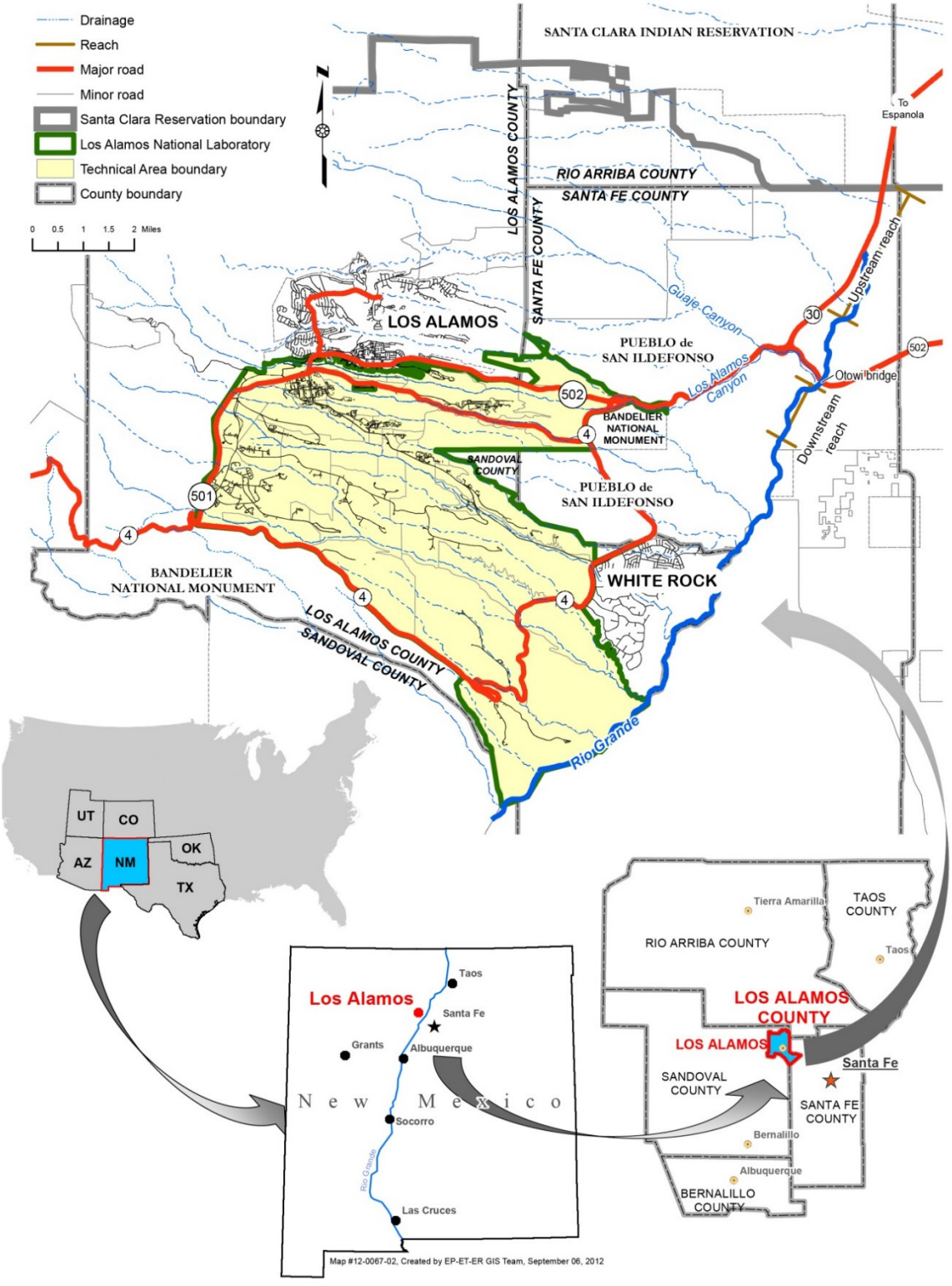
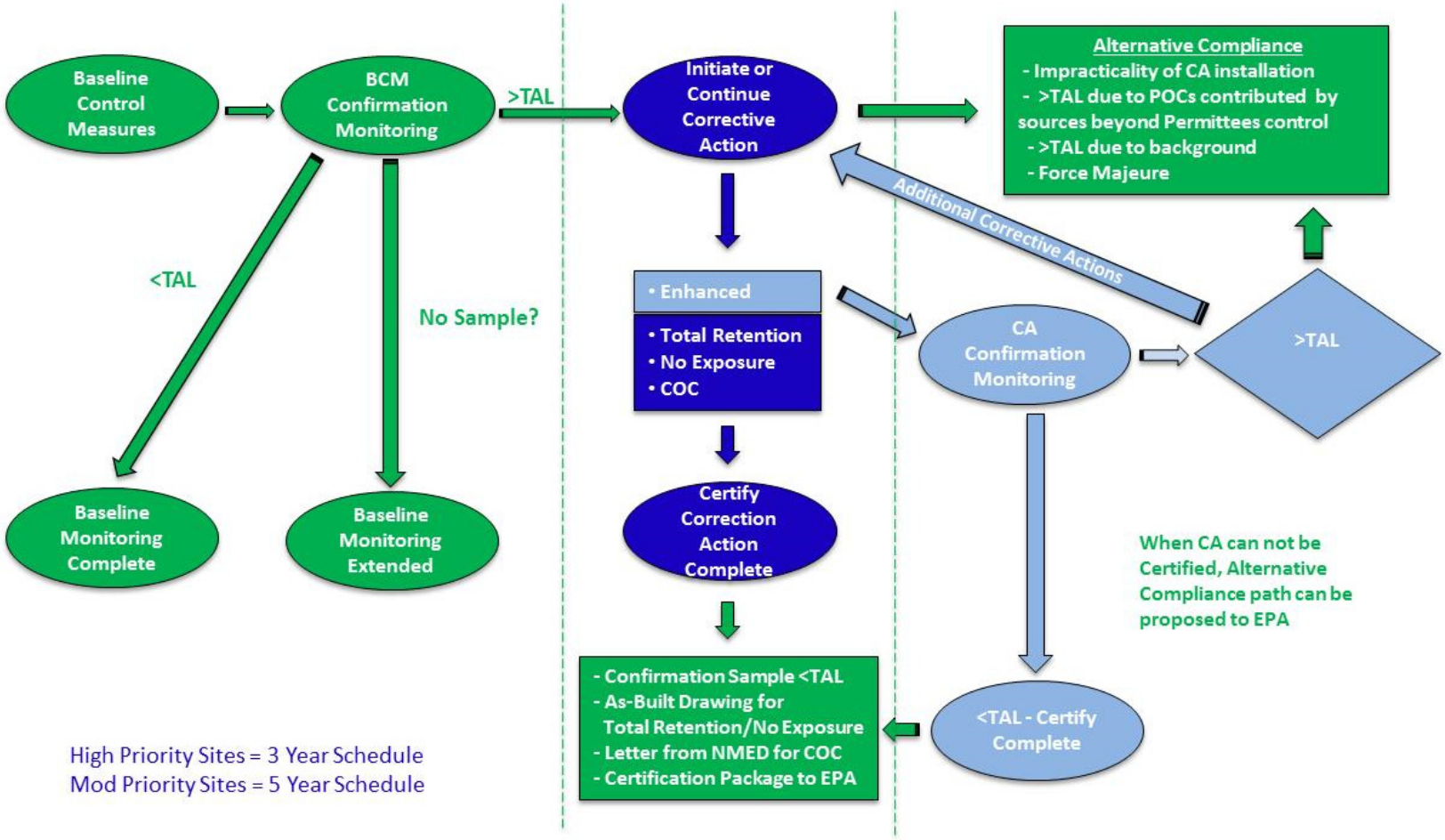
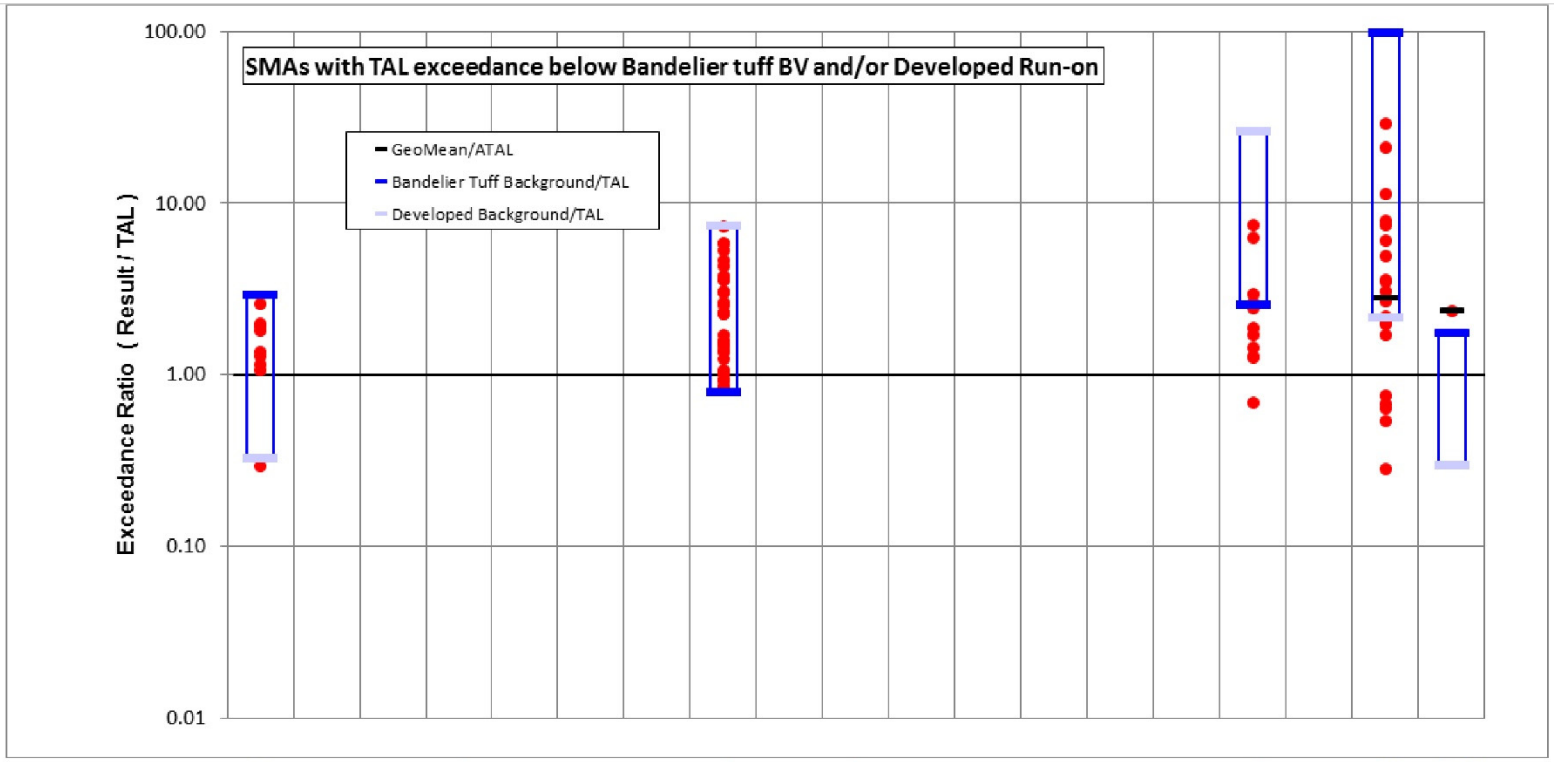


Figure 1.0-1 Location of the Laboratory with insets of New Mexico State and Los Alamos County



Note: BCM = Baseline Control Measures, CA = Corrective Action, COC = Certificate of Completion, POC = Pollutants of Concern, TAL = Target Action Level.

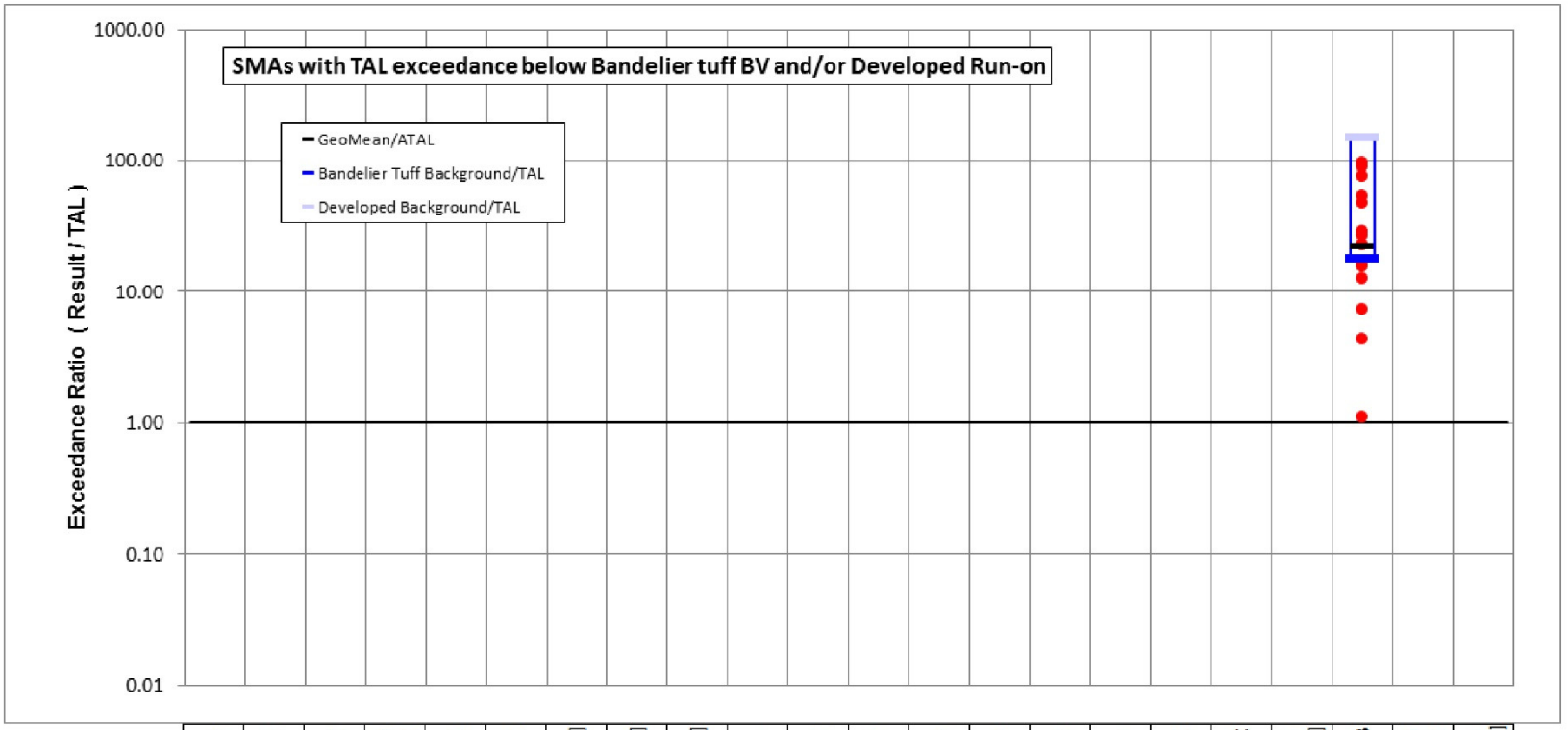
Figure 2.0-1 Flow chart of the corrective action process/alternative compliance



	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	-	-	-	-	-	-	MTAL	-	-	-	-	-	-	-	MTAL	-	ATAL	ATAL
std value	750	-	-	-	-	-	-	4.3	-	-	-	-	-	-	-	42	-	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
Max result	**1920**	-	-	-	-	-	-	**31.2**	-	-	-	-	-	-	-	**314**	-	**434**	**70.3**
Max result / TAL	**2.6**	-	-	-	-	-	-	**7.3**	-	-	-	-	-	-	-	**7.5**	-	**29**	**2.3**

Bold font indicates result>TAL; italic font indicates undetected results; "-" is used if no analytical results were available.

Figure 5.1-1 Storm water monitoring exceedance plot for metals and radionuclides



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Max result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.063**	-	-
Maxresult / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**98**	-	-

Bold font indicates result>TAL; italic font indicates undetected results; "-" is used if no analytical results were available.

Figure 5.1-2 Storm water monitoring exceedance plot for organics

Table 4.0-1
TAL Exceedance for the SMA/Sites Included in the Request for Alternative Compliance

SMA	Site	Brief Description	TAL Exceedance [a, b]
2M-SMA-1	03-010(a)	Vacuum Repair Shop Outfall	Al(1.9)
2M-SMA-1.43	22-015(a)	Drainlines and Dry Wells	Al(2.0), GA(3.5)
2M-SMA-1.43	22-014(a)	Sump System	Al(2.0), GA(3.5)
2M-SMA-1.7	03-055(a)	Outfall from Building 03-16	Cu(1.1)
2M-SMA-1.8	03-001(k)	Storage Area	Cu(3.1), Zn(1.7)
2M-SMA-1.9	03-003(a)	Storage Area	Cu(5.8), Zn(7.5)
2M-SMA-2	03-050(d)	Soil Contamination from TA-03 Air Emissions	Cu(4.6), Zn(2.9), PCB(41.6)
2M-SMA-2	03-054(b)	Outfall from Building 03-38	Cu(4.6), Zn(2.9), PCB(41.6)
3M-SMA-0.5	15-009 (c)	Septic System	Cu(1.1), GA(2.0)
A-SMA-6	33-004(k)	Drainline and Outfall Associated with Structure 33-87	Cu(1.4), GA(2.0)
A-SMA-6	33-007(a)	Inactive Firing Range	Cu(1.4), GA(2.0)
A-SMA-6	33-010(a)	Surface Disposal Area	Cu(1.4), GA(2.0)
CDB-SMA-0.25	46-004(c2)	Outfall from Building 46-1	Cu(3.5), PCB(5.7)
CDB-SMA-0.25	46-004(e2)	Outfall from Building 46-42	Cu(3.5), PCB(5.7)
CDB-SMA-0.55	46-004(g)	Drains and Exhaust System	Cu(3.8), PCB(1.1)
CDB-SMA-0.55	46-004(s)	Outfall Associated with Building 46-1	Cu(3.8), PCB(1.1)
CDB-SMA-0.55	46-006(f)	Storage Area	Cu(3.8), PCB(1.1)
CDV-SMA-8	15-011(c)	Dry Well	GA (3.6), Al (1.8)
CHQ-SMA-2	33-004(d)	Septic System	Al (1.3), Cu(1.6), GA(6.1)
CHQ-SMA-2	C-33-003	Soil Contamination	Al (1.3), Cu(1.6), GA(6.1)
DP-SMA-0.4	21-021	Site-wide Air Release	Al(4.7), Cu(2.5)
LA-SMA-0.85	03-055(c)	Outfall	Cu(6.1), Zn(1.9)
LA-SMA-1	C-00-044	Soil Contamination	Al(1.1), GA(11.9), PCB(36.9)
LA-SMA-1.25	C-43-001	Outfall	Cu(1.7), Zn(2.6)
LA-SMA-4.1	01-003(b)	Surface Disposal Site	Cu(1.6), GA 2.2), PCB(35.2)
LA-SMA-4.1	01-006(b)	Drainlines and Outfalls	Cu(1.6), GA 2.2), PCB(35.2)
LA-SMA-5.35	C-41-004	Storm Drains	Cu(2.6), GA(1.5)
M-SMA-1	03-050(a)	Soil Contamination from TA-03 Air Emissions	Cu(7.3), Zn(6.3), GA(1.3), PCB(16.2)
M-SMA-1	03-054(e)	Outfall from Building 03-29	Cu(7.3), Zn(6.3), GA(1.3), PCB(16.2)
M-SMA-1.22	03-045(h)	Outfall from Cooling Tower 03-187	Cu(1.4)
M-SMA-3	48-001	Air Exhaust System	GA(1.7), PCB (28.3)

Table 4.0-1 (continued)

SMA	Site	Brief Description	TAL Exceedance[a, b]
M-SMA-3	48-007(c)	Outfall from Building 48-1	GA(1.7), PCB (28.3)
M-SMA-4	48-001	Air Exhaust System	Cu(1.4), PCB(90.3) Radium 226&228(2.3)
M-SMA-6	35-016(h)	Storm Drains and Outfall Associated with Building 35-213	Cu(3.0), GA(11.2), PCB(54.5)
M-SMA-7	35-016(g)	Drains and Outfall from Building 35-213	Zn(1.4), GA(3.1)
STRM-SMA-1.05	08-009(f)	Outfall Associated with Building 08-22	Cu(2.5)
W-SMA-1	16-026(c2)	Outfall from Building 16-462	Al(1.3), Cu(1.03), GA(3.4)
W-SMA-1	16-026(v)	Outfall from Building 16-460	Al(1.3), Cu(1.03), GA(3.4)
W-SMA-5	16-026(e)	Outfall from Structure 16-301	Cu(1.5)
W-SMA-5	16-001(e)	Dry Well	Cu(1.5)
W-SMA-5	16-003(f)	Sumps	Cu(1.5)
W-SMA-5	16-026(b)	Outfall from Structure 16-307	Cu(1.5)
W-SMA-5	16-026(c)	Outfall from Structure 16-305	Cu(1.5)
W-SMA-5	16-026(d)	Outfall from Structure 16-303	Cu(1.5)
W-SMA-8.7	13-001	Firing Site	Al(2.6)
W-SMA-8.7	13-002	Landfill	Al(2.6)
W-SMA-8.7	16-004(a)	Imhoff Tank	Al(2.6)
W-SMA-8.7	16-026(j2)	Outfall	Al(2.6)
W-SMA-8.7	16-029(h)	Outfall from Building 16-478	Al(2.6)
W-SMA-8.7	16-035	Soil Contamination from Control Bunker 13-2	Al(2.6)
W-SMA-9.7	11-011(a)	Outfall from Building 11-30	Cu(2.3)
W-SMA-9.7	11-011(b)	Outfall from Building 11-30A	Cu(2.3)

[a] Al=aluminum, Cu=copper, Zn=zinc, GA = Gross-alpha radioactivity.

[b] Number in parentheses is the storm water sample concentration divided by the applicable maximum TAL (MTAL) or average TAL (ATAL) value (i.e., 1.9 indicates storm water concentration was 1.9 times greater than the TAL). If the MTAL applies the greater of any validated sample result for the compliance stage for the SMA in Table 5.1-2 is used to represent the storm water concentration. If the ATAL applies, and more than one validated sample result exists for the compliance stage, as reported in Table 5.1-2, then the geomean of the reported values is used to represent the storm water concentration. If the ATAL applies and only one validated sample result exists for the compliance stage the value is used to represent the storm water sample concentration.

Table 5.1-1
Comparison of Storm Water Monitoring Results to the UTL

SMA	Sample Date	Sample Type	Constituent	Concentration/ Activity (µg/L or pCi/L)[a]	Comparison to Developed UTL[b]	Comparison to Undeveloped UTL[b]
2M-SMA-1	7/25/2012	Corrective Action	Aluminum	222	—[c]	10.0%
	9/12/2012	Corrective Action	Aluminum	1430	—	64.7%
2M-SMA-1.43	7/12/2013	Baseline	Aluminum	1500	—	67.9%
	7/12/2013	Baseline	Gross Alpha	52	—	3.5%
2M-SMA-1.7	7/8/2014	Corrective Action	Copper	4.6	14.2%	—
	8/26/2014	Corrective Action	Copper	3.57	11.0%	—
2M-SMA-1.8	8/4/2011	Baseline	Copper	13.2	40.1%	—
	9/9/2011	Baseline	Copper	6.6	20.4%	—
	8/4/2011	Baseline	Zinc	71.8	6.4%	—
	9/9/2011	Baseline	Zinc	28.7	2.6%	—
2M-SMA-1.9	7/11/2012	Baseline	Copper	24.9	77.1%	—
	7/11/2012	Baseline	Zinc	314	28.0%5	—
2M-SMA-2	6/14/2013	Corrective Action	Copper	18.5	57.3%	—
	8/18/2013	Corrective Action	Copper	19.9	61.6%	—
	6/14/2013	Corrective Action	Zinc	102	9.1%	—
	8/18/2013	Corrective Action	Zinc	123	11.0%	—
	6/14/2013	Corrective Action	PCBs	0.0497	50.7%	—
	8/18/2013	Corrective Action	PCBs	0.0148	15.1%	—
3M-SMA-0.5	7/9/2014	Baseline	Copper	4.35	13.4%	—
	7/9/2014	Baseline	Gross Alpha	29.5	—	2.0%
A-SMA-6	8/4/2013	Baseline	Copper	5.86	18.1%	
	8/4/2013	Baseline	Gross Alpha	29.6	—	2.0%
CDB-SMA-0.25	7/26/2013	Corrective Action	Copper	15.2	47.1%	—
	9/10/2013	Corrective Action	Copper	15.2	47.1%	—
	7/26/2013	Corrective Action	PCBs	0.00282	2.9%	—
	9/10/2013	Corrective Action	PCBs	0.00474	4.8%	—
CDB-SMA-0.55	9/13/2013	Baseline	Copper	16.3	50.5%	—
	9/13/2013	Baseline	PCBs	0.000711	0.7%	—
CHQ-SMA-2	7/4/2012	Baseline	Aluminum	967	—	43.8%
	7/4/2012	Baseline	Copper	6.75	20.9%	—
	7/4/2012	Baseline	Gross Alpha	91.1	—	6.1%
CDV-SMA-8	7/31/2014	Baseline	Aluminum	1360	—	61.5%
	7/31/2014	Baseline	Gross Alpha	53.4	—	3.6%
DP-SMA-0.4	9/13/2013	Baseline	Aluminum	3540	—	160.2%
	9/13/2013	Baseline	Copper	10.7	33.1%	—

Table 5.1-1 (continued)

SMA	Sample Date	Sample Type	Constituent	Concentration/ Activity (µg/L or pCi/L)[a]	Comparison to Developed UTL[b]	Comparison to Undeveloped UTL[b]
LA-SMA-0.85	11/9/2012	Corrective Action	Copper	26.4	81.7%	—
	5/15/2013	Corrective Action	Copper	22.8	70.6%	—
	11/9/2012	Corrective Action	Zinc	56.1	5.0%	—
	5/15/2013	Corrective Action	Zinc	78.2	7.0%	—
LA-SMA-1	9/13/2013	Corrective Action	Aluminum	800	—	36.2%
	9/13/2013	Corrective Action	Gross Alpha	434	—	29.1%
	7/29/2014	Corrective Action	Gross Alpha	73.3	—	4.9%
	9/13/2013	Corrective Action	PCBs	0.0175	18.4%	—
	7/29/2014	Corrective Action	PCBs	0.0306	31.6%	—
LA-SMA-1.25	9/10/2012	Corrective Action	Copper	25	77.4%	—
	10/12/2012	Corrective Action	Copper	7.31	22.6%	—
	9/10/2012	Corrective Action	Zinc	111	9.9%	—
	10/12/2012	Corrective Action	Zinc	53.2	4.8%	—
LA-SMA-4.1	8/19/2011	Baseline	Copper	6.7	20.7%	—
	9/4/2011	Baseline	Copper	5.3	16.4%	—
	8/19/2011	Baseline	Gross Alpha	111	—	7.4%
	9/4/2011	Baseline	Gross Alpha	9.63	—	0.6%
	8/19/2011	Baseline	PCBs	0.0625	25.5%	—
	9/4/2011	Baseline	PCBs	0.0081	8.3%	—
LA-SMA-5.35	6/21/2014	Corrective Action	Copper	11.3	35.0%	—
	7/19/2014	Corrective Action	Copper	3.98	12.3%	—
	6/21/2014	Corrective Action	Gross Alpha	118	—	7.9%
	7/19/2014	Corrective Action	Gross Alpha	4.27	—	0.3%
M-SMA-1	6/14/2013	Corrective Action	Copper	31.2	96.75	—
	7/2/2013	Corrective Action	Copper	9.66	29.9%	—
	6/14/2013	Corrective Action	Zinc	264	23.6%	—
	7/2/2013	Corrective Action	Zinc	53.4	4.8%	—
	6/14/2013	Corrective Action	Gross Alpha	32.5	—	2.2%
	7/2/2013	Corrective Action	Gross Alpha	11.3	—	0.8%
	6/14/2013	Corrective Action	PCBs	0.0102	10.4%	—
	7/2/2013	Corrective Action	PCBs	0.0105	10.7%	—
M-SMA-1.22	7/29/2014	Corrective Action	Copper	5.96	18.4%	—
	9/12/2014	Corrective Action	Copper	3.72	11.5%0	—
M-SMA-3	7/12/2013	Baseline	Gross Alpha	25.4	—	1.7%
	7/12/2013	Baseline	PCBs	0.0181	18.5%	—

Table 5.1-1 (continued)

SMA	Sample Date	Sample Type	Constituent	Concentration/ Activity (µg/L or pCi/L)[a]	Comparison to Developed UTL[b]	Comparison to Undeveloped UTL[b]
M-SMA-4	8/19/2011	Baseline	Copper	6.0	18.6%	—
	8/19/2011	Baseline	Radium-226&228	70.3	—	133%
	8/19/2011	Baseline	PCBs	0.0578	59.1%	—
M-SMA-6	10/12/2012	Baseline	Copper	13	40.2%	—
	10/12/2012	Baseline	Gross Alpha	168	—	11.3%
	10/12/2012	Baseline	PCBs	0.0349	35.6%	—
M-SMA-7	7/7/2012	Baseline	Zinc	60.6	5.4%	—
	7/7/2012	Baseline	Gross Alpha	46.3	—	3.1%
	7/29/2014	Corrective Action	Gross Alpha	10.1	—	0.7%
STRM-SMA-1.05	7/12/2013	Corrective Action	Copper	10.8	33.4%	—
	8/1/2013	Corrective Action	Copper	9.92	30.7%	—
W-SMA-1	9/12/2013	Corrective Action	Aluminum	1010	—	45.7%
	7/19/2014	Corrective Action	Aluminum	858	—	38.9%
	9/12/2013	Corrective Action	Copper	4.01	12.4%	—
	7/19/2014	Corrective Action	Copper	4.45	13.8%	—
	9/12/2013	Corrective Action	Gross Alpha	314	—	21.1%
	7/19/2014	Corrective Action	Gross Alpha	8.31	—	0.6%
W-SMA-5	7/3/2012	Baseline	Copper	6.28	19.4%	—
W-SMA-8.7	9/12/2013	Baseline	Aluminum	1920	—	86.9%
W-SMA-9.7	9/13/2013	Baseline	Copper	9.74	30.2%	—

[a] µg/L for aluminum, copper, zinc, and PCBs. pCi/L for gross alpha and radium-226 and radium-228.

[b] The values represent the concentration in the storm water sample as a percentage of the UTL. Dissolved aluminum undeveloped landscape runoff UTL = 2210 µg/L. Dissolved copper developed landscape runoff UTL = 32.3 µg/L. Unfiltered gross alpha undeveloped landscape runoff UTL = 1490 pCi/L. Unfiltered PCBs developed landscape runoff UTL = 0.098 µg/L. Dissolved zinc developed runoff UTL = 1120 µg/L.

[c] — = Not available.

Table 5.1-2
SMA Storm Water Sampling Results

SMA	Analyte	Sample	Detect Flag	Result	Units	Collection Date	Compliance Stage
2M-SMA-1	Aluminum	WT_IPPAJ-12-22080	Y	222	µg/L	7/25/2012	Corrective Action
2M-SMA-1	Aluminum	WT_IPPAJ-12-22081	Y	1430	µg/L	9/12/2012	Corrective Action
2M-SMA-1.43	Aluminum	WT_IPC-13-32394	Y	1500	µg/L	7/12/2013	Baseline
2M-SMA-1.43	Gross alpha	WT_IPC-13-32260	Y	52	pCi/L	7/12/2013	Baseline
2M-SMA-1.7	Copper	WT_IPC-14-55933	Y	4.6	µg/L	7/8/2014	Corrective Action
2M-SMA-1.7	Copper	WT_IPC-14-55936	Y	3.57	µg/L	8/26/2014	Corrective Action
2M-SMA-1.8	Copper	WT_IPPAJ-11-11207	Y	13.2	µg/L	8/4/2011	Baseline
2M-SMA-1.8	Copper	WT_IPPAJ-11-11208	Y	6.6	µg/L	9/9/2011	Baseline
2M-SMA-1.8	Zinc	WT_IPPAJ-11-11207	Y	71.8	µg/L	8/4/2011	Baseline
2M-SMA-1.8	Zinc	WT_IPPAJ-11-11208	Y	28.7	µg/L	9/9/2011	Baseline
2M-SMA-1.9	Copper	WT_IPPAJ-12-12741	Y	24.9	µg/L	7/11/2012	Baseline
2M-SMA-1.9	Zinc	WT_IPPAJ-12-12741	Y	314	µg/L	7/11/2012	Baseline
2M-SMA-2	Copper	WT_IPC-13-34609	Y	18.5	µg/L	6/14/2013	Corrective Action
2M-SMA-2	Copper	WT_IPC-13-34610	Y	19.9	µg/L	8/18/2013	Corrective Action
2M-SMA-2	Total PCB	WT_IPC-13-34608	Y	0.0148	µg/L	8/18/2013	Corrective Action
2M-SMA-2	Total PCB	WT_IPC-13-34607	Y	0.0497	µg/L	6/14/2013	Corrective Action
2M-SMA-2	Zinc	WT_IPC-13-34609	Y	102	µg/L	6/14/2013	Corrective Action
2M-SMA-2	Zinc	WT_IPC-13-34610	Y	123	µg/L	8/18/2013	Corrective Action
3M-SMA-0.5	Copper	WT_IPC-14-76521	Y	4.35	µg/L	7/9/2014	Baseline
3M-SMA-0.5	Gross alpha	WT_IPC-14-76522	Y	29.5	pCi/L	7/9/2014	Baseline
A-SMA-6	Copper	WT_IPC-13-32530	Y	5.86	µg/L	8/4/2013	Baseline
A-SMA-6	Gross alpha	WT_IPC-13-32044	Y	29.6	pCi/L	8/4/2013	Baseline
CDB-SMA-0.25	Copper	WT_IPC-13-32113	Y	15.2	µg/L	9/10/2013	Corrective Action
CDB-SMA-0.25	Copper	WT_IPC-13-39426	Y	15.2	µg/L	7/26/2013	Corrective Action
CDB-SMA-0.25	Total PCB	WT_IPC-13-32514	Y	0.00474	µg/L	9/10/2013	Corrective Action
CDB-SMA-0.25	Total PCB	WT_IPC-13-39427	Y	0.00282	µg/L	7/26/2013	Corrective Action

Table 5.1-2 (continued)

SMA	Analyte	Sample	Detect Flag	Result	Units	Collection Date	Compliance Stage
CDB-SMA-0.55	Copper	WT_IPC-13-32368	Y	16.3	µg/L	9/13/2013	Baseline
CDB-SMA-0.55	Total PCB	WT_IPC-13-32159	Y	7.11E-04	µg/L	9/13/2013	Baseline
CDV-SMA-8	Aluminum	WT_IPC-14-55822	Y	1360	µg/L	07/31/14	Baseline
CDV-SMA-8	Gross alpha	WT_IPC-14-56095	Y	53.4	pCi/L	07/31/14	Baseline
CHQ-SMA-2	Aluminum	WT_IPCHA-12-13032	Y	967	µg/L	7/4/2012	Baseline
CHQ-SMA-2	Copper	WT_IPCHA-12-13032	Y	6.75	µg/L	7/4/2012	Baseline
CHQ-SMA-2	Gross alpha	WT_IPCHA-12-13031	Y	91.1	pCi/L	7/4/2012	Baseline
DP-SMA-0.4	Aluminum	WT_IPC-13-32335	Y	3540	µg/L	9/13/13	Baseline
DP-SMA-0.4	Copper	WT_IPC-13-32335	Y	10.7	µg/L	9/13/13	Baseline
DP-SMA-0.4	Gross Alpha	WT_IPC-13-32336	Y	8.71	pCi/L	9/13/13	Baseline
DP-SMA-0.4	Radium-226 and Radium-228	WT_IPC-13-32336	N	0.854	µg/L	9/13/13	Baseline
DP-SMA-0.4	Zinc	WT_IPC-13-32336	Y	20.6	µg/L	9/13/13	Baseline
LA-SMA-0.85	Copper	WT_IPC-13-32499	Y	22.8	µg/L	5/15/2013	Corrective Action
LA-SMA-0.85	Zinc	WT_IPC-13-32499	Y	78.2	µg/L	5/15/2013	Corrective Action
LA-SMA-1	Aluminum	WT_IPC-13-32488	Y	800	µg/L	9/13/2013	Corrective Action
LA-SMA-1	Gross alpha	WT_IPC-13-32154	Y	434	pCi/L	9/13/2013	Corrective Action
LA-SMA-1	Gross alpha	WT_IPC-14-56019	Y	73.3	pCi/L	7/29/2014	Corrective Action
LA-SMA-1	Total PCB	WT_IPC-13-32154	Y	0.0175	µg/L	9/13/2013	Corrective Action
LA-SMA-1	Total PCB	WT_IPC-14-56019	Y	0.0306	µg/L	7/29/2014	Corrective Action
LA-SMA-1.25	Copper	WT_IPLAP-12-22012	Y	25	µg/L	9/10/2012	Corrective Action
LA-SMA-1.25	Copper	WT_IPLAP-12-22013	Y	7.31	µg/L	10/12/2012	Corrective Action
LA-SMA-1.25	Zinc	WT_IPLAP-12-22012	Y	111	µg/L	9/10/2012	Corrective Action
LA-SMA-1.25	Zinc	WT_IPLAP-12-22013	Y	53.2	µg/L	10/12/2012	Corrective Action
LA-SMA-4.1	Copper	WT_IPLAP-11-10534	Y	6.7	µg/L	8/19/2011	Baseline
LA-SMA-4.1	Copper	WT_IPLAP-11-10535	Y	5.3	µg/L	9/4/2011	Baseline
LA-SMA-4.1	Gross alpha	WT_IPLAP-11-10536	Y	111	pCi/L	8/19/2011	Baseline
LA-SMA-4.1	Gross alpha	WT_IPLAP-11-10537	Y	9.63	pCi/L	9/4/2011	Baseline
LA-SMA-4.1	Total PCB	WT_IPLAP-11-10536	Y	0.0625	µg/L	8/19/2011	Baseline

Table 5.1-2 (continued)

SMA	Analyte	Sample	Detect Flag	Result	Units	Collection Date	Compliance Stage
CDB-SMA-0.55	Copper	WT_IPC-13-32368	Y	16.3	µg/L	9/13/2013	Baseline
LA-SMA-4.1	Total PCB	WT_IPLAP-11-10537	Y	0.0081	µg/L	9/4/2011	Baseline
LA-SMA-5.35	Copper	WT_IPC-14-55934	Y	3.98	µg/L	7/19/2014	Corrective Action
LA-SMA-5.35	Copper	WT_IPC-14-55935	Y	11.3	µg/L	6/21/2014	Corrective Action
LA-SMA-5.35	Gross alpha	WT_IPC-14-56107	Y	4.27	pCi/L	7/19/2014	Corrective Action
LA-SMA-5.35	Gross alpha	WT_IPC-14-56108	Y	118	pCi/L	6/21/2014	Corrective Action
M-SMA-1	Copper	WT_IPC-13-38616	Y	9.66	µg/L	7/2/2013	Corrective Action
M-SMA-1	Copper	WT_IPC-13-32501	Y	31.2	µg/L	6/14/2013	Corrective Action
M-SMA-1	Gross alpha	WT_IPC-13-38617	Y	11.3	pCi/L	7/2/2013	Corrective Action
M-SMA-1	Gross alpha	WT_IPC-13-32157	Y	32.5	pCi/L	6/14/2013	Corrective Action
M-SMA-1	Total PCB	WT_IPC-13-38617	Y	0.0105	µg/L	7/2/2013	Corrective Action
M-SMA-1	Total PCB	WT_IPC-13-32157	Y	0.0102	µg/L	6/14/2013	Corrective Action
M-SMA-1	Zinc	WT_IPC-13-38616	Y	53.4	µg/L	7/2/2013	Corrective Action
M-SMA-1	Zinc	WT_IPC-13-32501	Y	264	µg/L	6/14/2013	Corrective Action
M-SMA-1.22	Copper	WT_IPC-14-55816	Y	3.72	µg/L	7/29/2014	Corrective Action
M-SMA-3	Gross alpha	WT_IPC-13-32183	Y	25.4	pCi/L	7/12/2013	Baseline
M-SMA-3	Total PCB	WT_IPC-13-32183	Y	0.0181	µg/L	7/12/2013	Baseline
M-SMA-4	Copper	WT_IPMOR-11-10899	Y	6	µg/L	8/19/2011	Baseline
M-SMA-4	Radium-226 and Radium-228	WT_IPMOR-11-10901	Y	70.3	pCi/L	8/19/2011	Baseline
M-SMA-4	Total PCB	WT_IPMOR-11-10901	Y	0.0578	µg/L	8/19/2011	Baseline
M-SMA-6	Copper	WT_IPMOR-12-13174	Y	13	µg/L	10/12/2012	Baseline
M-SMA-6	Gross alpha	WT_IPMOR-12-13210	Y	168	pCi/L	10/12/2012	Baseline
M-SMA-6	Total PCB	WT_IPMOR-12-13210	Y	0.0349	µg/L	10/12/2012	Baseline
M-SMA-7	Gross alpha	WT_IPMOR-12-13156	Y	46.3	pCi/L	7/7/2012	Baseline
M-SMA-7	Zinc	WT_IPMOR-12-13158	Y	60.6	µg/L	7/7/2012	Baseline
STRM-SMA-1.05	Copper	WT_IPC-13-34615	Y	10.8	µg/L	7/12/2013	Corrective Action
STRM-SMA-1.05	Copper	WT_IPC-13-34616	Y	9.92	µg/L	8/1/2013	Corrective Action

Table 5.1-2 (continued)

SMA	Analyte	Sample	Detect Flag	Result	Units	Collection Date	Compliance Stage
CDB-SMA-0.55	Copper	WT_IPC-13-32368	Y	16.3	µg/L	9/13/2013	Baseline
W-SMA-1	Aluminum	WT_IPC-14-55959	Y	858	µg/L	7/19/2014	Corrective Action
W-SMA-1	Aluminum	WT_IPC-13-32495	Y	1010	µg/L	9/12/2013	Corrective Action
W-SMA-1	Copper	WT_IPC-14-55959	Y	4.45	µg/L	7/19/2014	Corrective Action
W-SMA-1	Copper	WT_IPC-13-32495	Y	4.01	µg/L	9/12/2013	Corrective Action
W-SMA-1	Gross alpha	WT_IPC-14-56051	Y	8.13	pCi/L	7/19/2014	Corrective Action
W-SMA-1	Gross alpha	WT_IPC-13-32167	Y	314	pCi/L	9/12/2013	Corrective Action
W-SMA-5	Copper	WT_IPWAT-12-12848	Y	6.28	µg/L	7/3/2012	Baseline
W-SMA-8.7	Aluminum	WT_IPC-13-32433	Y	1920	µg/L	9/12/2013	Baseline
W-SMA-9.7	Copper	WT_IPC-13-32399	Y	9.74	µg/L	9/13/2013	Baseline

Table 5.1-3
Percentage of Developed and Undeveloped Areas within Each SMA

SMA	Watershed	TAL Exceedance Constituent	SMA Drainage Area (acre)	Developed Landscape within SMA	Undeveloped Landscape within SMA
2M-SMA-1	Pajarito	Al(1.9)	18.56	36%	64%
2M-SMA-1.43	Pajarito	Al(2.0), GA(3.5)	0.26	42%	58%
2M-SMA-1.7	Pajarito	Al(2.0), GA(3.5)	0.21	94%	6%
2M-SMA-1.8	Pajarito	Cu(1.1)	1.21	76%	24%
2M-SMA-1.9	Pajarito	Cu(3.1), Zn(1.7)	0.25	100%	0%
2M-SMA-2	Pajarito	Cu(5.8), Zn(7.5)	10.53	96%	4%
3M-SMA-0.5	Pajarito	Cu(4.6), Zn(2.9), PCB(41.6)	5.57	20%	80%
A-SMA-6	Ancho/Chaquehui	Cu(1.1), GA(2.0)	7.58	19%	81%
CDB-SMA-0.25	Sandia/Mortandad	Cu(1.4), GA(2.0)	4.60	73%	27%
CDB-SMA-0.55	Sandia/Mortandad	Cu(1.4), GA(2.0)	4.64	62%	38%
CDV-SMA-8	Water/ Cañon de Valle	Cu(3.5), PCB(5.7)	24.32	6%	94%
CHQ-SMA-2	Ancho/Chaquehui	Cu(1.4), GA(2.0)	12.95	15%	85%
DP-SMA-0.4	Los Alamos/Pueblo	Al(4.7), Cu(2.5)	0.21	8%	92%
LA-SMA-0.85	Los Alamos/Pueblo	Cu(3.5), PCB(5.7)	4.09	93%	7%
LA-SMA-1	Los Alamos/Pueblo	Cu(3.8), PCB(1.1)	1.03	14%	86%
LA-SMA-1.25	Los Alamos/Pueblo	Cu(3.8), PCB(1.1)	0.92	88%	12%
LA-SMA-4.1	Los Alamos/Pueblo	Cu(3.8), PCB(1.1)	4.86	89%	11%

Table 5.1-3 (continued)

SMA	Watershed	TAL Exceedance Constituent	SMA Drainage Area (acre)	Developed Landscape within SMA	Undeveloped Landscape within SMA
LA-SMA-5.35	Los Alamos/Pueblo	Al (1.3), Cu(1.6), GA(6.1)	22.76	44%	56%
M-SMA-1	Sandia/Mortandad	Al (1.3), Cu(1.6), GA(6.1)	29.67	61%	39%
M-SMA-1.22	Sandia/Mortandad	Al (1.3), Cu(1.6), GA(6.1)	1.84	68%	32%
M-SMA-3	Sandia/Mortandad	PCB (28.3), GA (1.7)	0.37	81%	19%
M-SMA-4	Sandia/Mortandad	Cu(6.1), Zn(1.9)	6.08	71%	29%
M-SMA-6	Sandia/Mortandad	Al(1.1), GA(11.9), PCB(36.9)	0.16	29%	71%
M-SMA-7	Sandia/Mortandad	Cu(1.7), Zn(2.6)	0.25	28%	72%
STRM-SMA-1.05	Pajarito	Cu(2.6), GA(1.5)	3.31	17%	83%
W-SMA-1	Water/Cañon de Valle	Cu(7.3), Zn(6.3), GA(1.3), PCB(16.2)	5.91	22%	78%
W-SMA-5	Water/Cañon de Valle	Cu(7.3), Zn(6.3), GA(1.3), PCB(16.2)	71.29	16%	84%
W-SMA-8.7	Water/Cañon de Valle	Cu(1.4)	17.30	8%	92%
W-SMA-9.7	Water/Cañon de Valle	GA(1.7), PCB (28.3)	0.15	34%	66%

Appendix A

Data for 52 Site Monitoring Area/Site Combinations Exceeding Target Action Levels from Nonpoint Sources

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A-1.0 INTRODUCTION

This appendix provides Site-specific information to support the alternative compliance requests for 52 site monitoring area (SMA)/Site combinations at Los Alamos National Laboratory (LANL or the Laboratory). The Laboratory has prepared this request pursuant to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit No. NM0030759 (hereafter, the Individual Permit or Permit). The information provided for each Site and SMA includes site descriptions, storm water monitoring results, developed and undeveloped sources of target action level (TAL) exceedances, and historical activities potentially related to TAL exceedances. Additional details on the specific information presented is provided below.

A-1.1 Site Description

Site descriptions identify the Sites regulated within the SMA and provide a brief history of industrial activities, environmental investigations and, if applicable, remediation activities. Sites within the SMA, but not included in this request, are also described.

A-1.2 Storm Water Monitoring Results

For each SMA the storm water monitoring results section describes the storm water data, date of sample collection, and comparison to the applicable TALs. The storm water monitoring results are plotted on graphs at the end of each SMA section. Organic and inorganic analytes are presented in different plots.

A-1.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

This section provides detail on the percentage of each SMA that is developed and undeveloped to better understand the potential for developed and undeveloped sources that contribute to the TAL exceedance. A map is provided that delineates the developed and undeveloped areas in each SMA.

Also in this section, the TAL exceedances are evaluated against the appropriate storm water background values (BV), that is, “Bandelier Tuff background” for undeveloped landscapes or “developed background” for urban landscapes. BVs are expressed as upper tolerance limits (UTLs) using the approved U.S. Environmental Protection Agency (EPA) statistical method. UTLs for undeveloped landscapes were derived from storm water runoff in undeveloped reference watersheds are labeled “Bandelier Tuff Background” in the monitoring results plots for each SMA. UTLs for urban landscapes are labeled “Developed Background” in the monitoring results plots for each SMA.

A-1.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

For any constituents exceeding the TAL, an evaluation of historical industrial activities at each Site is provided to determine if TAL exceedance constituent(s) are known to be associated with industrial materials historically managed at the Site. The discussion is organized by Site and analyte. For any constituents exceeding the TAL, a summary of the results from soil and sediment samples collected at the Site during Compliance Order on Consent (Consent Order) or other 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.

A-2.0 2M-SMA-1

A-2.1 Site Description

2M-SMA-1, located in the Pajarito watershed, includes Solid Waste Management Unit (SWMU) 03-010(a), the former outfall area from a former vacuum repair shop at Technical Area 03 (TA-03). The outfall area is located on a steep slope on the rim of Twomile Canyon, about 30 ft west of a general warehouse (building 03-30). The outfall received discharges of waste oil containing mercury between 1950 and 1957. Former workers estimated that more than 100 lb of mercury was disposed of at this Site. SWMU 03-010(a) was investigated and remediated between 1992 and 2010. The 1994 Phase II Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) confirmed the contaminants of concern (mercury, petroleum hydrocarbons, and volatile organic chemicals) in surface soil were no longer present above applicable soil screening levels (SSLs).

RFI and remediation activities were completed for SWMU 03-010(a) before the Consent Order went into effect in 2005. Groundwater monitoring was conducted in accordance with the Consent Order and is complete. SWMU 03-010(a) was investigated concurrently with Area of Concern (AOC) 03-001(e), the former vacuum repair shop in building 03-0030. Residual contamination associated with AOC 03-001(e) may be located beneath building 03-0030. Therefore, further characterization and investigation of AOC 03-001(e) are delayed until the demolition of building 03-0030. As a result, a certificate of completion (COC) has not been requested for SWMU 03-010(a). Detailed sampling results are presented in the Investigation Report for Solid Waste Management Units 03-010(a) and 03-001(e) at Technical Area 03 (DOE 2005).

A-2.2 Storm Water Monitoring Results

SWMU 03-010(a) is monitored within 2M-SMA-1. Following the installation of baseline control measures, two baseline storm water samples were collected on August 4, 2011, and August 20, 2011. Analytical results from these baseline monitoring samples yielded two TAL exceedances (Figure A-2.2-1):

- Aluminum concentration of 1200 µg/L (maximum TAL [MTAL] is 750 µg/L), and
- Gross-alpha activity of 18.3 pCi/L (average TAL [ATAL] is 15 pCi/L).

Following the installation of enhanced control measures, two corrective action storm water samples were collected on July 25, 2012, and September 12, 2012. Analytical results from these corrective action monitoring samples yielded one TAL exceedance (Figure A-2.2-1):

- Aluminum concentration of 1430 µg/L (MTAL is 750 µg/L).

This 2012 TAL exceedance is the subject of the alternative compliance request for this SMA/Site. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-2.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

2M-SMA-1 is an 18.56-acre watershed that consists of 36% developed areas and 64% undeveloped areas. Developed areas consist of 6.66 acres of pavement and buildings. Undeveloped areas consist of 11.90 acres of grassland (Figure A-2.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

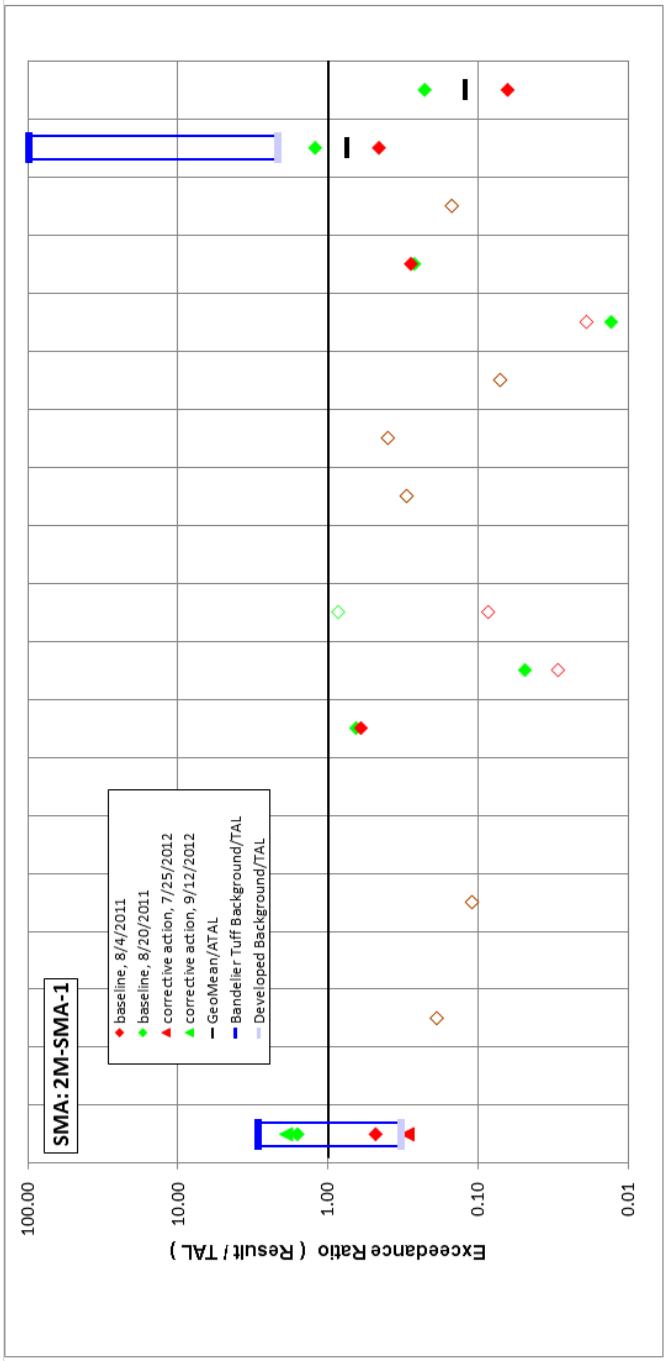
- Aluminum—The aluminum UTL from developed urban landscape storm water run-on is 245 µg/L; the aluminum UTL for background storm water containing sediment derived from Bandelier Tuff is 2210 µg/L. The aluminum results from both 2011 and 2012 are between these values.

A-2.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft below ground surface [bgs]) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 03-010(a):

- Aluminum is not known to have been associated with industrial materials historically managed at this Site. Aluminum was not detected above soil, sediment, or tuff BVs in shallow (i.e., less than 3 ft bgs) RFI samples.



std used in ratio calculations	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 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
9/12/2012 result	**1430**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
result / TAL	**1.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7/25/2012 result	222	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
result / TAL	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8/20/2011 result	**1200**	*1*	*1.7*	16.7	*0.11*	*2*	3.4	2.8	0.83	*0.66*	1.3	*1.5*	*0.2*	*0.45*	1.3	11.2	*0.002*	**18.3**	6.82
result / TAL	**1.6**	*0.002*	*0.19*	0.0033	*0.11*	*0.01*	0.0034	0.65	0.049	*0.86*	0.0076	*0.3*	*0.4*	*0.071*	0.013	0.27	*0.15*	**1.2**	0.23
8/4/2011 result	362	*1*	*1.7*	*15*	*0.11*	*2*	*1*	2.6	*0.5*	*0.066*	0.55	*1.5*	*0.2*	*0.45*	*1.9*	11.8	*0.002*	6.88	1.91
result / TAL	0.48	*0.002*	*0.19*	*0.003*	*0.11*	*0.01*	*0.001*	0.6	*0.029*	*0.086*	0.0032	*0.3*	*0.4*	*0.071*	*0.019*	0.28	*0.15*	0.46	0.064

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-2.2-1 TAL exceedance plot for 2M-SMA-1

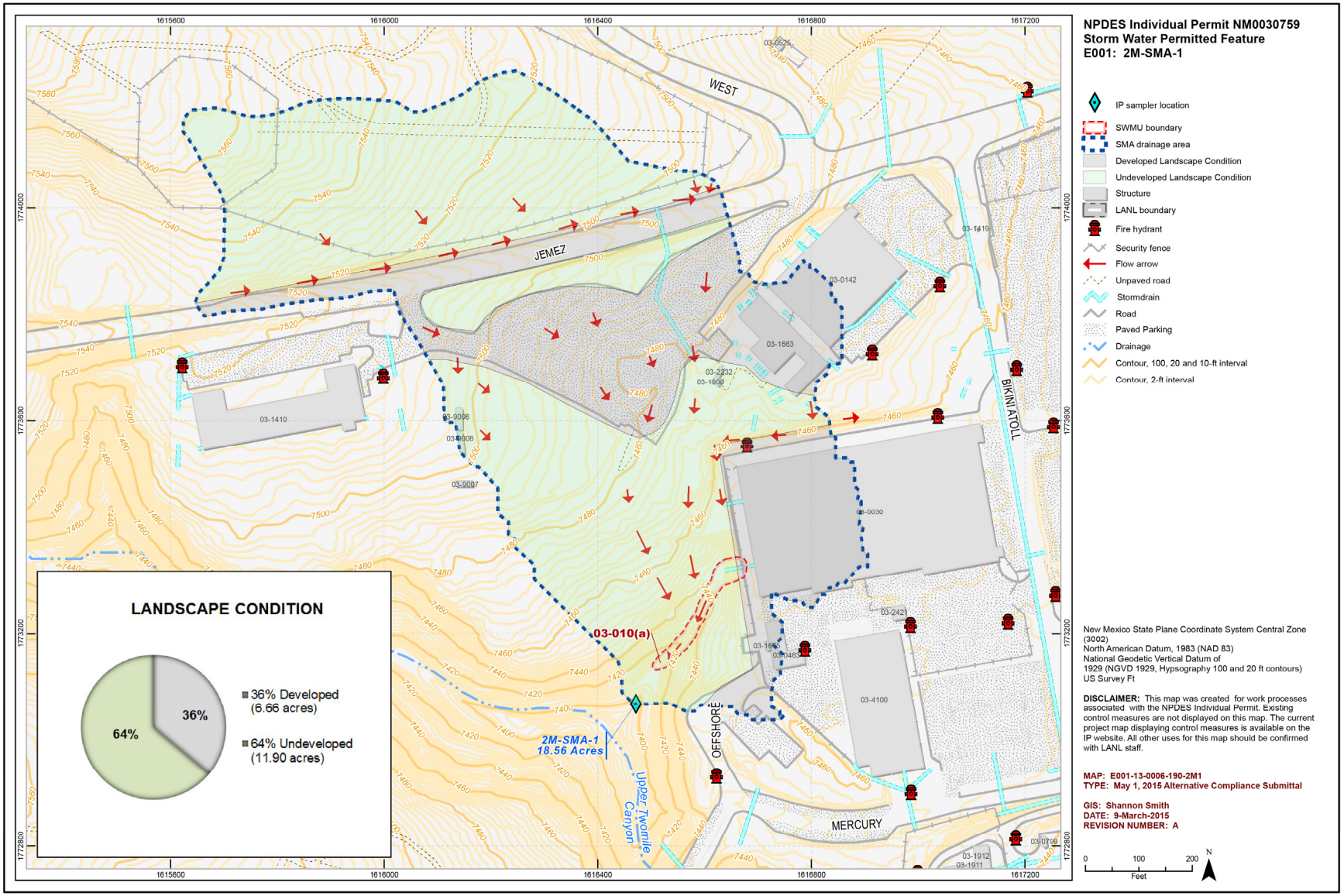


Figure A-2.3-1 SMA map for 2M-SMA-1

A-3.0 2M-SMA-1.43

A-3.1 Site Description

2M-SMA-1.43, located in the Pajarito watershed, includes SWMUs 22-014(a) and 22-015(a), an active high explosives (HE) sump, an associated inactive drainline, and an inactive seepage pit. The sump is located immediately south of building 22-0093. The sump is constructed of concrete containing an inset aluminum tank and measures approximately 4 ft deep × 9 ft long × 3 ft wide. The sump system began operations in 1985 and receives rinse water from a washing facility for parts and clothing from explosives compacting operations in rooms C112 and C114 in building 22-0093. Before 1995, the sump discharged approximately 100 gal. of wastewater each week through a drainline to a seepage pit located 150 ft south of the sump in the upper part of Tributary B of Twomile Canyon. The seepage pit is 4 ft in diameter and 40 ft deep. In 1995, the drainline from the sump was capped, rendering the sump drainlines and seepage pit inactive. Operations in building 22-0093 continue to discharge wastewater to the sump, where the effluent is retained and suspended solids settle out as sludge. The sump contents are periodically removed for disposal at approved facilities at TA-16. The sump is equipped with a level monitor and an alarm that are monitored remotely in a manager's office.

SWMU 22-015(a), situated on Twomile Mesa in the central-east area of TA-22, consists of two inactive seepage pits (Pits A and B), located east of building 22-91 in an open, grass-covered area. Each pit had an outside diameter of 4 ft and is filled with crushed gravel with a central 4-in. polypropylene perforated pipe vented to the surface. Pit A was 26 ft deep, and Pit B was 20 ft deep. The pits served rooms B102, B107, B121, B123, 8145, and B160 of building 22-91, which housed printed circuit board etching operations. From 1985 to 1987, waste from the etching operations in building 22-91 was discharged through a 6-in.-diameter polyvinyl chloride drainpipe to the seepage pits. Before discharge, waste material was pretreated to remove contaminants. However, small quantities of dissolved contaminants and fine particulates may have been carried as effluent into the pits. The seepage pits were intended to allow liquids to percolate into the surrounding soils and tuff, while retaining potential contaminants in the seepage pit sediments and immediate (surrounding) soil matrix. The system failed because the effluent production rate exceeded the infiltration rate of liquid into the tuff, resulting in seepage pit overflow. In 1987, the pits were disconnected from their drainlines and left in place. After the pits were disconnected, effluent was allowed to daylight for only a few months before the drainlines were tied into the TA-16 wastewater treatment plant (WWTP).

Consent Order investigations have not been performed at SWMUs 22-014(a) and 22-015(a); no decision-level data are available for these Sites. However, screening-level data are available for both Sites from samples collected during the 1994 RFI. Detailed sampling results are presented in the Historical Investigation Report for Twomile Canyon Aggregate Area (LANL 2010a).

A-3.2 Storm Water Monitoring Results

SWMUs 22-014(a) and 22-015(a) are monitored within 2M-SMA-1.43. Following the installation of baseline control measures, a baseline storm water sample was collected on July 12, 2013. Analytical results from this sample yielded two TAL exceedances (Figure A-3.2-1):

- Aluminum concentration of 1500 µg/L (MTAL is 750 µg/L) and
- Gross-alpha activity of 52 pCi/L (ATAL is 15 pCi/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-3.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

2M-SMA-1.43 is a 0.26-acre watershed that consists of 42% developed areas and 58% undeveloped areas. Developed areas consist of 0.11 acres of pavement. Undeveloped areas consist of 0.15 acres of grassland (Figure A-3.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Aluminum—The aluminum UTL from developed urban landscape storm water run-on is 245 µg/L; the aluminum UTL for background storm water containing sediment derived from Bandelier Tuff is 2210 µg/L. The aluminum result from 2013 is between these two values.
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is between these two values.

A-3.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

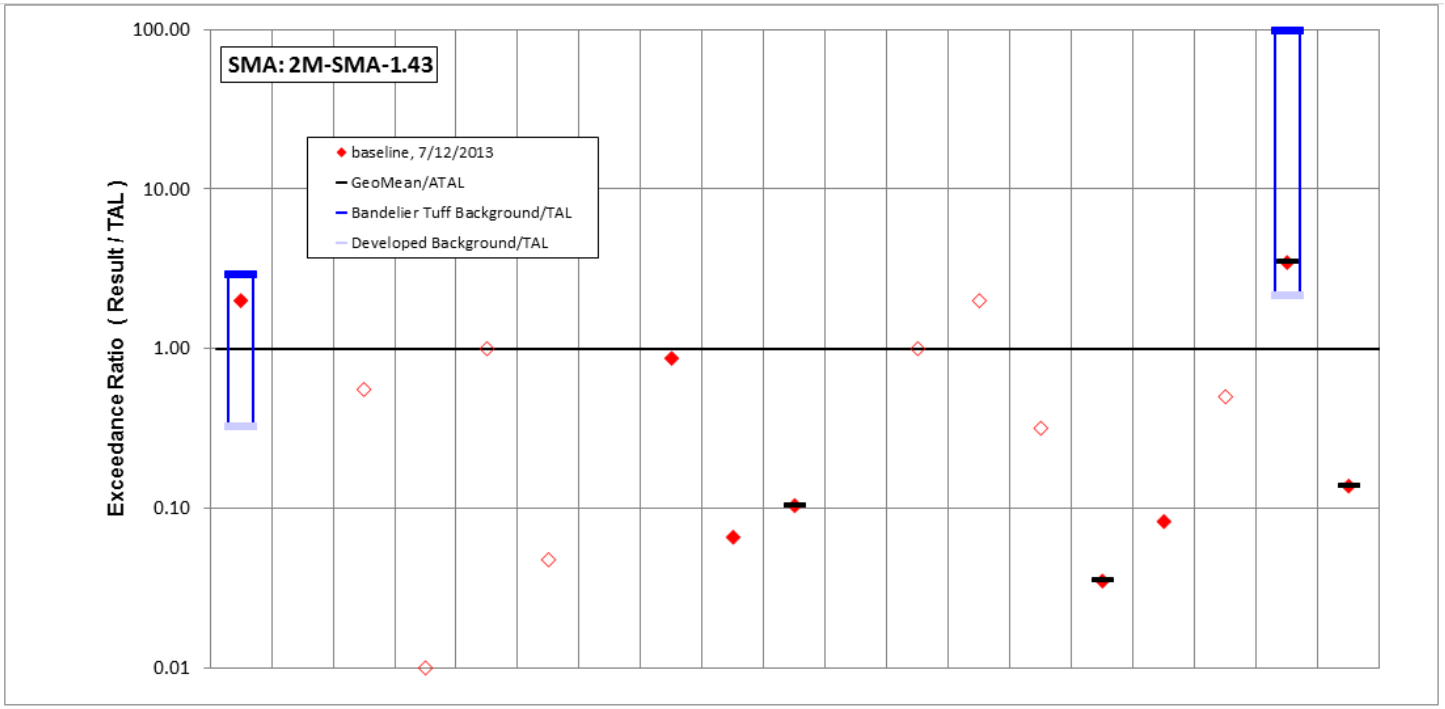
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 22-014(a):

- Aluminum is not known to be associated with industrial materials historically managed at the Site. Shallow (i.e., less than 3 ft bgs) soil samples collected during the 1994 RFI at the Site were not analyzed for inorganic chemicals because these constituents are not associated with historical Site activities.
- Alpha-emitting radionuclides are not known to be associated with industrial materials historically managed at the Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the Clean Water Act (CWA) and are excluded from the definition of adjusted gross-alpha radioactivity.

SWMU 22-015(a):

- Aluminum may potentially be associated with industrial materials historically managed at the Site. Aluminum was not, however, detected above the BV in any of the three shallow 1994 RFI soil samples collected at the Site.
- Alpha-emitting radionuclides are not associated with historical site activities. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/12/2013 result	**1500**	*3*	*5*	*50*	*1*	*10*	4.46	3.74	1.12	0.08	1.25	*5*	***1***	*2*	3.5	3.47	*0.005*	**52**	4.13
result / TAL	**2**	*0.005*	*0.56*	*0.01*	*1*	*0.048*	0.0045	0.87	0.066	0.1	0.0074	*1*	***2***	*0.32*	0.035	0.083	*0.5*	**3.5**	0.14

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-3.2-1 TAL exceedance plot for 2M-SMA-1.43

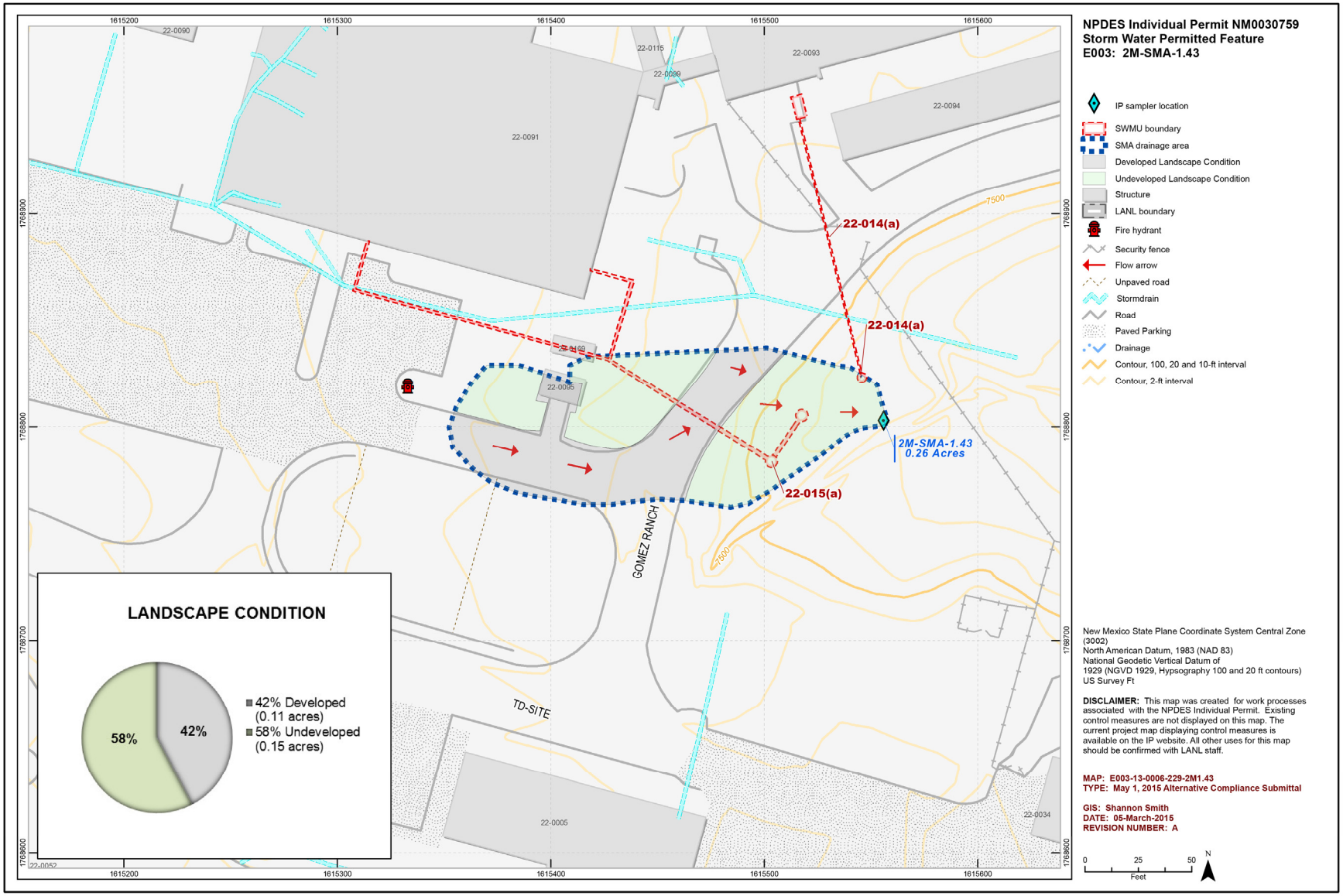


Figure A-3.3-1 SMA map for 2M-SMA-1.43

A-4.0 2M-SMA-1.7

A-4.1 Site Description

2M-SMA-1.7, located in the Pajarito watershed, includes SWMU 03-055(a), an outfall located approximately 50 ft south of the Van de Graaff facility (building 03-16). Roof drains and one floor drain in a generator room (room 68) discharged to the outfall, which is located at the edge of the mesa into Twomile Canyon. The outfall currently receives only storm water from Van de Graaff building roof drains. The Van de Graaff facility was constructed in 1952. The facility has been inactive since the late 1990s; radiological decontamination and decommissioning (D&D) activities began in 2005.

Consent Order or other environmental investigations have not been performed at SWMU 03-055(a); no investigation data are available for this Site.

A-4.2 Storm Water Monitoring Results

SWMU 03-055(a) is monitored within 2M-SMA-1.7. Following the installation of baseline control measures, two baseline storm water samples were collected on August 3, 2011, and September 9, 2011. Analytical results from these samples yielded one TAL exceedance (Figure A-4.2-1):

- Copper concentration of 11.4 µg/L (MTAL is 4.3 µg/L).

Following the installation of enhanced control measures at 2M-SMA-1.7, corrective action storm water samples were collected on July 8, 2014, and August 26, 2014. Analytical results from the July 8, 2014, corrective action monitoring sample yielded one TAL exceedance:

- Copper concentration of 4.6 µg/L (MTAL is 4.3 µg/L).

This 2014 TAL exceedance is the subject of the alternative compliance request for this SMA/Site. The TAL exceedance from the baseline compliance stage is provided for informational purposes only and are not evaluated in the following discussion.

A-4.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

2M-SMA-1.7 is a 0.21-acre watershed that consists of 94% developed areas and 6% undeveloped areas. Developed areas consist of 0.20 acres of rooftops and pavement. Undeveloped areas consist of 0.01 acres of grassland (Figure A-4.3-1).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

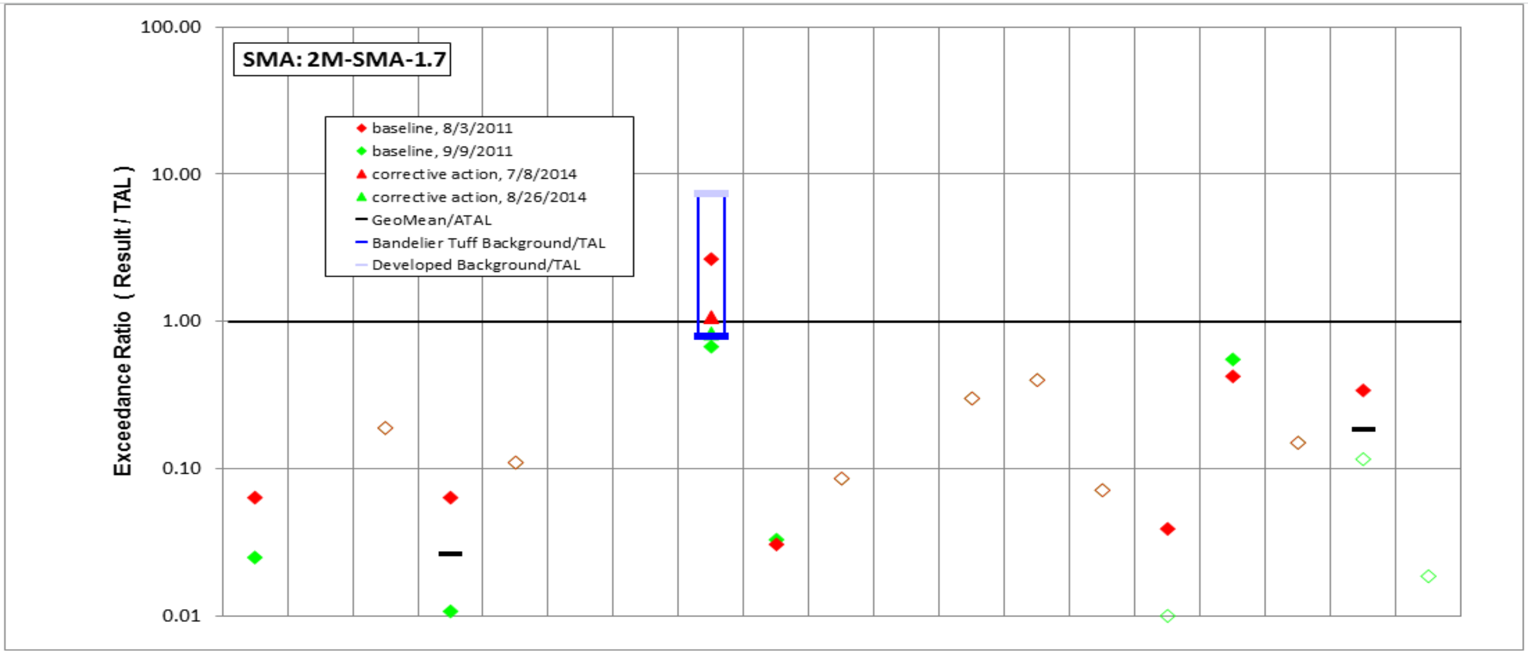
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2011 and 2014 are between these values.

A-4.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 03-055(a):

- Copper is not known to be associated with industrial materials historically managed at the Site. No investigation data are available for SWMU 03-055(a).



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
8/26/2014 result	-	-	-	-	-	-	-	3.57	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	0.83	-	-	-	-	-	-	-	-	-	-	-
7/8/2014 result	-	-	-	-	-	-	-	**4.6**	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	**1.1**	-	-	-	-	-	-	-	-	-	-	-
9/9/2011 result	18.7	*1*	*1.7*	53.7	*0.11*	*2*	2	2.9	0.56	*0.066*	*0.5*	*1.5*	*0.2*	*0.45*	*1*	23.2	*0.002*	*1.74*	*0.558*
result / TAL	0.025	*0.002*	*0.19*	0.011	*0.11*	*0.01*	0.002	0.67	0.033	*0.086*	*0.003*	*0.3*	*0.4*	*0.071*	*0.01*	0.55	*0.15*	*0.12*	*0.019*
8/3/2011 result	47.7	*1*	*1.7*	318	*0.11*	*2*	*1*	**11.4**	0.52	*0.066*	1.6	*1.5*	*0.2*	*0.45*	3.9	17.8	*0.002*	5.1	*0.037*
result / TAL	0.064	*0.002*	*0.19*	0.064	*0.11*	*0.01*	*0.001*	**2.7**	0.031	*0.086*	0.0094	*0.3*	*0.4*	*0.071*	0.039	0.42	*0.15*	0.34	*0.001*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-4.2-1 TAL exceedance plot for 2M-SMA-1.7

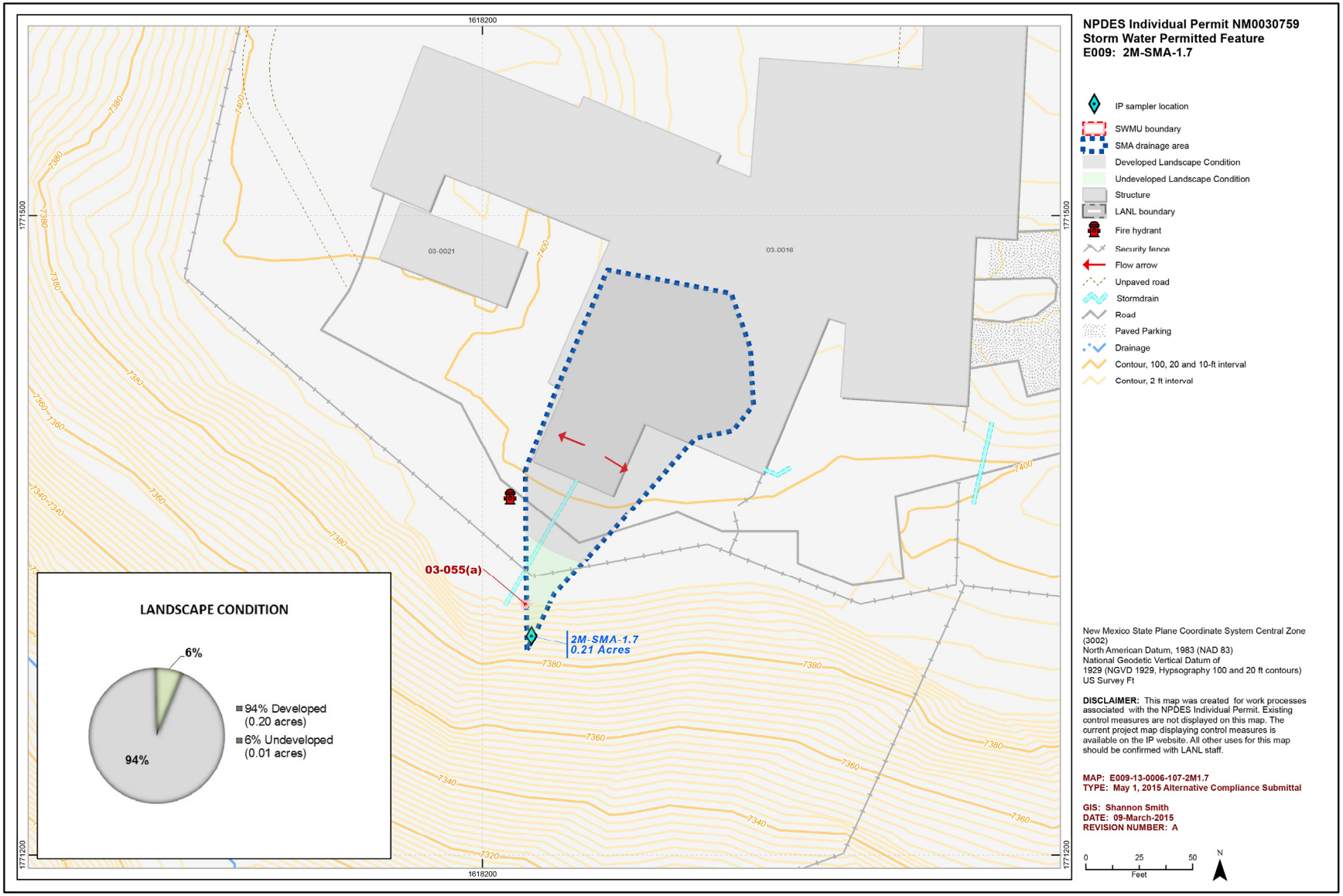


Figure A-4.3-1 SMA map for 2M-SMA-1.7

A-5.0 2M-SMA-1.8

A-5.1 Site Description

2M-SMA-1.8, located in the Pajarito watershed, includes SWMU 03-001(k), the former location of a less-than-90-day hazardous waste accumulation area located on the south side of building 03-16, the inactive Van de Graaff Building. SWMU 03-001(k) consists of two level asphalt areas, each measuring approximately 20 × 30 ft. The areas are located next to the doors on the south side of the building. Concrete pads located in front of each doorway are bounded by asphalt paving on three sides. SWMU 03-001(k) was used primarily as a storage yard for electrical equipment designated for salvage. Drums of vacuum oil, tritium-contaminated waste, and used solvents from experiments conducted in the building were also stored in this area. A 1986 field inspection of SWMU 03-001(k) noted oily unmarked drums where new vacuum oil for experiments was stored. Asphalt chip samples collected in 1989 indicated the presence of polychlorinated biphenyls (PCBs) at a concentration of 7.8 mg/kg. A 1993 inspection found no stains on the asphalt and concrete pad.

Consent Order investigations have not been performed at SWMU 03-001(k); no decision-level data are available for this Site. However, screening-level data are available from pre-Consent Order soil and asphalt-chip sampling performed in 2001. Detailed sampling results are presented in the historical investigation report for Twomile Canyon Aggregate Area (LANL 2010a).

A-5.2 Storm Water Monitoring Results

SWMU 03-001(k) is monitored within 2M-SMA-1.8. Following the installation of baseline control measures, two baseline storm water samples were collected on August 4, 2011, and September 9, 2011. Analytical results from these samples yielded three TAL exceedances (Figure A-5.2-1):

- Copper concentrations of 6.6 µg/L and 13.2 µg/L (MTAL is 4.3 µg/L) and
- Zinc concentration of 71.8 µg/L (MTAL is 42 µg/L).

These 2011 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-5.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

2M-SMA-1.8 is a 1.23-acre watershed that consists of 75% developed areas and 25% undeveloped areas. Developed areas consist of 0.39 acres of buildings and 0.53 acres of pavement. Undeveloped areas consist of 0.11 acres of ponderosa woodland and 0.20 of grassland (Figure A-5.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

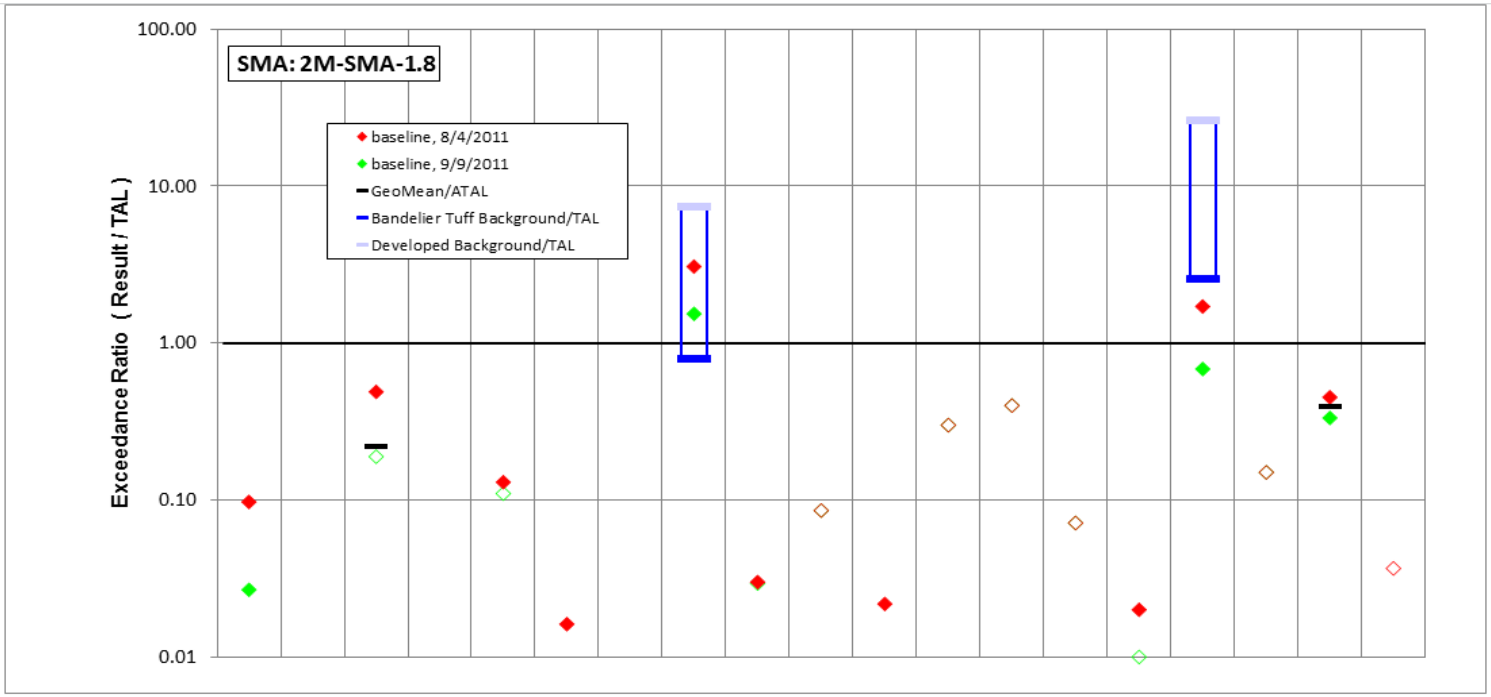
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2011 are between these values.
- Zinc—The zinc UTL from developed urban landscape storm water run-on is 1120 µg/L; the zinc UTL for background storm water containing sediment derived from Bandelier Tuff is 109 µg/L. The zinc result from 2011 is less than both of these values.

A-5.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 03-001(k):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above BV in 1 of 4 shallow soil samples collected at the Site in 2001 with a maximum concentration 2 times the soil BV.
- Zinc is not known to be associated with industrial materials historically managed at the Site. Zinc was detected above BV in 1 of 4 shallow soil samples collected at the Site in 2001 with a maximum concentration 1.2 times the soil BV.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
9/9/2011 result	20.1	*1*	*1.7*	*15*	*0.11*	*2*	2.3	**6.6**	*0.5*	*0.066*	1.2	*1.5*	*0.2*	*0.45*	*1*	28.7	*0.002*	5	*0.175*
result / TAL	0.027	*0.002*	*0.19*	*0.003*	*0.11*	*0.01*	0.0023	**1.5**	*0.029*	*0.086*	0.0071	*0.3*	*0.4*	*0.071*	*0.01*	0.68	*0.15*	0.33	*0.006*
8/4/2011 result	72.9	*1*	4.4	*15*	0.13	3.4	*1*	**13.2**	0.51	*0.066*	3.7	*1.5*	*0.2*	*0.45*	2	**71.8**	*0.002*	6.77	*1.1*
result / TAL	0.097	*0.002*	0.49	*0.003*	0.13	0.016	*0.001*	**3.1**	0.03	*0.086*	0.022	*0.3*	*0.4*	*0.071*	0.02	**1.7**	*0.15*	0.45	*0.037*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-5.2-1 TAL exceedance plot for 2M-SMA-1.8

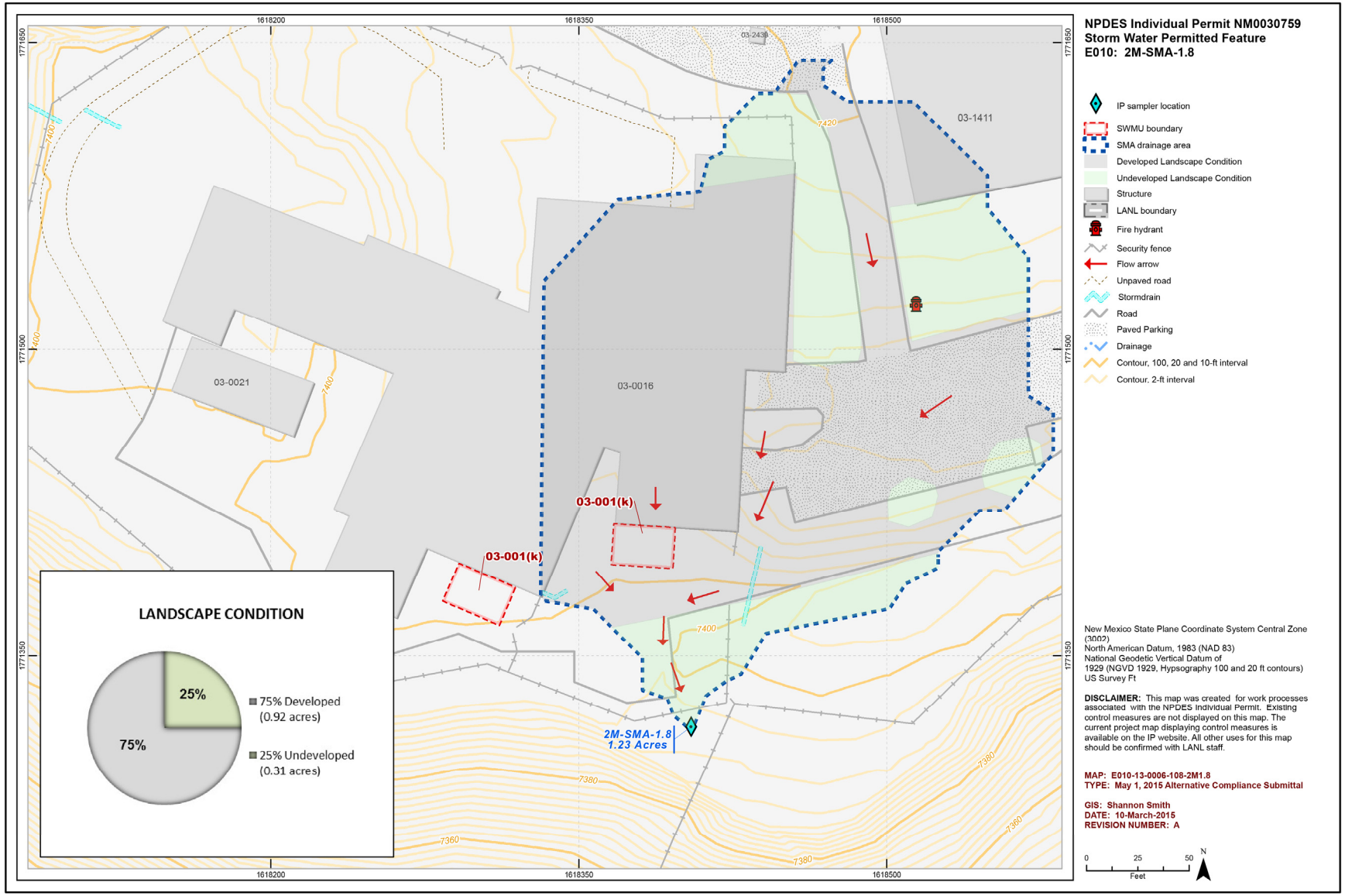


Figure A-5.3-1 SMA map for 2M-SMA-1.8

A-6.0 2M-SMA-1.9

A-6.1 Site Description

2M-SMA-1.9, located in the Pajarito watershed, includes SWMU 03-003(a), a former outdoor storage area used for temporary storage of electrical equipment destined for salvage, some of which contained oil. The storage area was located on the north and west sides of building 03-0218. The northern portion of the storage area consisted of the asphalt paving next to the north side of building 03-0218. The western portion of the storage area consisted of a 44-ft-long × 27-ft-wide concrete pad surrounded by an 18- to 20-in.-high concrete curb. The concrete pad and curb are bounded on three sides by soil covered with gravel. A 30-ft-wide × 60-ft-long area of asphalt paving abuts the south end of the concrete curb. During the 1986 Comprehensive Environmental Assessment and Response Program (CEARP) survey, six 55-gal. drums were observed stored next to capacitors on asphalt in the storage area on the north side of building 03-0218; staining was visible on the asphalt beneath the drums. Capacitors and transformers labeled as containing less than 50 ppm PCBs were stored in the western portion of the former storage area. During a 1989 inspection, leaking capacitors, drums of epoxy, one or two batteries, and vacuum pumps were observed in the western portion of the storage area. In the early 1990s, a small area of oil-stained asphalt was excavated to a depth of 3 in. around the storm drain located in the western portion of SWMU 03-003(a). Use of the SWMU 03-003(a) storage area ceased in the early 1990s.

Consent Order sampling has not yet been conducted at SWMU 03-003(a); no decision-level data are available for this Site. However, screening-level data are available from samples collected during the 1994 RFI conducted at the Site. Detailed sampling results are presented in the Historical Investigation Report for Twomile Canyon Aggregate Area (LANL 2010a).

A-6.2 Storm Water Monitoring Results

SWMU 03-003(a) is monitored within 2M-SMA-1.9. Following the installation of baseline control measures, a baseline storm water sample was collected on July 11, 2012. Analytical results from this sample yielded two TAL exceedances (Figure A-6.2-1):

- Copper concentration of 24.9 µg/L (MTAL is 4.3 µg/L) and
- Zinc concentration of 314 µg/L (MTAL is 42 µg/L).

These 2012 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-6.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

2M-SMA-1.9 is a 0.25-acre watershed that consists of 100% developed area. Developed areas consist of 0.25 acres of buildings and/or pavement (Figure A-6.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

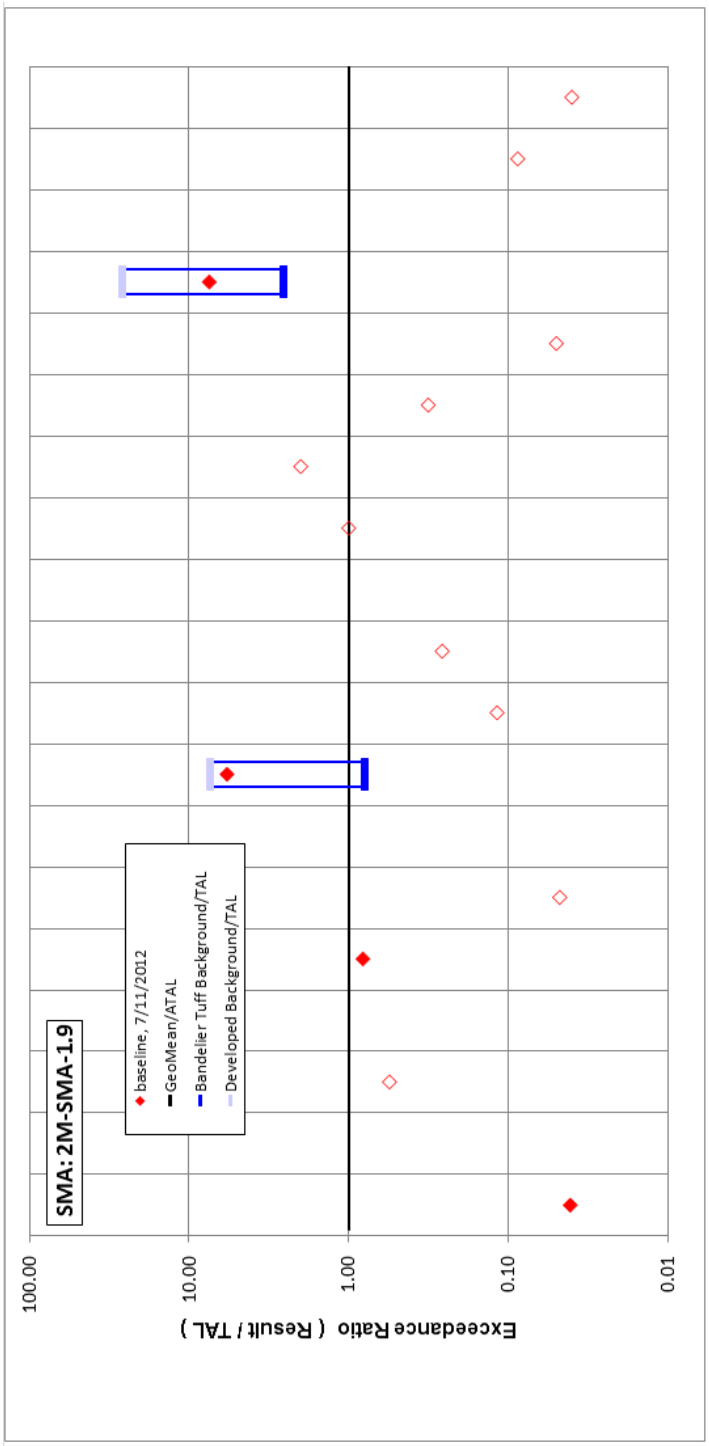
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2012 is greater than both of these values.
- Zinc—The zinc UTL from developed urban landscape storm water run-on is 1120 µg/L; the zinc UTL for background storm water containing sediments derived from Bandelier Tuff is 109 µg/L. The zinc result from 2012 is between these values.

A-6.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 03-003(a):

- Copper is not known to have been associated with industrial materials historically managed at this Site. Copper was not detected above the soil BV in shallow 1994 RFI soil samples; the 1994 RFI data are screening level only.
- Zinc is not known to be associated with industrial materials historically managed at the Site. Zinc was detected above the soil BV in 1 of 2 shallow soil samples with a maximum concentration 1.1 times the soil BV but less than the maximum soil background concentration. The 1994 RFI data are screening level only.



std used in ratio calculations	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 value	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	-	ATAL	ATAL
unit	750	640	9	5000	1	210	1000	4.3	17	0.77	170	5	0.5	6.3	100	42	-	15	30
7/11/2012 result	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
result / TAL	30.7	1.78	5	16.8	0.815	*10*	5	**24.9**	2	*0.2*	1.38	5	***1***	2	5	**314**	-	*1.31*	*1.2*
	0.041	0.0028	*0.56*	0.0034	0.82	*0.048*	*0.005*	**5.8**	*0.12*	*0.26*	0.0081	*1*	***2***	*0.32*	*0.05*	**7.5**	-	*0.087*	*0.04*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-6.2-1 TAL exceedance plot for 2M-SMA-1.9

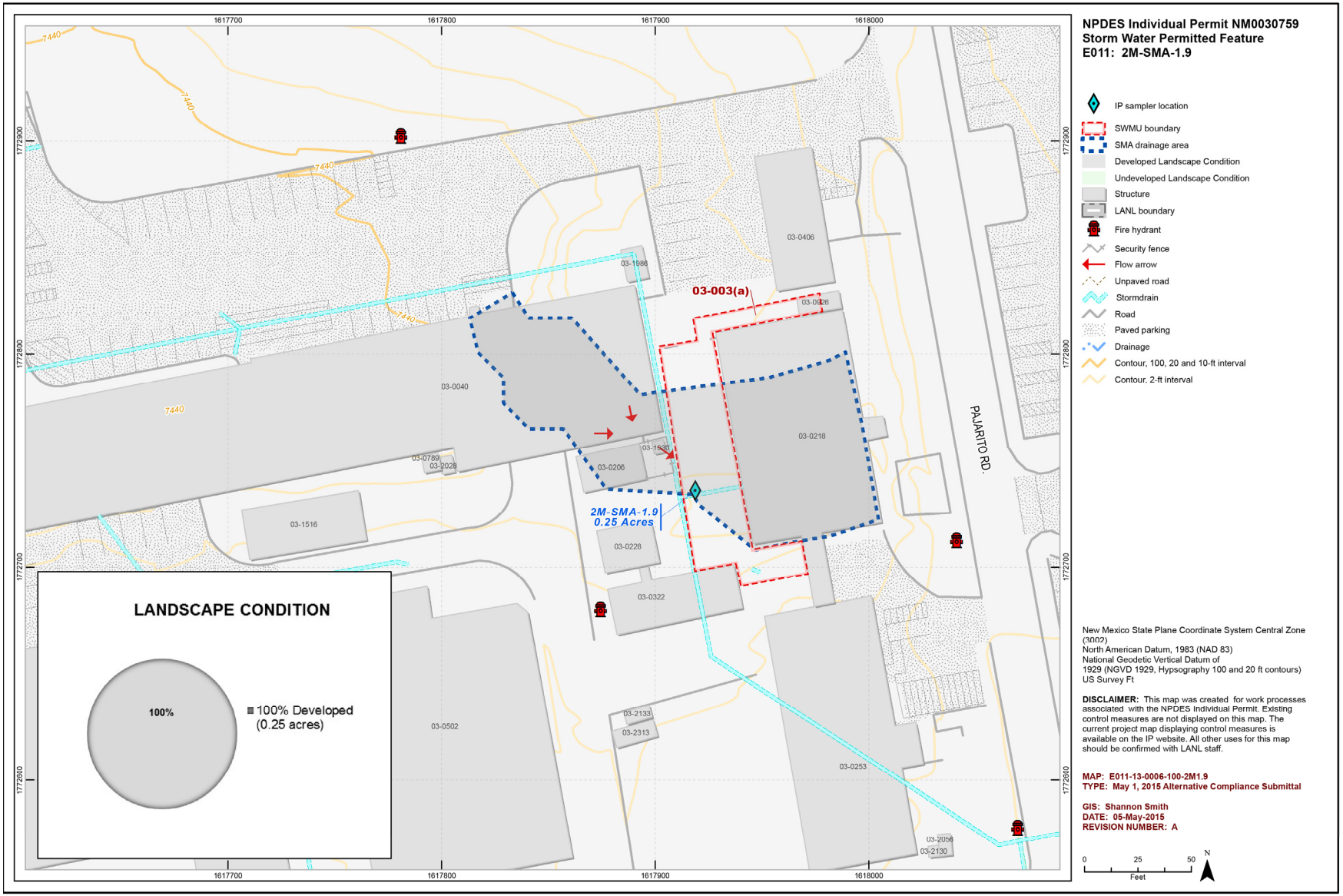


Figure A-6.3-1 SMA map for 2M-SMA-1.9

A-7.0 2M-SMA-2

A-7.1 Site Description

2M-SMA-2, located in the Pajarito watershed, includes SWMUs 03-050(d) and 03-054(b).
SWMU 03-050(d) consists of potential soil contamination from historical emissions of particulates possibly released from the former air-pollution control device on the exhaust system at the south side of the tech shops addition (building 03-102). The device was a shaker-type baghouse located on a concrete pad. Building 03-102 was built in 1957 for machining radioactive materials. Machined items included those with uranium-235 and uranium-238, lithium hydride, and small quantities of other inorganic chemicals. The baghouse was the primary air-pollution-control device to remove lithium hydride particulates in the gas stream to the stack. The baghouse was also used as a secondary air-pollution-control device to remove uranium graphite particulates in the gas stream to the stack. The bag house ceased operating in 1992 because of failure in the dioctyl phthalate penetration test, which measures the efficiency of the collection system. All ventilation ducts associated with machining operations then were diverted to a high-flow-rate ventilation system connected to an operational baghouse located immediately east of the inoperative baghouse. Radionuclide air emissions at the inoperative baghouse were monitored from the beginning of its use in 1957. Release of radioactive uranium particulates to the concrete pad through the inoperative baghouse fabric filter also was documented. The concrete pad was painted in 1993 to immobilize any existing uranium particulates. Radiological survey results after the pad was painted showed no detectable activity on the pad or in the soil around the pad.

No Consent Order or other investigations have been conducted at SWMU 03-050(d).

SWMU 03-054(b) is an outfall at TA-03 that discharges into Twomile Canyon. This outfall, located southeast of building 03-1411 and southwest of building 03-1316, was formerly permitted as NPDES 03A009 to receive discharge water from the cooling tower effluent blowdown and noncontact cooling water from building 03-0102. This discharge was rerouted to the TA-46 sanitary WWTP in 1993, and the outfall is no longer on the NPDES permit.

Two active storm drain inlets [SWMUs 03-052(a) and 03-052(e)] are connected to a drainline that goes to the outfall. Storm water runoff from surface areas surrounding 26 buildings and 94 roof drains in TA-03 currently discharge to this outfall.

No Consent Order investigations have been conducted at SWMU 03-054(b). However, decision-level data are available from pre-Consent Order sampling performed in 2002 prior to construction activities near the Site. Detailed sampling results are presented in the Historical Investigation Report for Twomile Canyon Aggregate Area (LANL 2010a).

A-7.2 Storm Water Monitoring Results

SWMUs 03-050(d) and 03-054(b) are monitored within 2M-SMA-2. Following the installation of baseline control measures, two baseline storm water samples were collected on July 28, 2011, and September 4, 2011. Analytical results from these samples yielded five TAL exceedances (Figure A-7.2-1):

- Copper concentrations of 5.5 µg/L and 14.9 µg/L (MTAL is 4.3 µg/L),
- Zinc concentrations of 72.3 µg/L and 140 µg/L (MTAL is 42 µg/L), and
- PCB concentration of 65 ng/L (ATAL is 0.6 ng/L).

Following the installation of enhanced control measures at 2M-SMA-2, corrective action storm water samples were collected on June 1, 2013, and September 4, 2013. Analytical results from these corrective action monitoring sample yielded six TAL exceedances:

- Copper concentrations of 18.5 µg/L and 19.9 µg/L (MTAL is 4.3 µg/L),
- Zinc concentration of 102 µg/L and 123 µg/L (MTAL is 42 µg/L), and
- PCB concentration of 50 ng/L and 15 ng/L (ATAL is 0.6 ng/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites. All TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-7.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

Site 2M-SMA-2 is a 10.53-acre watershed that consists of 96% developed areas and 4% undeveloped areas. Developed areas consist of 10.07 acres of building rooftop and pavement. Undeveloped areas consist of 0.46 acres of ponderosa woodland (Figure A-7.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2011 and 2013 are between these values.
- Zinc—The zinc UTL from developed urban landscape storm water run-on is 1120 µg/L; the zinc UTL for background storm water containing sediments derived from Bandelier Tuff is 109 µg/L. One of the zinc results from 2011 and 2013 is less than both of these values, and the other result from both 2011 and 2013 is between them.
- PCB—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for background storm water containing sediments derived from Bandelier Tuff is 11.7 ng/L. The PCB results from 2011 and 2013 are between these values.

A-7.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

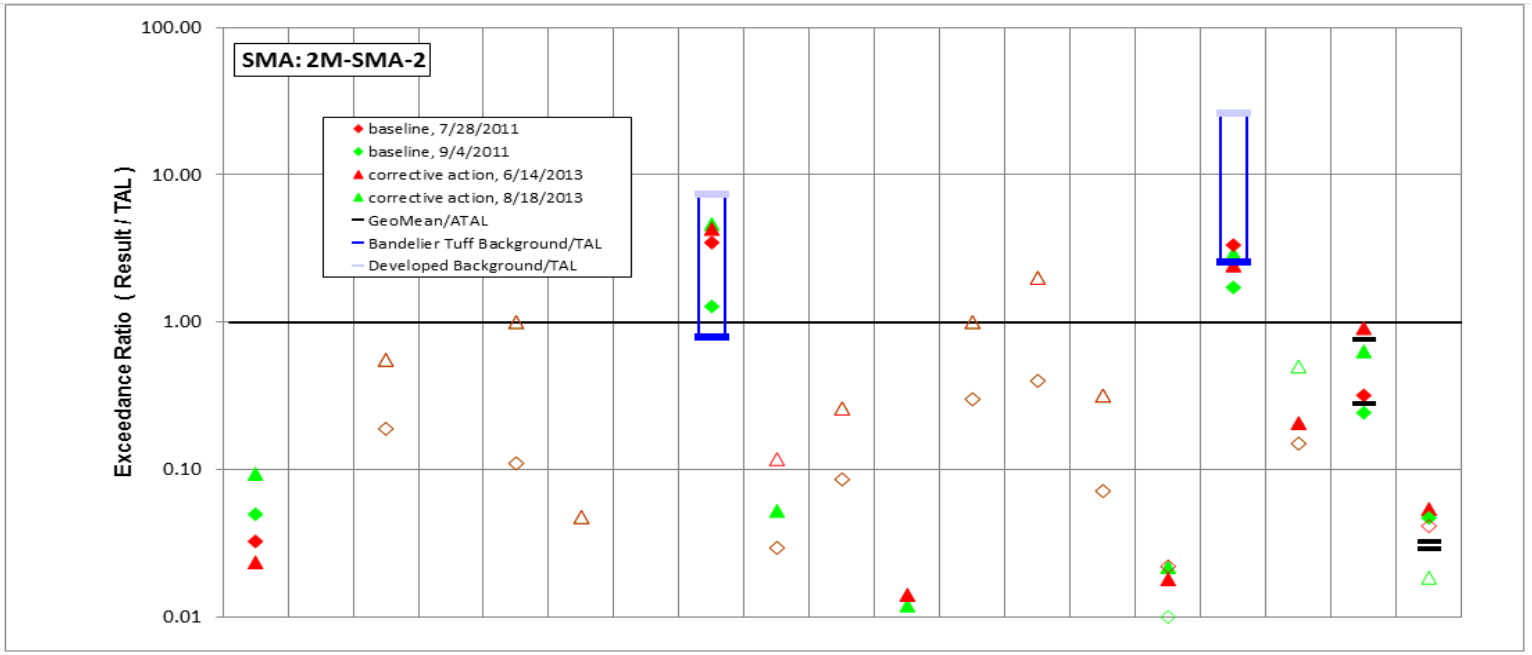
SWMU 03-050(d):

- Copper, zinc, and PCBs are not known to be associated with industrial materials historically managed at this Site. No investigation data are available for SWMU 03-050(d).

SWMU 03-054(b):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above the soil BV in shallow (i.e., less than 3 ft bgs) samples collected in 2002 before construction activities began near the Site. Copper was detected above BV in 17 of 18 shallow samples with a maximum concentration 17 times the soil BV.

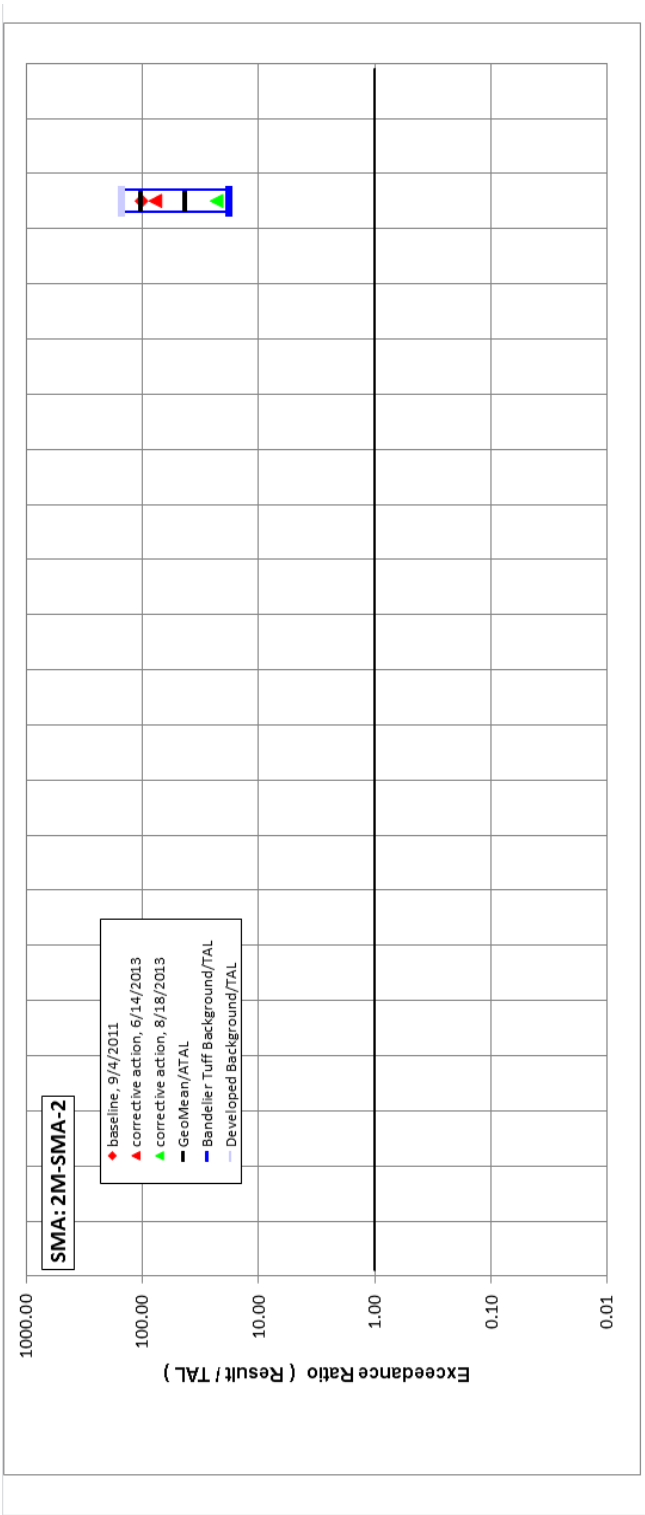
- Zinc is not known to be associated with industrial materials historically managed at the Site. Zinc was detected above the soil BV in shallow samples collected in 2002 before construction activities began near the Site. Zinc was detected above BV in 18 of 18 shallow samples with a maximum concentration 17 times the soil BV.
- PCBs are not known to be associated with industrial materials historically managed at the Site. Samples collected at the Site in 2002 were not analyzed for PCBs because they were not identified as a potential contaminant at this Site.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
8/18/2013 result	70.2	1.25	*5*	29.5	*1*	*10*	*5*	**19.9**	0.891	*0.2*	2.03	*5*	***1***	*2*	2.18	**123**	*0.005*	9.51	*0.554*
result / TAL	0.094	0.002	*0.56*	0.0059	*1*	*0.048*	*0.005*	**4.6**	0.052	*0.26*	0.012	*1*	***2***	*0.32*	0.022	**2.9**	*0.5*	0.63	*0.018*
6/14/2013 result	17.6	1.84	*5*	36.1	*1*	*10*	2.43	**18.5**	*2*	*0.2*	2.4	*5*	***1***	*2*	1.8	**102**	0.0021	13.7	1.62
result / TAL	0.023	0.0029	*0.56*	0.0072	*1*	*0.048*	0.0024	**4.3**	*0.12*	*0.26*	0.014	*1*	***2***	*0.32*	0.018	**2.4**	0.21	0.91	0.054
9/4/2011 result	37.3	*1.8*	*1.7*	*15*	*0.11*	*2*	2.7	**5.5**	*0.5*	*0.066*	0.55	*1.5*	*0.2*	*0.45*	*1*	**72.3**	*0.002*	3.64	1.41
result / TAL	0.05	*0.003*	*0.19*	*0.003*	*0.11*	*0.01*	0.0027	**1.3**	*0.029*	*0.086*	0.0032	*0.3*	*0.4*	*0.071*	*0.01*	**1.7**	*0.15*	0.24	0.047
7/28/2011 result	24.4	6.2	*1.7*	18.2	*0.11*	*2*	*1.6*	**14.9**	*0.5*	*0.066*	1.3	*1.5*	*0.2*	*0.45*	*2.2*	**140**	*0.002*	4.78	*1.24*
result / TAL	0.033	0.0097	*0.19*	0.0036	*0.11*	*0.01*	*0.002*	**3.5**	*0.029*	*0.086*	0.0076	*0.3*	*0.4*	*0.071*	*0.022*	**3.3**	*0.15*	0.32	*0.041*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-7.2-1 TAL exceedance plot for 2M-SMA-2



std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
unit	ug/L	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
8/18/2013 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6/14/2013 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/4/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7/28/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-7.2-1 (continued) TAL exceedance plot for 2M-SMA-2

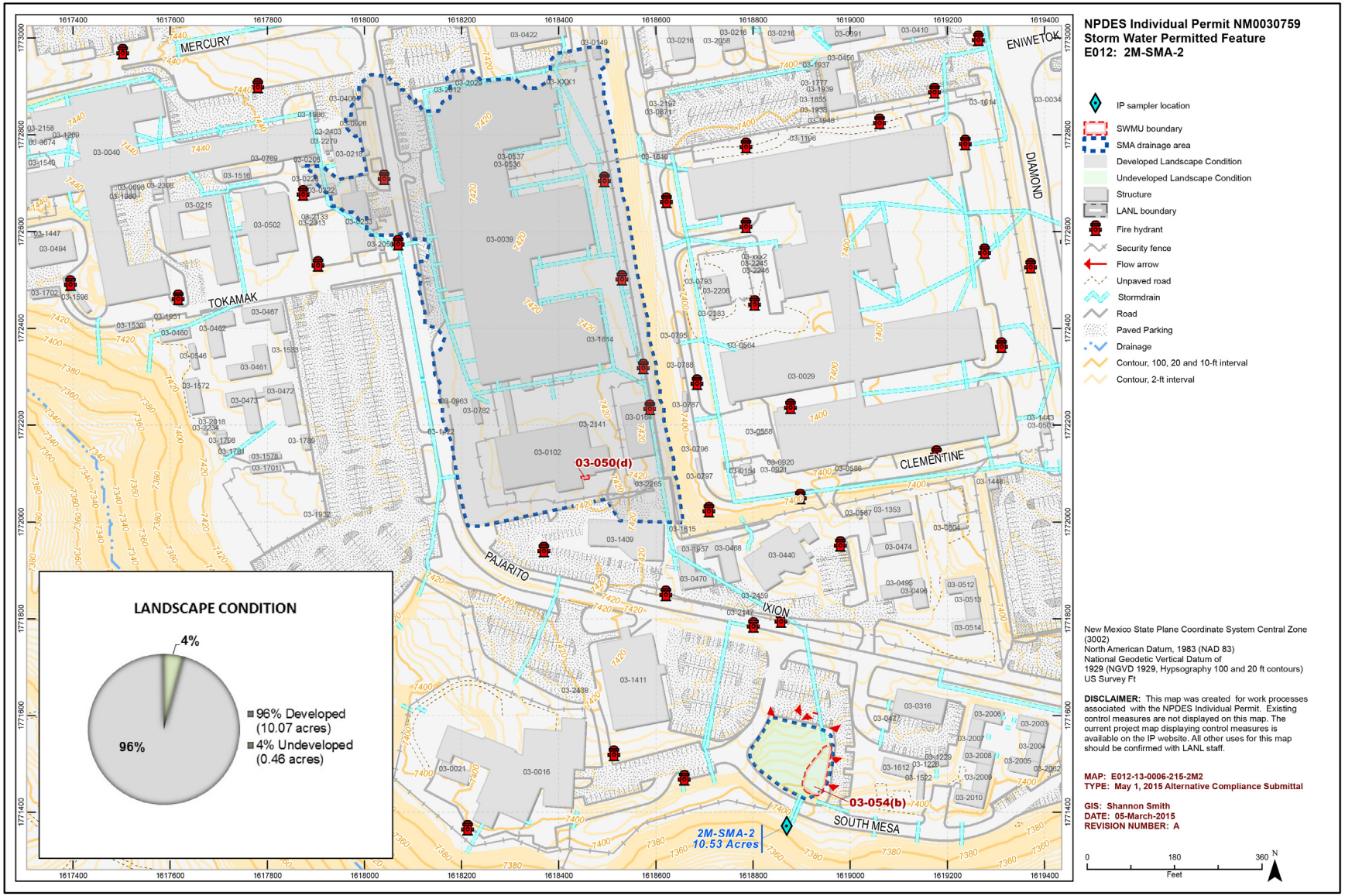


Figure A-7.3-1 SMA map for 2M-SMA-2

A-8.0 3M-SMA-0.5

A-8.1 Site Description

2M-SMA-0.5, located in the Pajarito watershed, includes SWMUs 15-009(c) and 15-006(c). SWMU 15-009(c) is a septic system located at Firing Site R 44 at TA-15. The septic system consisted of a septic tank (former structure 15-62), associated drainlines, and an outfall. The septic tank was constructed in 1951 of reinforced concrete with a 540-gal. capacity. The system received effluent from restroom facilities in the firing site control building 15-44. The drainlines are constructed of cast iron and discharged to an outfall into the south fork of Threemile Canyon. The outfall is located approximately 25 ft downgradient of the tank. A 2003 engineering drawing shows that the outfall has been plugged and the septic tank was removed during the 2009–2010 site investigation, but the drainlines remain in place.

Nature and extent will be reevaluated under the supplemental investigation report for Threemile Canyon Aggregate Area, scheduled to be submitted to the New Mexico Environment Department (NMED) in 2015. It is anticipated this Site will be recommended for corrective action complete and will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for Threemile Canyon Aggregate Area (LANL 2010f).

SWMU 15-006(c), a septic system located at Firing Site R-44 at TA-15, is also regulated under 2M-SMA-0.5. This Site is planned for evaluation of corrective action alternatives and is not part of this alternative compliance request.

A-8.2 Storm Water Monitoring Results

SWMU 15-009(c) is monitored within 3M-SMA-0.5. Following the installation of baseline control measures, a baseline storm water sample was collected on July 9, 2014. Analytical results from this sample yielded two TAL exceedances (Figure A-8.2-1):

- Copper concentrations of 4.35 µg/L (MTAL is 4.3 µg/L) and
- Gross-alpha activity of 29.5 pCi/L (ATAL is 15 pCi/L).

These 2014 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites.

A-8.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

3M-SMA-0.5 is a 5.57-acre watershed that consists of 20% developed areas and 80% undeveloped areas. Developed areas consist of 1.11 acres of primarily paved and dirt roads. Undeveloped areas consist of 0.27 acres of bare soil, 0.15 acres of grassland and 4.04 acres of ponderosa, piñon, and juniper woodland (Figure A-8.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2014 is between these values.

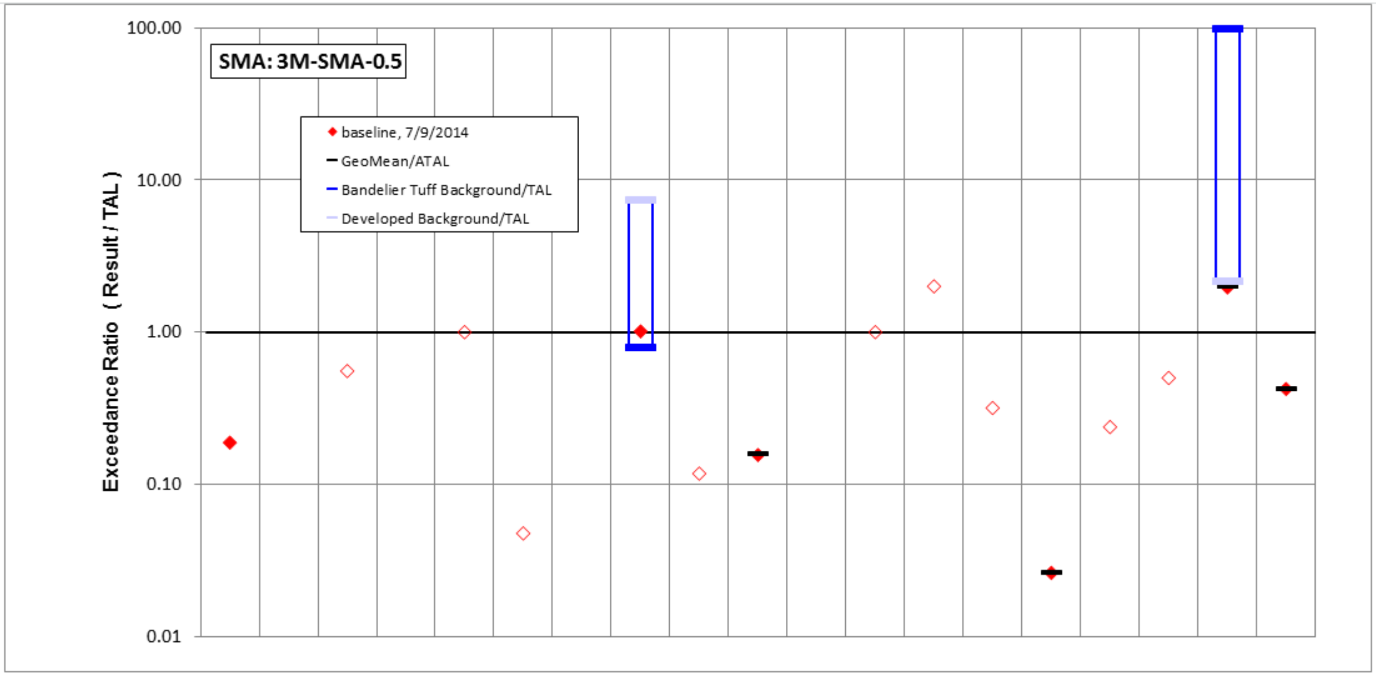
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2014 gross-alpha result is below these two values.

A-8.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 15-009(c):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was not detected above BVs in any of the 39 shallow (i.e., less than 3 ft bgs) 2010 Consent Order and 1998 RFI samples collected at the Site.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Consent Order and RFI samples were not analyzed for gross-alpha radioactivity but were analyzed for americium-241, plutonium isotopes and uranium isotopes, which are alpha-emitting radionuclides. Any alpha-emitting radionuclides associated with the Site are exempt from regulation under the CWA. Although these radionuclides may be associated with the gross-alpha radioactivity detected in the Permit sample, they are excluded from the definition of adjusted gross-alpha radioactivity and would not be the source of the TAL exceedance.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/9/2014 result	141	*3*	*5*	16.5	*1*	*10*	*5*	**4.35**	*2*	0.12	1.39	*5*	***1***	*2*	2.62	*10*	*0.005*	**29.5**	12.7
result / TAL	0.19	*0.005*	*0.56*	0.0033	*1*	*0.048*	*0.005*	**1**	*0.12*	0.16	0.0082	*1*	***2***	*0.32*	0.026	*0.24*	*0.5*	**2**	0.42

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-8.2-1 TAL exceedance plot for 3M-SMA-0.5

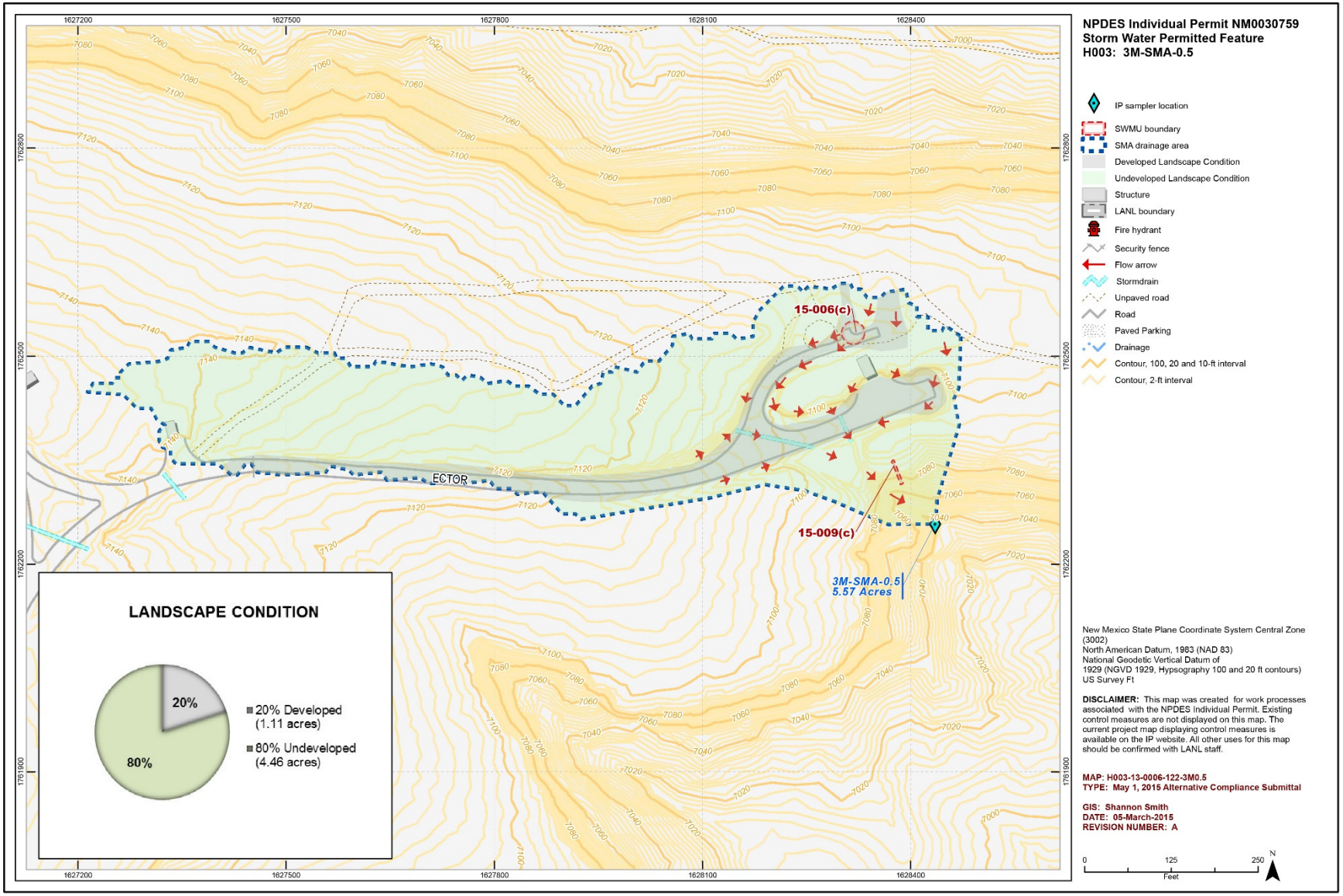


Figure A-8.3-1 SMA map for 3M-SMA-0.5

A-9.0 A-SMA-6

A-9.1 Site Description

A-SMA-6, located in the Ancho/Chaquehui watershed, includes SWMUs 33-004(k), 33-007(a), and 33-010(a). SWMU 33-004(k) consists of a suspected outfall from building 33-87 located at East Site at TA-33. Building 33-87 was constructed in 1955 to support firing site experiments at East Site. The firing tests that structure 33-87 supported were conducted until the early 1970s. The outfall reportedly received discharge from a toilet, sink, floor drains, and an electrical water cooler within the building. Structure 33-87 was used to house electronic equipment, and there is no recorded use of radioactive materials in this building. The RFI work plan indicated that photoprocessing may have occurred. Engineering drawing C-3304 shows a cast-iron drainpipe exiting the south wall of the building and extending approximately 125 ft southeast of the building where it terminates at the outfall. The engineering drawing describes the drainline as consisting of 54 ft of 8-in.-diameter cast-iron pipe and 71 ft of 8-in.-diameter vitrified clay pipe (VCP). Attempts to locate the drainline and outfall in 1994 and 1995 using geophysics and test trenches were unsuccessful. An inspection of the building performed in 1996 revealed that no floor drains existed in the building. The sink and toilet in the building discharge to septic tank 33-96 [SWMU 33-004(c)], located north of the building. Therefore, the drainline and outfall likely never existed.

SWMU 33-004(k) is included in the Consent Order as part of the South Ancho Canyon Aggregate Area. Consent Order investigations for this aggregate area have not yet begun. No decision-level data are available for SWMU 33-004(k).

SWMU 33-007(a) is a gun firing site located at East Site at TA-33. The firing site consists of three gun mounts (structures 33-116, 33-117, and 33-135) and two former catcher boxes (structures 33-118 and 33-136). Firing site activities began in the mid-1950s and included firing projectiles from large cannons into the catcher boxes filled with vermiculite and sand. Other activities included experiments using scintillation fluids and x-rays. Cobalt-60 was used in some of the firing site activities. Firing site activities ceased in 1972. In 1984, the catcher boxes and their contents were removed and disposed of in a landfill [SWMU 33-008(b)] located at East Site. A narrow asphalt road runs the length of the Site, as does an asphalt drainage ditch.

SWMU 33-007(a) is included in the Consent Order as part of the South Ancho Canyon Aggregate Area. Consent Order investigations for this aggregate area have not yet begun. No decision-level data are available for SWMU 33-007(a). However, screening-level data are available from samples collected during the 1994 RFI conducted at the Site. Detailed sampling results are presented in the RFI Report for TA-33: PRSs 33-004(b,c,j,m), 33-006(a,b), 33-007(a,b), 33-010(a,b,c,d,g,h), 33-011(b,c), 33-011 (LANL 1995).

SWMU 33-010(a) is a surface disposal area located on a cliff ledge above Ancho Canyon at East Site at TA-33. Much of the debris was associated with the initial clearing of East Site and included dead tree trunks, rocks, and scraped earth. Other debris, such as metal scrap, timber, and plastic foam, is associated with firing site operations conducted from 1955 to 1972. Debris was scattered at the rim of the canyon and within 15 ft below the rim. A voluntary corrective action (VCA) performed in 1995 removed 8 yd^3 of nonhazardous, nonradioactive debris ad 0.2 yd^3 of radioactive debris from the surface of the Site. No confirmation samples were collected.

SWMU 33-010(a) is included in the Consent Order as part of the South Ancho Canyon Aggregate Area. Consent Order investigations for this aggregate area have not yet begun. No decision-level data are available for SWMU 33-010(a). However, screening-level data are available from samples collected during the 1994 RFI conducted at the Site. Detailed sampling results are presented in the RFI Report for TA-33: PRSs 33-004(b,c,j,m), 33-006(a,b), 33-007(a,b), 33-010(a,b,c,d,g,h), 33-011(b,c), 33-011 (LANL 1995).

A-9.2 Storm Water Monitoring Results

SWMUs 33-004(k), 33-007(a), and 33-010(a) are monitored within A-SMA-6. Following the installation of baseline control measures, a baseline storm water sample was collected on August 4, 2013. Analytical results from this sample yielded two TAL exceedances (Figure A-9.2-1):

- Copper concentrations of 5.86 µg/L (MTAL is 4.3 µg/L) and
- Gross-alpha activity of 29.6 pCi/L (ATAL is 15 pCi/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites.

A-9.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

A-SMA-6 is a 7.58-acre watershed that consists of 19% developed areas and 81% undeveloped areas. Developed areas consist of 1.45 acres of mostly pavement. Undeveloped areas consist of 0.78 acres of bare soil, 2.88 acres of chamisa brush, and 2.47 acres of piñon and juniper woodland (Figure A-9.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2013 is between these two values.
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is less than both of these values.

A-9.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 33-004(k):

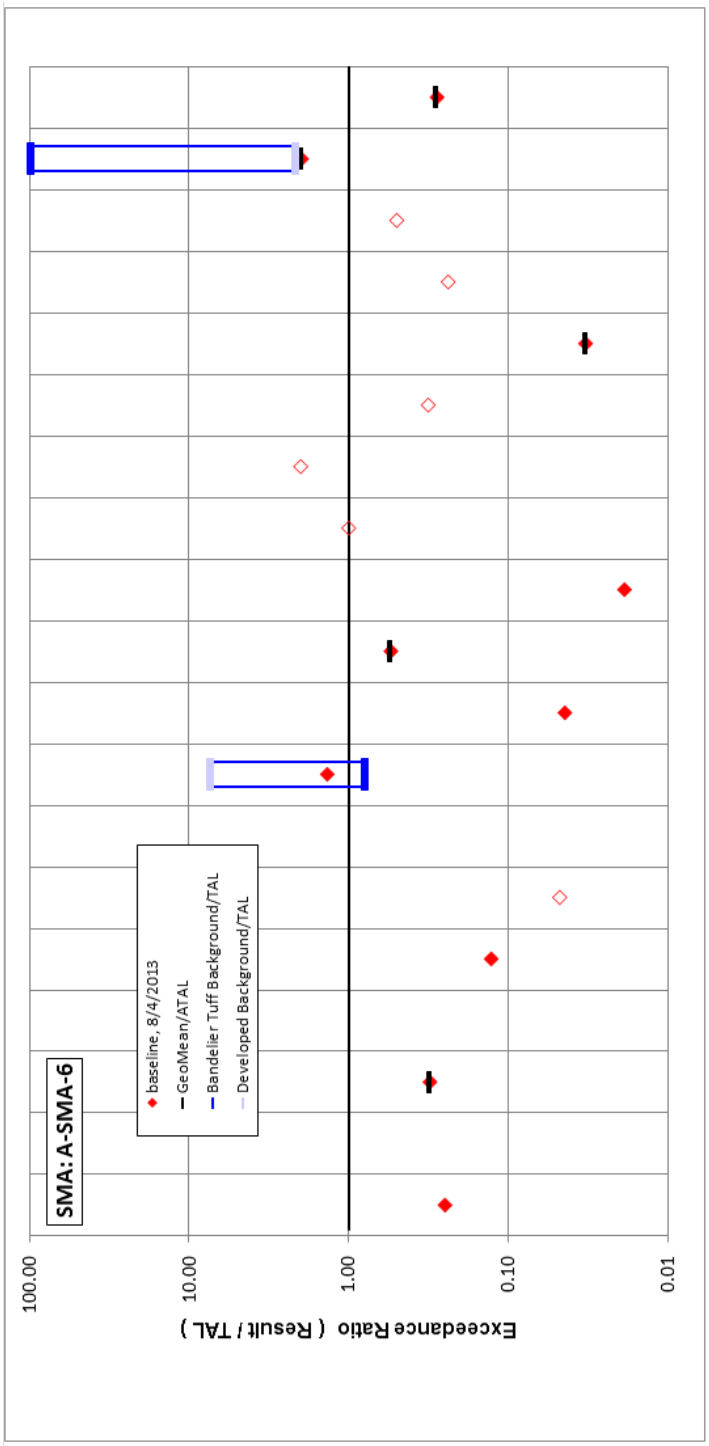
- Copper is not known to be associated with industrial materials historically managed at this Site. No investigation data are available for SWMU 33-004(k).
- Gross-alpha radioactivity is not known to be associated with industrial materials historically managed at this Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.

SWMU 33-007(a):

- Copper is not known to have been associated with industrial materials historically managed at this Site. Copper was not detected above BV in the 35 shallow (i.e., less than 3 ft bgs) RFI samples collected at the Site. The 1994 RFI data are screening level only.
- Gross alpha-emitting radionuclides are known to have been associated with industrial materials historically managed at this Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.

SWMU 33-010(a):

- Copper is not known to have been associated with industrial materials historically managed at this Site. Copper was not detected above BVs in the 8 shallow RFI samples collected at the Site. The 1994 RFI data are screening level only.
- Gross alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
8/4/2013 result	187	1.49	2.79	31.1	0.128	*10*	4.92	**5.86**	0.752	0.419	3.18	5	***1***	*2*	3.28	*10*	*0.005*	**29.6**	8.39
result / TAL	0.25	0.0023	0.31	0.0062	0.13	*0.048*	0.0049	**1.4**	0.044	0.54	0.019	*1*	***2***	*0.32*	0.033	*0.24*	*0.5*	***2***	0.28

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-9.2-1 TAL exceedance plot for A-SMA-6

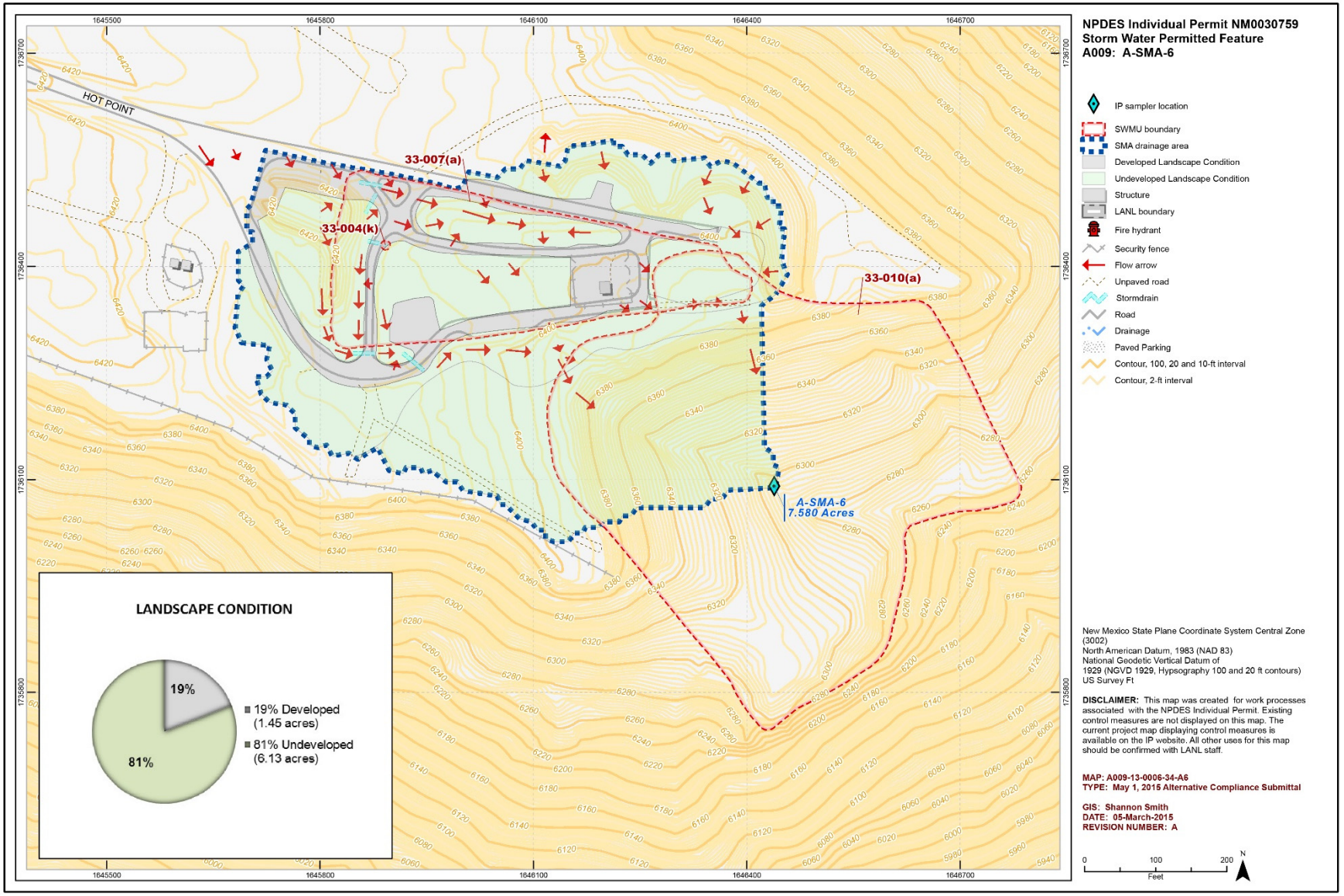


Figure A-9.3-1 SMA map for A-SMA-6

A-10.0 CDB-SMA-0.25

A-10.1 Site Description

CDB-SMA-0.25, located in the Sandia/Mortandad watershed, includes SWMU 46-004(c2) and Area of Concern (AOC) 46-004(e2). SWMU 46-004(c2) is a former NPDES-permitted outfall from an industrial drainline in building 46-1 at TA-46. Building 46-1 housed offices, two assembly bays, a machine shop, several laboratories for the assembly and checkout of electrical components, general laboratories, and a uranium-polishing area in support of the Rover Program. The outfall consists of a 4-in.-diameter cast-iron pipe that discharged effluent from floor drains in the north equipment room of building 46-1 to a ditch approximately 50 ft northwest of building 46-1. From the ditch, the effluent flowed to a storm drain culvert that discharged into Cañada del Buey. In 1997, the floor drains that discharged to the SWMU 46-004(c2) outfall either were removed from service or were rerouted to the TA-46 sanitary WWTP. The outfall was removed from the NPDES permit effective March 10, 1998.

AOC 46-004(e2) is the outfall from roof, floor, and sink drains in building 46-42 at TA 46. The outfall consists of a 4-in.-diameter pipe located approximately 50 ft northeast of building 46-42 at the head of a drainage ditch associated with SWMU 46-006(a). The outfall is located approximately 3 ft below the level of the asphalt pavement. Building 46-42 was constructed as an equipment checkout facility and contains electronics and robotics laboratories. Much of the effluent historically discharged from the outfall was blowdown and condensate. Hazardous materials might have been handled in historical machining operations, and solvents may be used in conjunction with the laboratories. In the mid-1990s, the floor and sink drains that discharged to this outfall either were removed from service or were rerouted to the sanitary sewer system. The outfall currently receives storm water only from building 46-42 roof drains.

Reevaluation of nature and extent will be completed under the supplemental investigation report for Upper Cañada del Buey Aggregate Area. It is anticipated this Site will be recommended for corrective action complete and will be eligible for a COC under the Consent Order after approval of the report by NMED. Detailed sampling results for each Site are presented in the Investigation Report for Upper Cañada del Buey Aggregate Area (LANL 2011b).

A-10.2 Storm Water Monitoring Results

SWMU 46-004(c2) and AOC 46-004(e2) are monitored within CDB-SMA-0.25. Following the installation of baseline control measures, a baseline storm water sample was collected on September 1, 2011. Analytical results from this sample yielded three TAL exceedances (Figure A-10.2-1):

- Aluminum concentration of 2310 µg/L (MTAL is 750 µg/L),
- Copper concentration of 11.2 µg/L (MTAL is 4.3 µg/L), and
- PCB concentration of 6 ng/L (ATAL is 0.6 ng/L).

Following the installation of enhanced control measures at CDB-SMA-0.25, corrective action storm water samples were collected on July 26, 2013, and September 10, 2013. Analytical results from these corrective action monitoring samples yielded four TAL exceedances:

- Copper concentrations of 15.2 µg/L and 15.2 µg/L (MTAL is 4.3 µg/L) and
- PCB concentration of 3 ng/L and 5 ng/L (ATAL is 0.6 ng/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-10.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

CDB-SMA-0.25 is a 4.30-acre watershed that consists of 27% developed areas and 73% undeveloped areas. Developed areas consist of 3.16 acres of building rooftop and pavement. Undeveloped areas consist of 0.25 acres of bare soil and rock, and 0.89 acres of gambel oak brush (Figure A-10.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2011 and 2013 are between these two values.
- PCB—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for storm water containing sediments derived from Bandelier Tuff is 11.7 ng/L. The PCB result from 2011 and 2013 are less than both of these values.

A-10.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

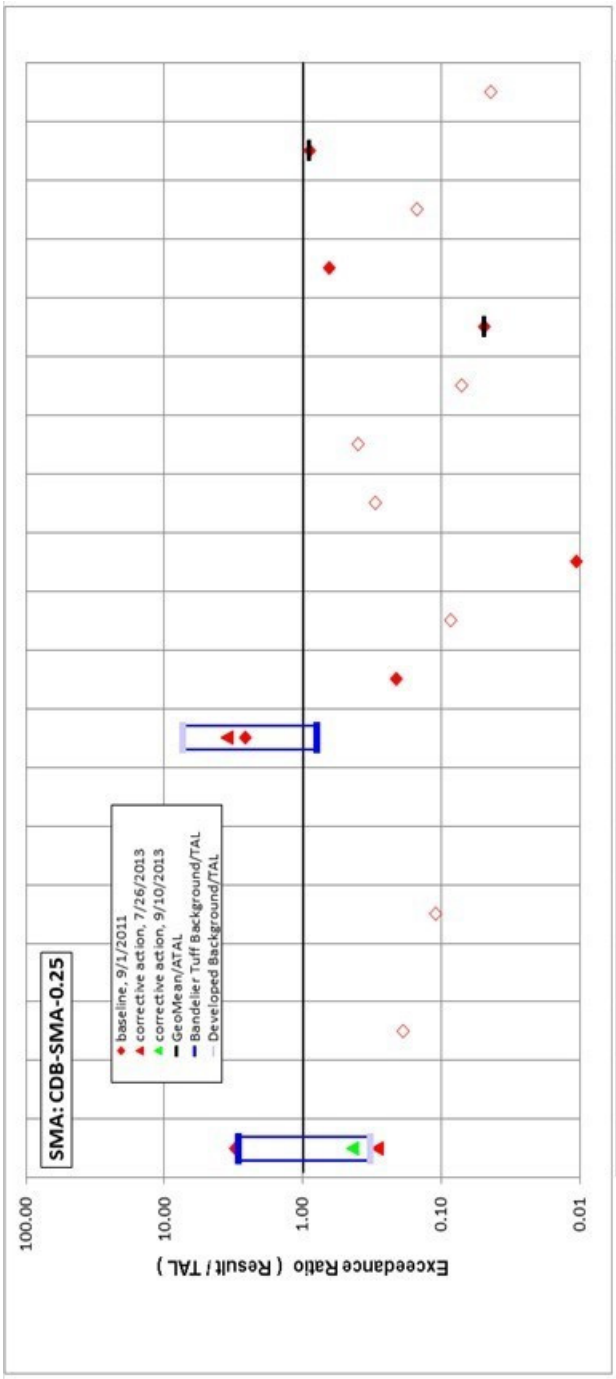
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 46-004(c2):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above the soil BV in shallow (i.e., less than 3 ft bgs) soil and tuff samples collected during the 2010 Consent Order investigation at the Site. Copper was detected above BV in 5 of 22 shallow samples with a maximum concentration 3.1 times the soil BV.
- PCBs are not known to have been associated with industrial materials historically managed at this Site. Two PCB mixtures (Aroclor-1254 and Aroclor-1260) were detected in shallow Consent Order samples. Aroclor-1254 was detected in 12 of 22 shallow samples with a maximum concentration 12% of the residential SSL. Aroclor-1260 was detected in 13 of 22 shallow samples with a maximum concentration 4% of the residential SSL.

AOC 46-004(e2):

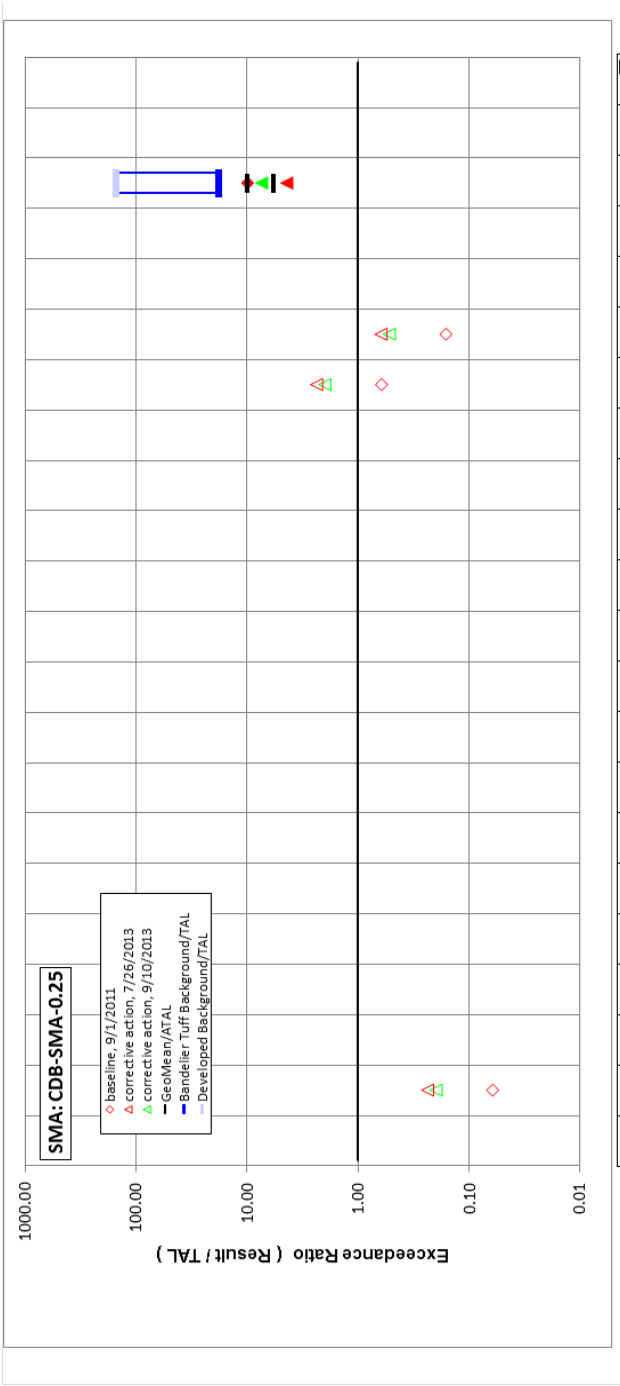
- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above soil and tuff BVs in shallow samples collected during the 2010 Consent Order investigation at the Site. Copper was detected above BV in 4 of 6 shallow samples with a maximum concentration 21 times the tuff BV.
- PCBs are not known to have been associated with industrial materials historically managed at this Site. Two PCB mixtures (Aroclor-1254 and Aroclor-1260) were detected in shallow Consent Order samples. Aroclor-1254 was detected in 5 of 6 shallow samples with a maximum concentration 10% of the residential SSL. Aroclor-1260 was detected in 5 of 6 shallow samples with a maximum concentration 4% of the residential SSL.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
9/10/2013 result	329	-	-	-	-	-	-	**15.2**	-	-	-	-	-	-	-	-	-	-	-
result / TAL	0.44	-	-	-	-	-	-	**3.5**	-	-	-	-	-	-	-	-	-	-	-
7/26/2013 result	218	-	-	-	-	-	-	**15.2**	-	-	-	-	-	-	-	-	-	-	-
result / TAL	0.29	-	-	-	-	-	-	**3.5**	-	-	-	-	-	-	-	-	-	-	-
9/1/2011 result	**2310**	3.8	*1.7*	16.6	*0.11*	*2*	2.5	**11.2**	3.6	*0.066*	1.8	*1.5*	*0.2*	*0.45*	4.9	27.1	*0.002*	13.4	*1.32*
result / TAL	**3.1**	0.0059	*0.19*	0.0033	*0.11*	*0.01*	0.0025	**2.6**	0.21	0.086	0.011	*0.3*	*0.4*	*0.071*	0.049	0.65	*0.15*	0.89	*0.044*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-10.2-1 TAL exceedance plot for CDB-SMA-0.25



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	**Hexachlorobenzene**	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	MQL	-	-	-	-	-	-	-	-	-	-	-	-	-	MQL	MTAL	-	-	ATAL	-	-
std value	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	5	19	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
9/10/2013 result	-	*1*	-	-	-	-	-	-	-	-	-	-	-	-	-	*10*	*10*	-	-	**0.005**	-	-
result / TAL	-	*0.2*	-	-	-	-	-	-	-	-	-	-	-	-	-	***2***	*0.53*	-	-	***7.4***	-	-
7/26/2013 result	-	*1.19*	-	-	-	-	-	-	-	-	-	-	-	-	-	***11.9***	*11.9*	-	-	**0.003**	-	-
result / TAL	-	*0.24*	-	-	-	-	-	-	-	-	-	-	-	-	-	***2.4***	*0.63*	-	-	***4.4***	-	-
9/1/2011 result	-	*0.309*	-	-	-	-	-	-	-	-	-	-	-	-	-	*3.09*	*3.09*	-	-	**0.006**	-	-
result / TAL	-	*0.062*	-	-	-	-	-	-	-	-	-	-	-	-	-	*0.62*	*0.16*	-	-	***9.9***	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; " - " is used if no analytical results were available.

Figure A-10.2-1 (continued) TAL exceedance plot for CDB-SMA-0.25

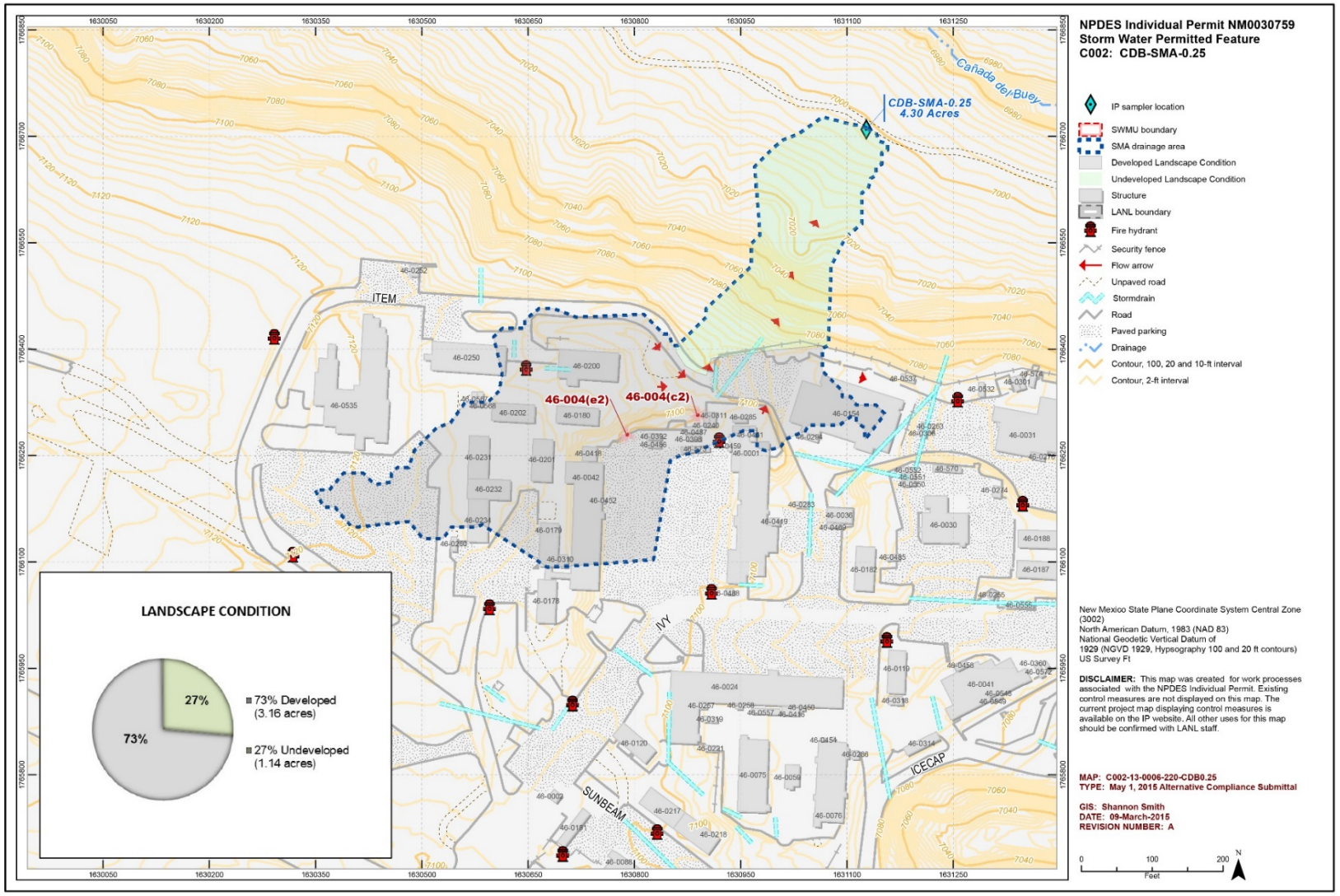


Figure A-10.3-1 SMA map for CDB-SMA-0.25

A-11.0 CDB-SMA-0.55

A-11.1 Site Description

CDB-SMA-0.55, located in the Sandia/Mortandad watershed, includes SWMUs 46-004(g), 46-004(s), and 46-006(f). SWMU 46-004(g) consists of an area of potential surface soil contamination associated with radionuclide exhaust emissions from stacks on building 46-1 and an inactive outfall from an industrial drainline in building 46-1 at TA 46. Work in building 46-1 that generated exhaust emissions involved the baking and high-temperature testing of fuel rods. The outfall component of SWMU 46-004(g) consists of an inactive 12-in.-diameter VCP industrial drain that received effluent from floor and roof drains within the central portion of building 46-1 and discharged into Cañada del Buey north of building 46-154. Building 46-1 housed offices, two assembly bays, a machine shop, several laboratories for the assembly and checkout of electrical components, general laboratories, and a uranium polishing area. In 1996 and 1997, the floor drains that discharged to this outfall were either removed from service or were rerouted to the TA-46 WWTP. Roof drains from building 46-1 that discharged to this outfall were rerouted to the storm water drain system in 1996.

SWMU 46-004(s) consists of an outfall located approximately 20 ft south of building 46-1 at TA-46. The outfall consists of a 4-in.-diameter cast-iron pipe that discharged to a drainage ditch (SWMU 46-007) on the south side of building 46-1. The drainage ditch leads to a storm drain culvert that discharges into Cañada del Buey. The outfall received effluent from floor and roof drains of the south high bay in building 46-1. Building 46-1 housed offices, two assembly bays, a machine shop, several laboratories for the assembly and checkout of electrical components, general laboratories, and a uranium-polishing area. In 1995, all floor drains in the south high bay of building 46-1 either were plugged or were rerouted to the Sanitary Wastewater Systems Consolidation (SWSC) plant. Currently, roof drains from the south high bay discharge to the storm drainage system and/or daylight near building 46-1, and the building has been deactivated.

The Cerro Grande fire of 2000 burned moderately to severely in the vicinity of this SWMU. As a result of the fire, the vegetative ground cover and canopy were mostly destroyed. Wattles were installed on slopes within the drainages, and rock check dams were placed in the main drainages to dissipate storm water run-on from upslope locations. The lower portion of the sloped area was hand raked, re-seeded with native grasses, and mulched with straw. The upper portion of the sloped area was hydromulched from above. An earthen base-course berm was installed along the fire road at the toe of the slope to provide additional protection from sediment migration.

SWMU 46-006(f) consists of a former storage shed (former building 46-36) that was located approximately 50 ft east of building 46-1. The 20- × 30-ft metal storage shed was constructed in 1955; the floor of the storage shed was paved and situated approximately 6 to 8 in. belowgrade. The area around the former storage shed was also used as a storage area as well as a staging area for equipment and materials awaiting disposal, and an unloading area for new equipment. Stored materials may have included oils (possibly containing PCBs), alkali metals, asbestos-containing products, beryllium alloys, potassium dichromate, lead bricks, lead shot, and mercury. Because the floor of building 46-36 was belowgrade, flooding of the storage shed occurred during significant precipitation events. The surrounding area slopes north to a storm drain culvert that discharges into Cañada del Buey. The shed and foundation were removed in 2013; waste characterization sampling data from the building foundation showed no detected PCBs.

Phase I Consent Order sampling at SWMUs 46-004(g), 46-004(s), and 46-006(f) is complete. SWMUs 46-004(g), 46-004(s), and 46-006(f) are expected to be eligible for COCs under the Consent Order after submittal and approval of the supplemental investigation report for Upper Cañada del Buey Aggregate Area. Detailed sampling results for each Site are presented in the Investigation Report for Upper Cañada del Buey Aggregate Area (LANL 2011b).

A-11.2 Storm Water Monitoring Results

SWMUs 46-004(g), 46-004(s), and 46-006(f) are monitored within CDB-SMA-0.55. Following the installation of baseline control measures, a baseline storm water sample was collected on September 13, 2013. Analytical results from this sample yielded two TAL exceedances (Figure A-11.2-1):

- Copper concentration of 16.3 µg/L (MTAL is 4.3 µg/L), and
- PCB concentration of 0.7 ng/L (ATAL is 0.6 ng/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites.

A-11.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

CDB-SMA-0.55 is a 4.64-acre watershed that consists of 38% developed areas and 62% undeveloped areas. Developed areas consist of 2.88 acres of building rooftop and pavement. Undeveloped areas consist of 1.76 acres of gambel oak brush (Figure A-11.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

Monitoring location CDB-SMA-0.55 receives storm water run-on from developed environments, including paved parking lots, roads, and buildings, as well as landscapes containing sediment derived from Bandelier Tuff. Metals including copper are associated with building materials, parking lots, and automobiles.

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2013 is between these two values.
- PCBs—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for background storm water containing sediment derived from Bandelier Tuff is 11.7 ng/L. The PCB result from 2013 is less than both of these values.

A-11.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 46-004(g):

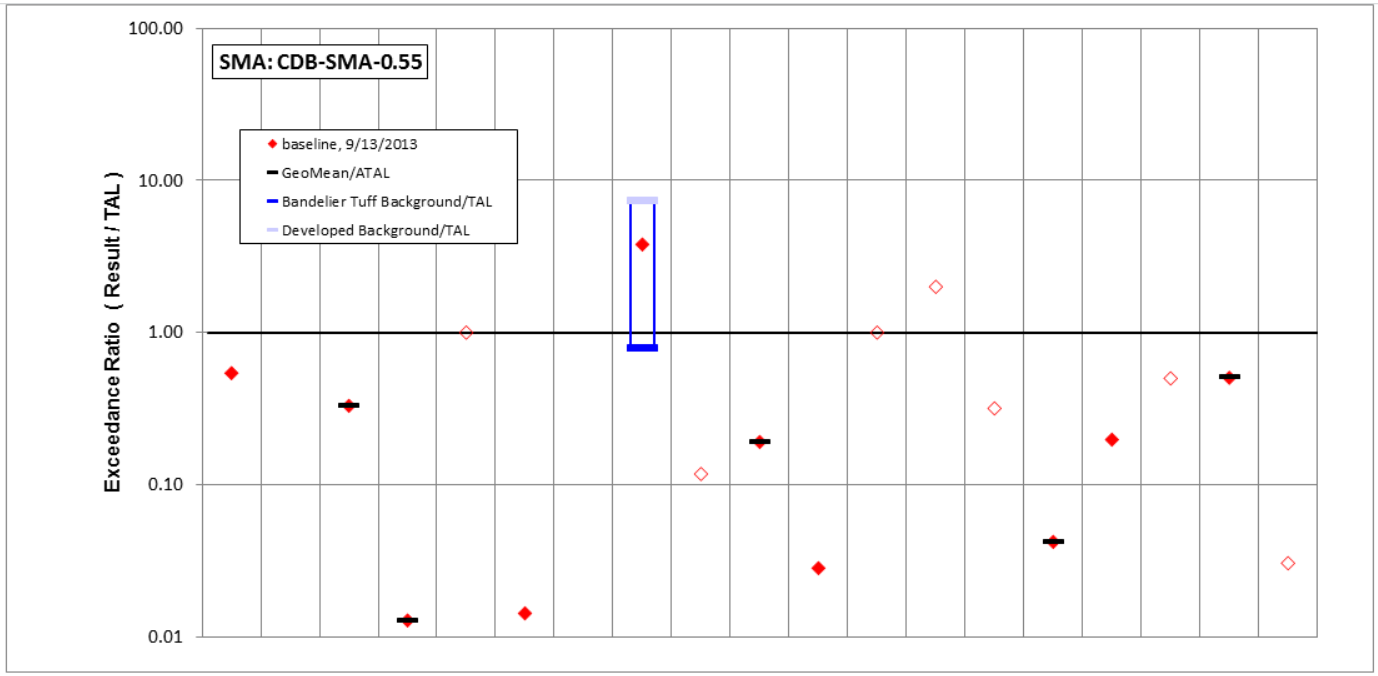
- Copper is not known to have been associated with industrial materials historically managed at the Site. Copper was detected above BVs in 7 of 16 shallow (i.e., less than 3 ft bgs) 2010 Consent Order soil and tuff samples at a maximum concentration 13 times the soil BV.
- PCBs are not known to be associated with industrial materials historically managed at this Site. Two PCB mixtures (Aroclor-1254 and Aroclor-1260) were detected in shallow Consent Order samples. Aroclor-1254 was detected in 6 of 16 shallow samples and Aroclor-1260 was detected in 3 of 16 shallow samples with maximum concentrations 10.7% and 0.96% of the residential SSLs, respectively.

SWMU 46-004(s):

- Copper is not known to have been associated with industrial materials historically managed at the Site. Copper was detected above BVs in 2 of 4 shallow 2010 Consent Order soil and tuff samples at a maximum concentration 40 times the tuff BV. This sample was collected upgradient of the outfall, however, and likely reflects contributions from other industrial sources within TA-46. Copper detected below the outfall decreased to 1.2 times the soil BV.
- PCBs are not known to be associated with industrial materials historically managed at this Site. Two PCB mixtures (Aroclor-1254 and Aroclor-1260) were detected in shallow Consent Order samples. Aroclor-1254 was detected in 2 of 4 shallow samples and Aroclor-1260 was detected in 1 of 4 shallow samples with maximum concentrations 3% and 0.6% of the residential SSLs, respectively.

SWMU 46-006(f):

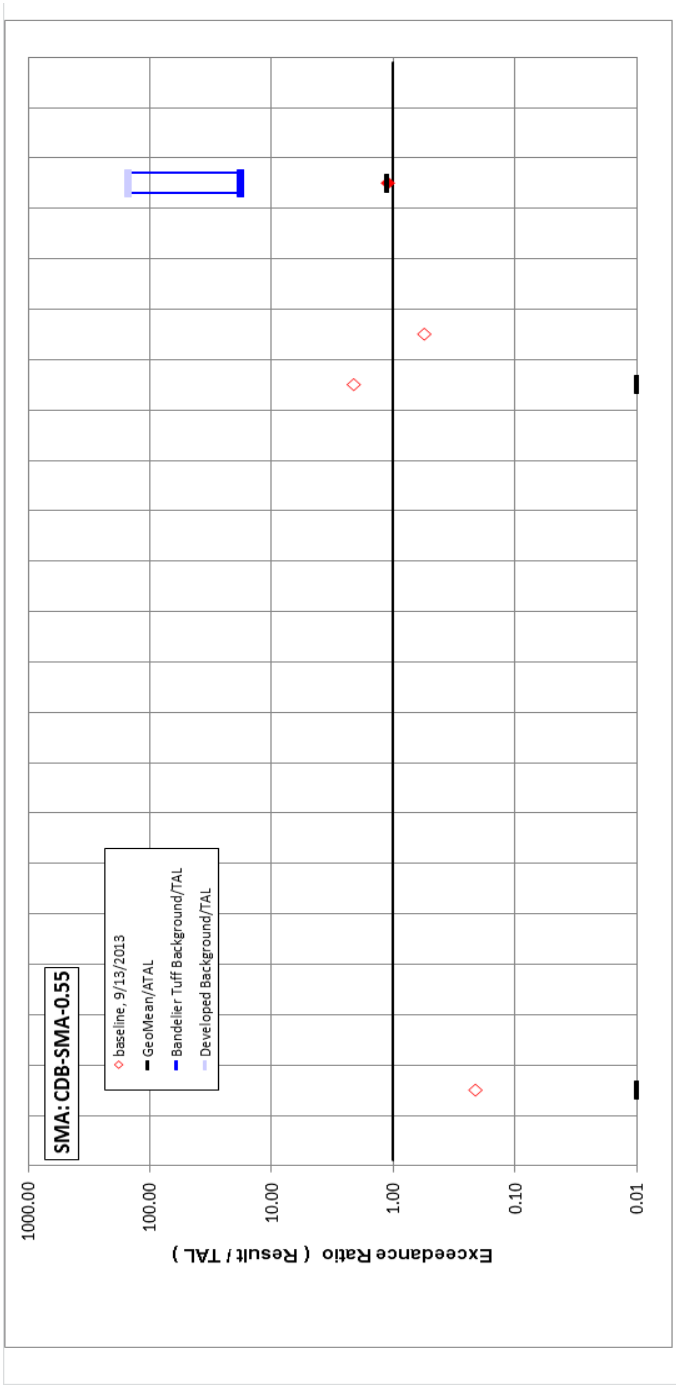
- Copper is not known to have been associated with industrial materials historically managed at the Site. Copper was not detected above soil or tuff BVs in any of the 8 shallow 2010 Consent Order soil and tuff samples.
- PCBs are not known to be associated with industrial materials historically managed at this Site. One PCB mixture (Aroclor-1254) was detected in 1 of 8 shallow samples at a maximum concentration 6.5% of the residential SSL.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
9/13/2013 result	406	1.34	2.97	64.1	*1*	3	*5*	**16.3**	*2*	0.147	4.81	*5*	***1***	*2*	4.21	8.31	*0.005*	7.57	*0.915*
result / TAL	0.54	0.0021	0.33	0.013	*1*	0.014	*0.005*	**3.8**	*0.12*	0.19	0.028	*1*	***2***	*0.32*	0.042	0.2	*0.5*	0.5	*0.031*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-11.2-1 TAL exceedance plot for CDB-SMA-0.55



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	**Hexachlorobenzene**	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	MQL	-	-	-	-	-	-	-	-	-	-	-	-	-	MQL	MTAL	-	-	ATAL	-	-
std value	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	5	19	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
9/13/2013 result	-	*1.06*	-	-	-	-	-	-	-	-	-	-	-	-	-	***10.6***	*10.6*	-	-	***7E-04***	-	-
result / TAL	-	*0.21*	-	-	-	-	-	-	-	-	-	-	-	-	-	***2.1***	*0.56*	-	-	***1.1***	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-11.2-1 (continued) TAL exceedance plot for CDB-SMA-0.55

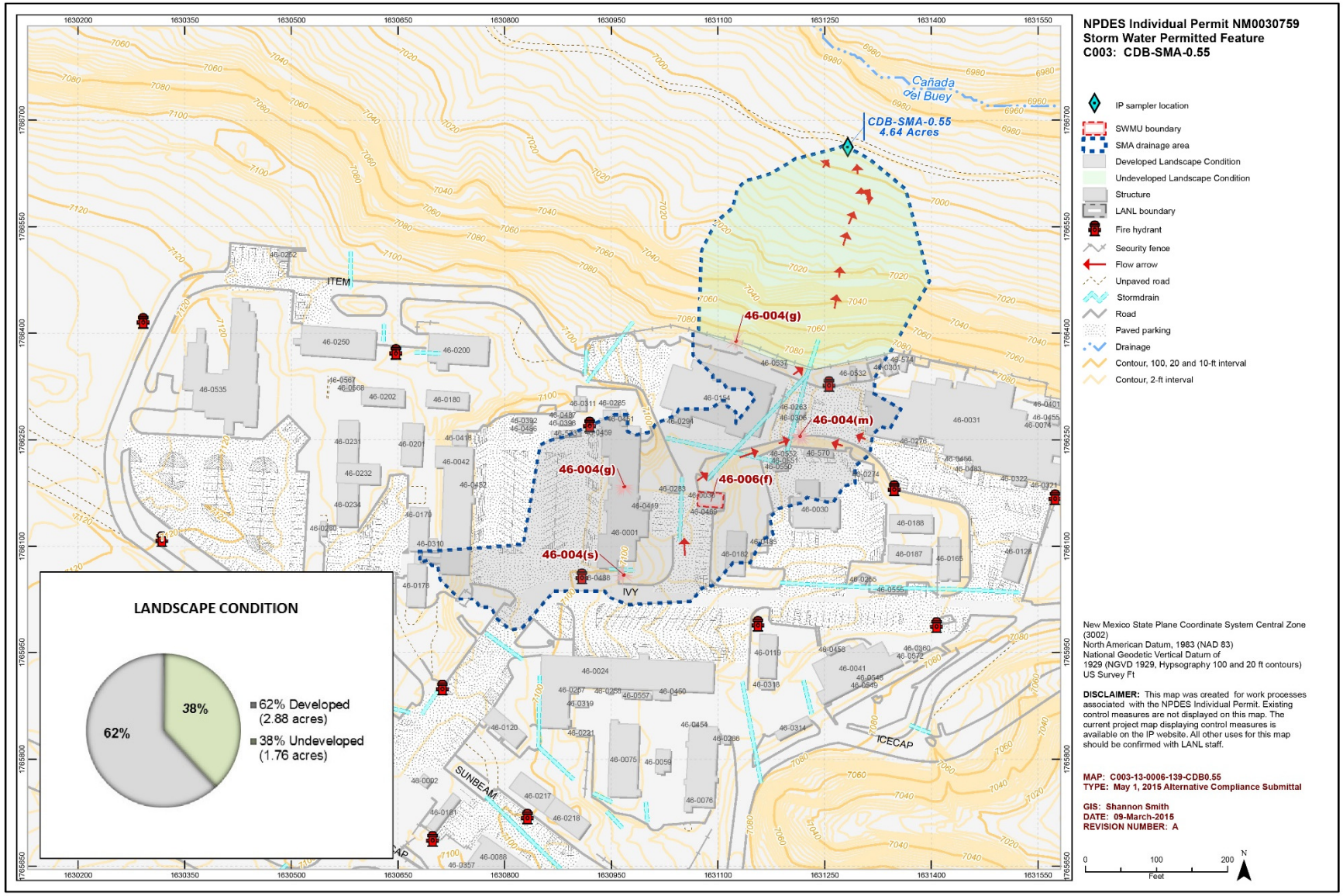


Figure A-11.3-1 SMA map for CDB-SMA-0.55

A-12.0 CDV-SMA-8

A-12.1 Site Description

CDV-SMA-8, located in the Water/Cañon de Valle watershed, includes SWMU 15-011(c), a purported dry well located west of the former electron gun building (15-194) near the edge of Cañon de Valle. Engineering drawing C-19082 depicts the dry well design and location; however, the drawing is not an as-built, and it is likely the dry well was never constructed. The Operable Unit 1086 RFI work plan states that no evidence of the dry well was found at the time the work plan was prepared and concludes that effluent from the building was discharged directly to the canyon via the drainage located north and west of the former Hollow buildings. This conclusion is consistent with the CEARP report and the SWMU report.

This effluent consisted of the discharge from two acid-cleaning sinks within former building 15-50. The sinks were removed before 1986. Building 15-194 and 15-50 were decommissioned in the mid-1990s, sustained severe damage in the 2000 Cerro Grande fire, and were subsequently demolished in 2004. The 1996 RFI report for Sites within TA-15 describes the SWMU as the drainage located (north and) west of the Hollow, a collection of buildings at TA-15; however, the drainage north and west of the former buildings 15-194 and 15-50 is SWMU 15-014(g).

Consent Order or other environmental investigations have not been performed at SWMU 15-011(c); no investigation data are available for this Site.

A-12.2 Storm Water Monitoring Results

SWMU 15-011(c) is monitored within CDV-SMA-8. Following the installation of baseline control measures, a baseline storm water sample was collected on July 31, 2014 (Figure A-12.2-1). Analytical results from this sample yielded two TAL exceedances:

- Aluminum concentration of 1360 µg/L (MTAL is 750 µg/L) and
- Gross-alpha activity of 53.4 pCi/L (ATAL is 15 pCi/L).

These 2014 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-12.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

CDV-SMA-8 is a 24.32-acre watershed that consists of 6% developed areas and 94% undeveloped areas. Developed areas consist of 1.45 acres of pavement. Undeveloped areas consist of 4.75 acres of oak brush, 6 acres of ponderosa woodland, and 12.12 acres of grassland (Figure A-12.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

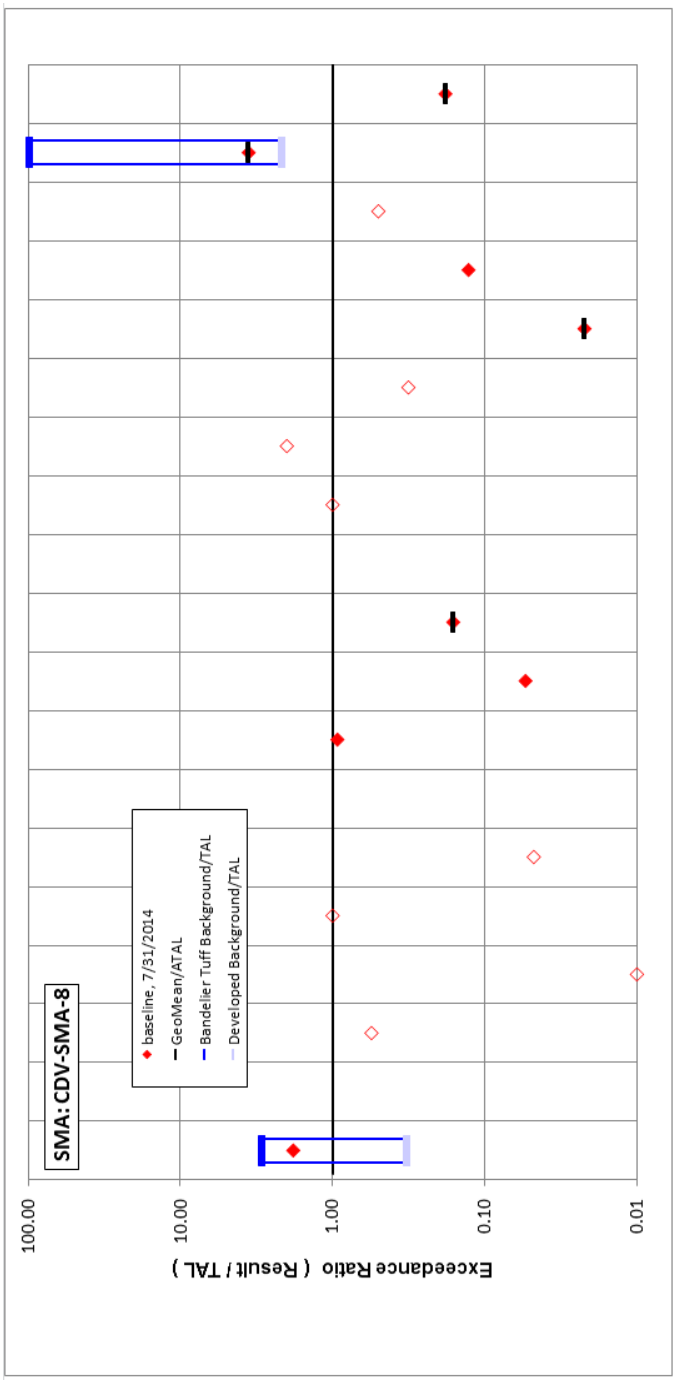
- Aluminum—The aluminum UTL from developed urban landscape storm water run-on is 245 µg/L; aluminum UTL for background storm water containing sediment derived from Bandelier Tuff is 2210 µg/L. The aluminum result from 2014 is between these values.
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2014 gross-alpha result is between these two values.

A-12.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 15-011(c):

- Aluminum is not known to be associated with industrial materials historically managed at the Site. No investigation data are available for SWMU 15-011(c).
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/31/2014 result	**1360**	3	5	*50*	*1*	*10*	2.22	4	0.917	0.124	1.42	5	***1***	2	2.21	5.37	*0.005*	**53.4**	5.44
result / TAL	**1.8**	*0.005*	*0.56*	*0.01*	*1*	*0.048*	0.0022	0.93	0.054	0.16	0.0084	*1*	***2***	*0.32*	0.022	0.13	*0.5*	**3.6**	0.18

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-12.2-1 TAL exceedance plot for CDV-SMA-8

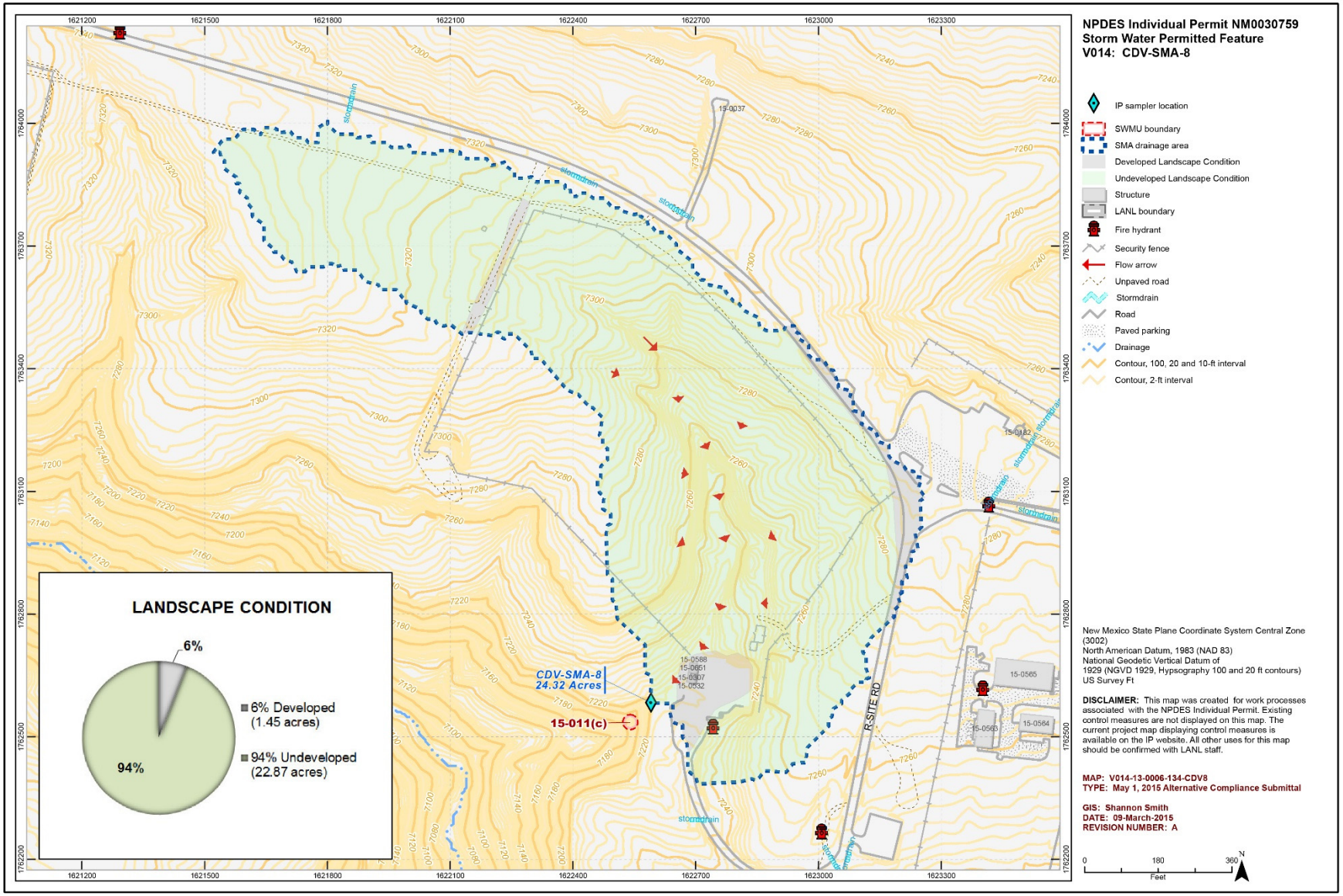


Figure A-12.3-1 SMA map for CDV-SMA-8

A-13.0 CHQ-SMA-2

A-13.1 Site Description

CHQ-SMA-2, located in the Ancho/Chaquehui watershed, includes SWMUs 33-004(d) and 33-007(c) and AOC C-33-003. SWMU 33-004(d) consists of an active septic tank (structure 33-121) and associated drainline and drain field located in TA-33, Area 6. Septic tank 33-121 is located approximately 50 ft southeast of building 33-1. Building 33-1 was used from 1948 to 1955 to support nonexplosive initiator tests conducted at Area 6. After 1955, building 33-1 was used as office space and for storage until use of the building was discontinued in 1991. A 1993 study of drains and discharges at TA-33 identified the only discharges to the septic system were from a lavatory, toilet, and sink drain. Although the building was removed from the Site in 1994, the septic tank is still in place. The septic tank is constructed of corrugated iron and has a capacity of 500 gal. Septic tank 33-121 received wastewater from a toilet and sink in a laboratory building (33-1). While building 33-1 was in use, effluent was discharged from the septic tank to a drain field located approximately 20 ft east of the tank. The drain field is constructed of a single row of vitrified-clay tiles installed in gravel approximately 5 ft belowgrade. In addition, the RFI work plan stated that there is a buried outfall from the drain field in a side wash of Chaquehui Canyon. Land surface at the tank location slopes east approximately 200 ft to a shallow drainage eroded into the bedrock that flows south.

SWMU 33-004(d) is included in the Consent Order as part of the Chaquehui Canyon Aggregate Area. Consent Order investigations for this aggregate area have not yet begun. The investigation work plan for Chaquehui Canyon Aggregate Area was approved in March 2011. No decision-level data are available for SWMU 33-004(d). However, screening-level data are available from samples collected during the 1993 RFI. Detailed sampling results are presented in the Historical Investigation Report for Chaquehui Canyon Aggregate Area (LANL 2009).

AOC C-33-003 consists of two former fill areas located at Main Site in TA-33. Fill was placed in these areas to provide level sites for portable trailers. One of the trailers (structure 33-169) was installed next to the Main Site water tower. The filled area to accommodate trailer 33-169 is approximately 100 × 100 × 4 ft deep. The other trailer (structure 33-170) was installed north of building 33-114. The filled area to accommodate trailer 33-170 is approximately 70 × 90 × 7 ft deep. Both trailers were installed in January 1984 and removed in June 1988. After the trailers were removed, no further improvements were made to these Sites. Three projectiles, one of which contained uranium, were discovered at the fill area near the water tower during brush-clearing activities conducted during the spring of 1996. The source of these projectiles appears to have been the fill material, which was obtained from the cinder cone located in Area 6, just west of Main Site. Projectiles historically were fired into catcher boxes at the base of the cinder cone during experiments conducted at the Area 6 firing area [SWMU 33-007(c)].

During a 1999 VCA, fill material was excavated until native soil or tuff was encountered. A total of 408.5 yd^3 of fill material was excavated. Radiation surveys of the excavated areas showed no readings greater than 2 times local background. Confirmation samples verified cleanup levels were achieved. The excavated material was transported to a Segmented Gate System treatment plant, where radioactive materials were separated from the fill and disposed of. A total of 1.45 yd^3 of contaminated fill was separated and disposed of as low-level waste. Treated fill samples verified cleanup levels were achieved. The decontaminated fill was returned to the Site and the Site was restored and revegetated.

Consent Order sampling has not been conducted at AOC C-33-003; however, decision-level data are available for the Site from samples collected following the 1996 VCA. Detailed sampling results are presented in the Historical Investigation Report for Chaquehui Canyon Aggregate Area (LANL 2009).

SWMU 33-007(c) consists of abandoned firing sites associated with the initiator tests conducted at Area 6, this Site is also an historical industrial activity associated with this SMA. This Site is planned for evaluation of corrective action alternatives and is not part of this alternative compliance request.

A-13.2 Storm Water Monitoring Results

SWMUs 33-004(d) and AOC C-33-003 are monitored within CHQ-SMA-2. Following the installation of baseline control measures, a baseline storm water sample was collected on July 4, 2012. Analytical results from this sample yielded three TAL exceedances (Figure A-13.2-1):

- Aluminum concentration of 967 µg/L (MTAL is 750 µg/L),
- Copper concentration of 6.75 µg/L (MTAL is 4.3 µg/L), and
- Gross-alpha activity of 91.2 pCi/L (ATAL is 15 pCi/L).

These 2012 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites.

A-13.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

CHQ-SMA-2 is a 12.95-acre watershed that consists of 15% developed areas and 85% undeveloped areas. Developed areas consist of 0.06 acres of building rooftop, 1.21 acres of gravel, and 0.67 acres of pavement. Undeveloped areas consist of 0.60 acres of bare soil, 10.18 acres of piñon and juniper woodland, and 0.23 acres of grassland (Figure A-13.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA). The SMA area has recently been increased from 12.36 acres to 12.95 acres to include additional drainage area in the northwest corner of the SMA. This additional area is from the presence of a culvert in the paved access road that crosses the northern half of the SMA in an east to west orientation.

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

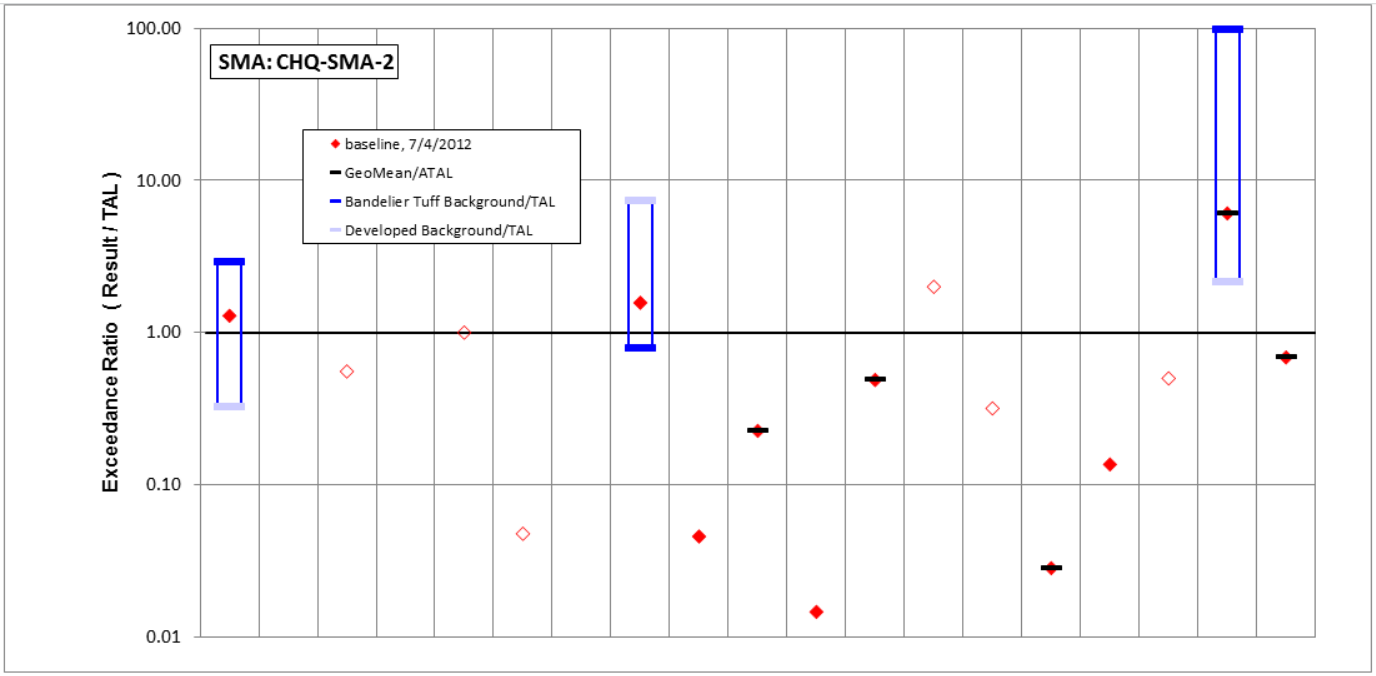
- Aluminum—The aluminum UTL for storm water containing sediments derived from Bandelier Tuff is 2210 µg/L; the result from 2012 is less than this value.
- Copper—The copper UTL for storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L; the result from 2012 is greater than this value.
- Gross alpha—The gross-alpha UTL for storm water containing sediments derived from Bandelier Tuff is 1490 pCi/L; the result from 2012 is less than this value.

A-13.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 33-004(d):

- Aluminum is not known to be associated with industrial materials historically managed at the Site. RFI samples collected at the Site were analyzed for toxicity characterization leaching procedure (TCLP) metals rather than total metals; therefore, aluminum was not an analyte.
- Copper is not known to be associated with industrial materials historically managed at the Site. RFI samples collected at the Site were analyzed for TCLP metals rather than total metals; therefore, copper was not an analyte.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/4/2012 result	**967**	*3*	*5*	20.3	*1*	*10*	3.69	**6.75**	0.777	0.174	2.48	2.44	***1***	*2*	2.83	5.71	*0.005*	**91.1**	20.6
result / TAL	**1.3**	*0.005*	*0.56*	0.0041	*1*	*0.048*	0.0037	**1.6**	0.046	0.23	0.015	0.49	***2***	*0.32*	0.028	0.14	*0.5*	**6.1**	0.69

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-13.2-1 TAL exceedance plot for CHQ-SMA-2

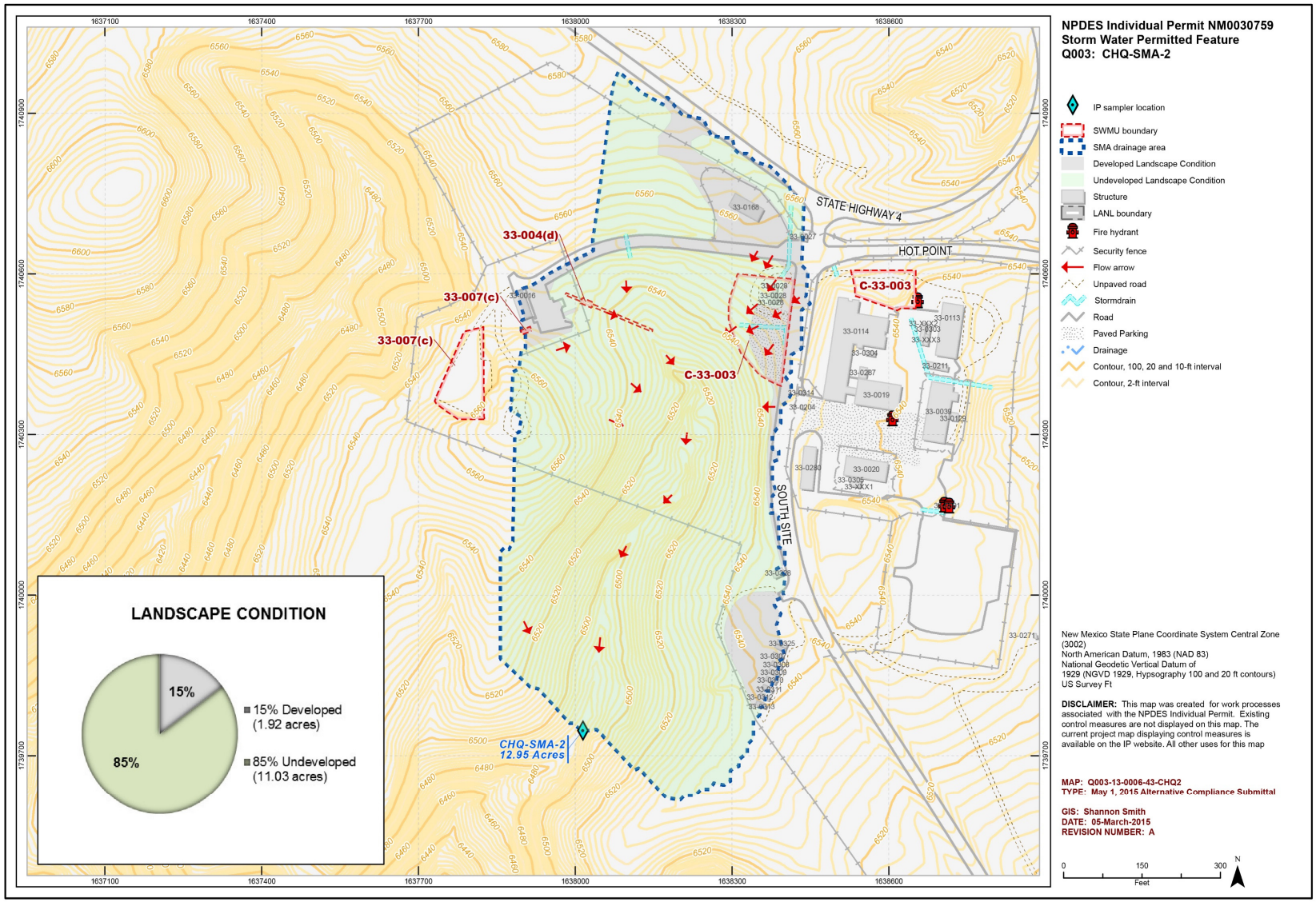


Figure A-13.3-1 SMA map for CHQ-SMA-2

A-14.0 DP-SMA-0.4

A-14.1 Site Description

DP-SMA-0.4, located in the Los Alamos/Pueblo watershed, includes SWMU 21-021, surface soil contamination resulting from emissions from stacks throughout TA-21. The estimated area of soil contamination is approximately 300,000 m^2 and overlaps all of TA-21, a developed industrial area. Radionuclides were known to have been released from stacks throughout TA-21. There is no documentation of nonradioactive chemical releases associated with historical TA-21 stack emissions.

SWMU 21-021 was investigated before the Consent Order went into effect in 2005 and was recommended for no further action. NMED approved the DP Site Aggregate Area investigation work plan, which indicated the investigation of SWMU 21-021 was complete and no additional investigations were required. Because SWMU 21-021 overlies all other SWMUs and AOCs within TA-21, a request for a COC is not expected to be made until investigation of all other TA-21 Sites is complete. Detailed sampling results are presented in the Phase Report 1B for TA-21, Operable Unit 1106, RCRA Facility Investigation: Operable Unit-Wide Surface Soil, Deposition Layer and Filter Building Investigation (LANL 1994).

A-14.2 Storm Water Monitoring Results

SWMU 21-021 is monitored within DP-SMA-0.4. Following the installation of baseline control measures, a baseline storm water sample was collected on September 13, 2013. Analytical results from this sample yielded two TAL exceedances (Figure A-14.2-1):

- Aluminum concentration of 3540 µg/L (MTAL is 750 µg/L) and
- Copper concentrations of 10.7 µg/L (MTAL is 4.3 µg/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-14.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

Site DP-SMA-0.4 is a 0.21-acre watershed that consists of 8% developed areas and 92% undeveloped areas. Developed areas consist of 0.02 acres of pavement. Undeveloped areas consist of 0.06 acres of ponderosa woodland and 0.13 acres of grassland (Figure A-14.3-1 shows the SMA map with the percentage of developed and undeveloped areas shown within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Aluminum—The aluminum UTL from developed urban landscape storm water run-on is 245 µg/L; the aluminum UTL for background storm water containing sediment derived from Bandelier Tuff is 2210 µg/L. The aluminum result from 2013 is greater than both of these values.
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2013 is between these two values.

The range of BVs for aluminum presented in the report entitled “Background Metals Concentrations and Radioactivity in Storm Water on the Pajarito Plateau, Northern New Mexico” (the Background Report) (LANL 2013):

- Reference area dissolved (filtered) aluminum minimum 79.7 µg/L to maximum 2620 µg/L, UTL 2210 µg/L.
- Western boundary dissolved (filtered) aluminum minimum 81.5 µg/L to maximum 1560 µg/L, UTL 1780 µg/L /L.
- Urban dissolved (filtered) aluminum minimum 10.7 µg/L to maximum 309 µg/L, UTL 245 µg/L.

An outlier of 4290 µg/L was removed from the background data set using the process described in the Background Report (LANL 2013).

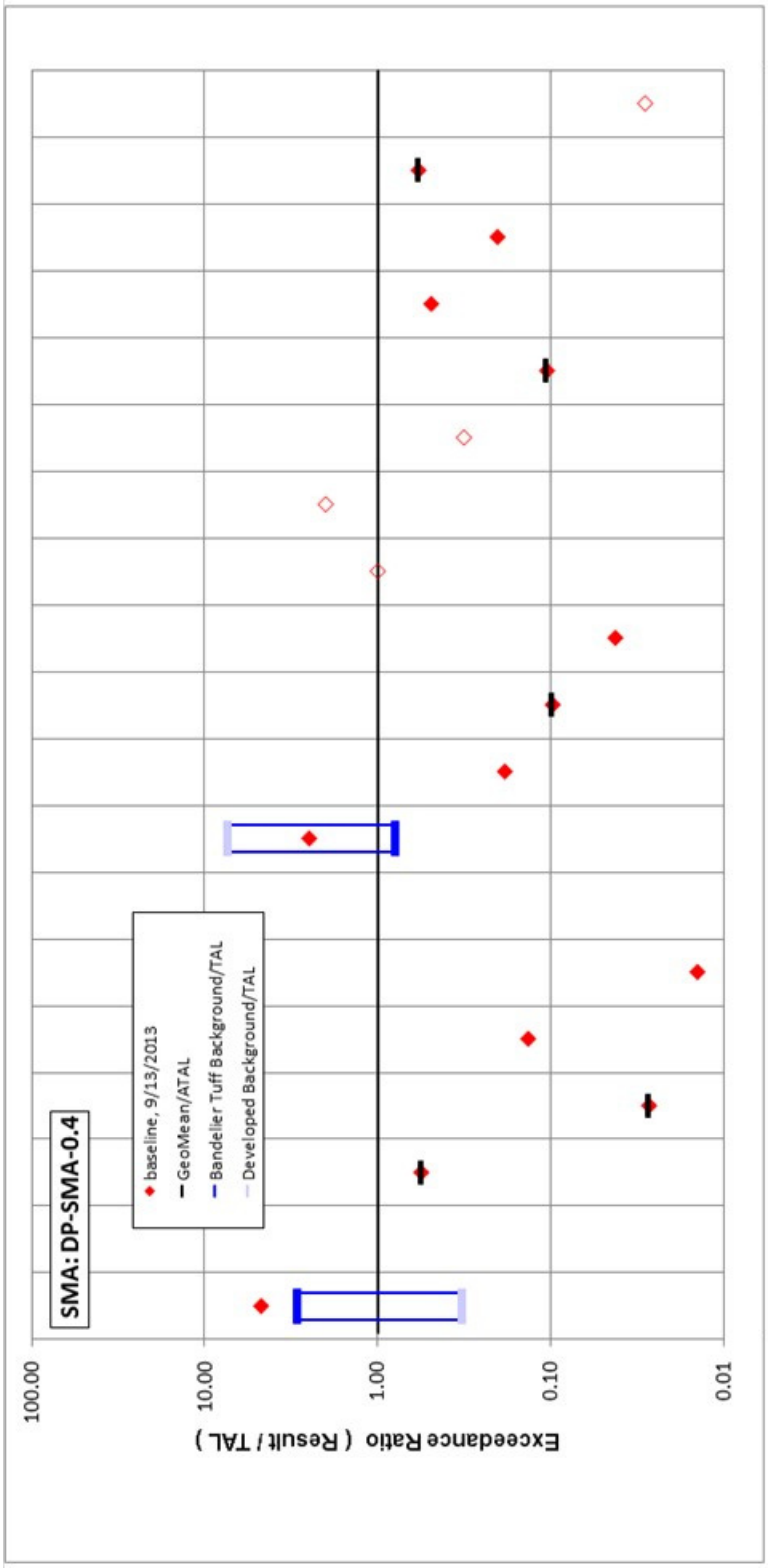
A-14.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 21-021:

- Aluminum is not known to be associated with industrial materials historically managed at the Site. Aluminum was not detected above BVs in any of the 3 shallow (i.e., less than 3 ft bgs) samples collected within the SMA boundary of DP-SMA-3 during the 1992 TA-21 RFI surface-wide soil investigation. Aluminum was detected above the BV in 2 of 85 shallow soil samples collected from one location during the 1992 TA-21 RFI at a maximum concentration 2.9 times the soil BV at a sampling location at the eastern end of the TA-21 mesa top, approximately one-half mile east of DP-SMA-0.4.
- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was not detected above BVs in any of the 3 shallow soil samples collected within the SMA boundary of DP-SMA-3 during the 1992 TA-21 RFI surface-wide soil investigation. Copper was detected above the BV in 6 of 155 shallow samples collected during the 1992 TA-21 RFI at a maximum concentration 9 times the soil BV at a sample location on the southern edge of the TA-21 mesa top near the east end of the mesa, approximately one-half mile from DP-SMA-0.4.

The Site history and lack of detections of TAL exceedance constituents within or near the SMA indicate the Site is not the source of the TAL exceedances.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
9/13/2013 result	**3540**	2.53	5.04	135	0.135	2.98	1.55	**10.7**	3.13	0.075	7.19	5	***1***	***2***	10.5	20.6	0.002	8.71	*0.854*
result / TAL	**4.7**	0.004	0.56	0.027	0.14	0.014	0.0016	**2.5**	0.18	0.097	0.042	*1*	***2***	*0.32*	0.1	0.49	0.2	0.58	*0.028*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-14.2-1 TAL exceedance plot for DP-SMA-0.4

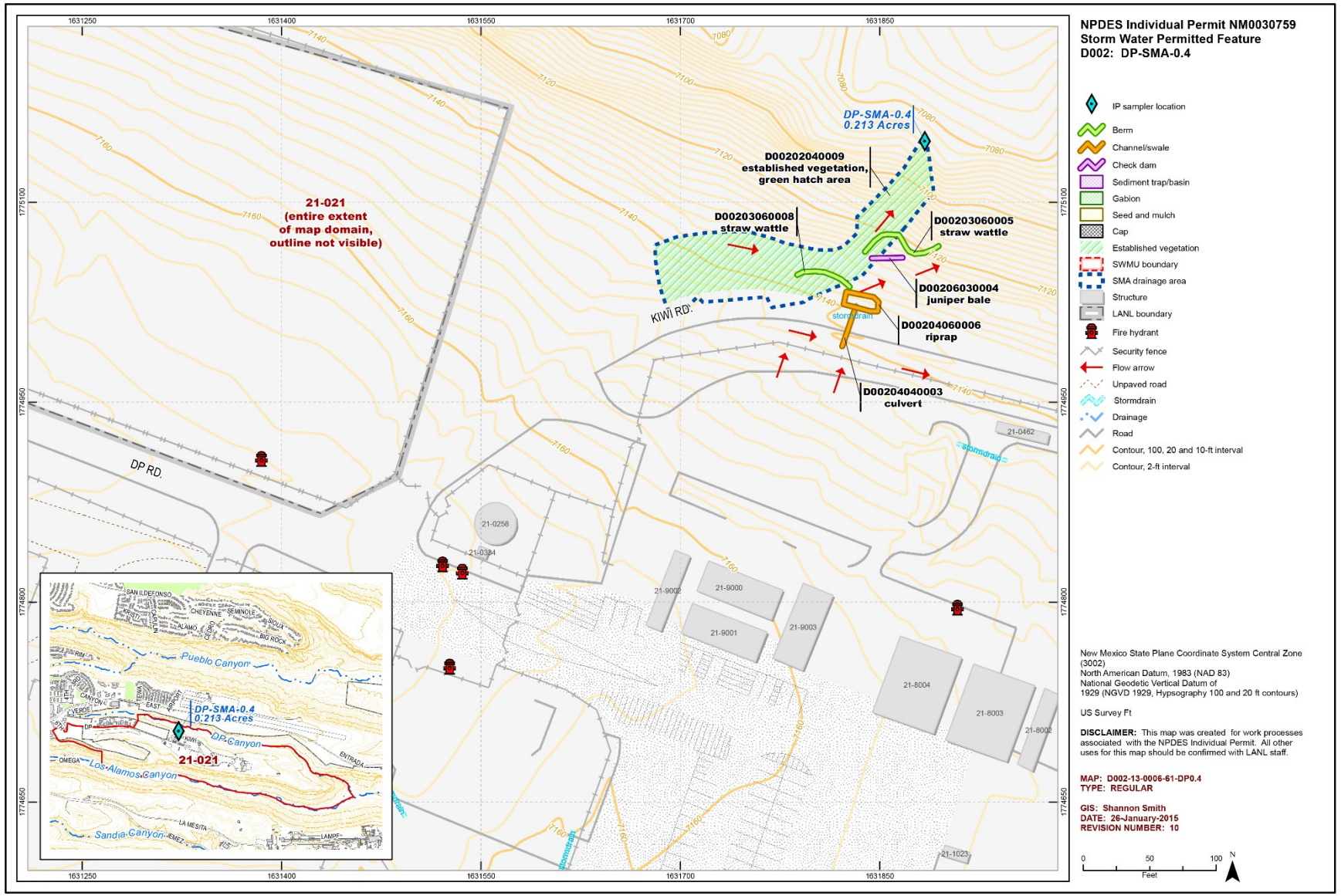


Figure A-14.3-1 SMA map for DP-SMA-0.4

A-15.0 LA-SMA-0.85

A-15.1 Site Description

LA-SMA-0.85, located in the Los Alamos/Pueblo watershed, includes SWMU 03-055(c), an outfall located northeast of the fire station (building 03-41). SWMU 03-055(c) channels storm water toward Los Alamos Canyon through a galvanized corrugated metal pipe (CMP). Previously, the storm drain was connected to the building 03-41 (fire station) floor drains until 1991 but currently collects and channels only storm water runoff from parking lots and paved roadways located in the northern portion of TA-03. In 1992, the storm water drainage channel into which the outfall flows was sampled by EM-8 as part of a reconnaissance survey associated with the construction of the Industrial Partnership Center at TA-03. The Site is currently an undeveloped wooded area on DOE property.

Consent Order sampling is complete for 03-055(c). Detailed sampling results are presented in the Investigation Report for Upper Los Alamos Canyon Aggregate Area (LANL 2010b).

A-15.2 Storm Water Monitoring Results

SWMU 03-055(c) is monitored within LA-SMA-0.85. Following the installation of baseline control measures, two baseline storm water samples were collected on July 30, 2011, and August 14, 2011. Analytical results from these samples yielded seven TAL exceedances (Figure A-15.2-1):

- Aluminum concentrations of 1310 µg/L and 4170 µg/L (MTAL is 750 µg/L),
- Copper concentrations of 18.9 µg/L and 47.1 µg/L (MTAL is 4.3 µg/L),
- Lead concentration of 17.7 µg/L (MTAL is 17 µg/L), and
- Zinc concentrations of 55.7 µg/L and 186 µg/L (MTAL is 42 µg/L).

Following the installation of enhanced control measures at LA-SMA-0.85, corrective action storm water samples were collected on November 9, 2012, and May 15, 2013. Analytical results from these corrective action monitoring samples yielded five TAL exceedances:

- Copper concentrations of 26.4 µg/L and 22.8 µg/L (MTAL is 4.3 µg/L),
- Zinc concentrations of 56.1 µg/L and 78.2 µg/L (MTAL is 42 µg/L), and
- Gross-alpha activity of 22.9 pCi/L (ATAL is 15 pCi/L).

These 2012 and 2013 TAL exceedances for copper and zinc are the subject of the alternative compliance request for this SMA/Site. A second corrective action sample had a gross-alpha activity of 9.1 pCi/L, resulting in a geometric mean of 14.4 pCi/L, which is less than the ATAL. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-15.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

LA-SMA-0.85 is a 4.09-acre watershed that consists of 7% developed areas and 93% undeveloped areas. Developed areas consist of 3.82 acres of pavement. Undeveloped areas consist of 0.27 acres of grassland (Figure A-15.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

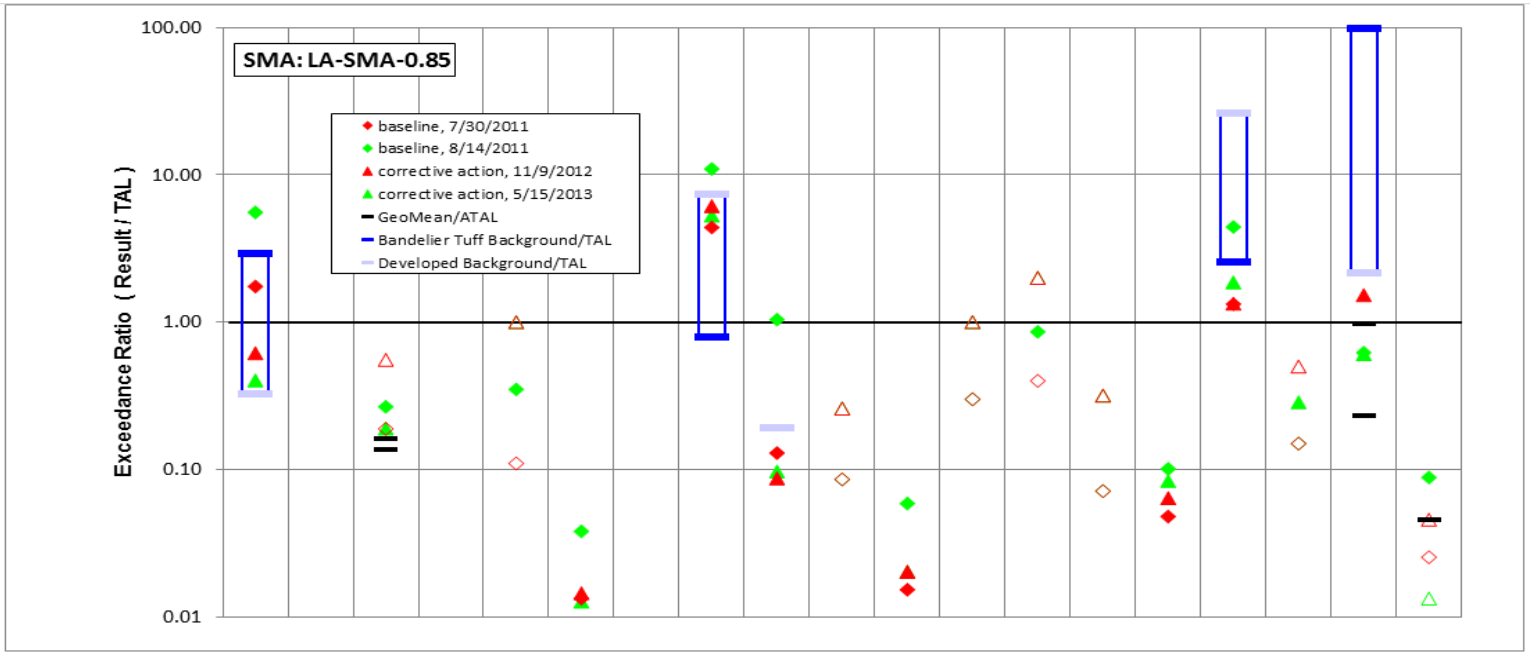
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper results from the 2012 and 2013 corrective action samples are between these two values.
- Zinc—The zinc UTL from developed urban landscape storm water run-on is 1120 µg/L; the zinc UTL for background storm water containing sediment derived from Bandelier Tuff is 109 µg/L. The zinc results from the 2012 and 2013 corrective action samples are less than both of these values.
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The gross-alpha result from the 2012 corrective action sample is less than both of these values.

A-15.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 03-055(c):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above the sediment BV in 2 of 18 shallow (i.e., less than 3 ft bgs) Consent Order samples with a maximum concentration 1.4 times the BV.
- Zinc is not known to be associated with industrial materials historically managed at the Site. Zinc was detected above the sediment BV in 13 of 18 shallow Consent Order samples with a maximum concentration of 5 times the BV.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
5/15/2013 result	302	*3*	1.71	26.4	*1*	2.67	3.35	**22.8**	1.65	*0.2*	3.44	*5*	***1***	*2*	8.37	**78.2**	0.0029	9.1	*0.4*
result / TAL	0.4	*0.005*	0.19	0.0053	*1*	0.013	0.0034	**5.3**	0.097	*0.26*	0.02	*1*	***2***	*0.32*	0.084	**1.9**	0.29	0.61	*0.013*
11/9/2012 result	462	1.28	*5*	28.4	*1*	3.04	1.73	**26.4**	1.48	*0.2*	3.44	*5*	***1***	*2*	6.4	**56.1**	*0.005*	**22.9**	*1.37*
result / TAL	0.62	0.002	*0.56*	0.0057	*1*	0.014	0.0017	**6.1**	0.087	*0.26*	0.02	*1*	***2***	*0.32*	0.064	**1.3**	*0.5*	**1.5**	*0.046*
8/14/2011 result	**4170**	*1*	2.4	49.6	0.35	8	3.8	**47.1**	**17.7**	*0.066*	10	*1.5*	0.43	*0.45*	10.1	**186**	*0.002*	9.32	2.65
result / TAL	**5.6**	*0.002*	0.27	0.0099	0.35	0.038	0.0038	**11**	**1**	*0.086*	0.059	*0.3*	0.86	*0.071*	0.1	**4.4**	*0.15*	0.62	0.088
7/30/2011 result	**1310**	*1*	*1.7*	22.3	*0.11*	2.8	1.4	**18.9**	2.2	*0.066*	2.6	*1.5*	*0.2*	*0.45*	4.8	**55.7**	*0.002*	*0.125*	*0.762*
result / TAL	**1.7**	*0.002*	*0.19*	0.0045	*0.11*	0.013	0.0014	**4.4**	0.13	*0.086*	0.015	*0.3*	*0.4*	*0.071*	0.048	**1.3**	*0.15*	*0.008*	*0.025*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-15.2-1 TAL exceedance plot for LA-SMA-0.85

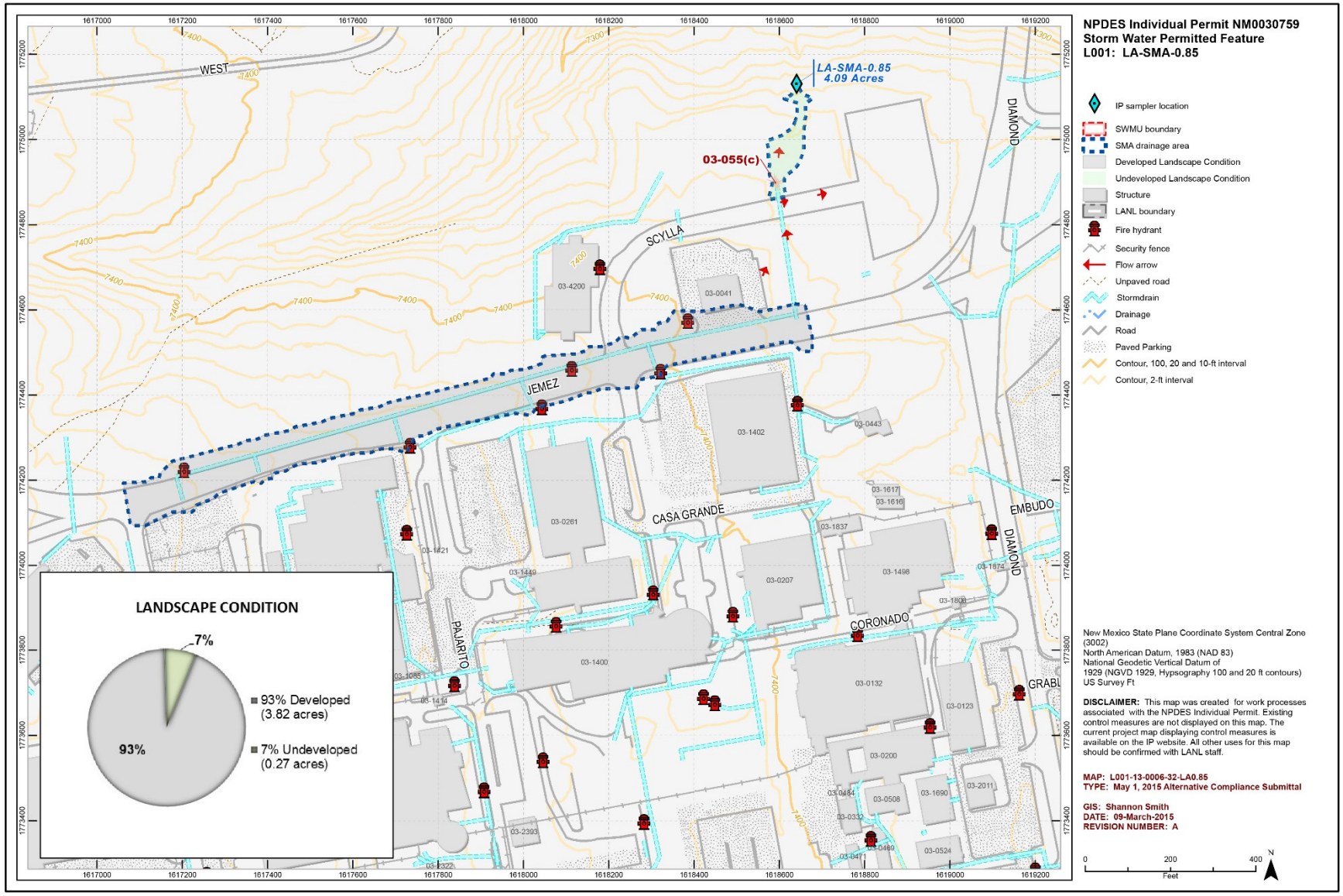


Figure A-15.3-1 SMA map for LA-SMA-0.85

A-16.0 LA-SMA-1

A-16.1 Site Description

LA-SMA-1, located in the Los Alamos/Pueblo watershed, includes AOC C-00-044, surface contamination resulting from the historical use of lead-based paint on the Los Alamos Canyon Bridge (also known as Omega Bridge). The bridge was constructed in 1951 and is located in both TA-00 and TA-03. This AOC was identified in 1999 during RFI activities. Surface samples collected from locations on the north and south end of the bridge during investigation of SWMU 00-017 contained elevated lead concentrations. The lead could not reasonably be attributed to SWMU 00-017, an inactive underground industrial waste line. During further research and interviews of Los Alamos County and Laboratory maintenance staff, it was discovered that lead paint chips were deposited beneath the bridge on the north and south slopes of Los Alamos Canyon as a result of periodic bridge maintenance activities, including scraping and chipping old paint before new paint was applied.

Consent Order sampling is complete for AOC C-00-044. Consent Order sampling data for AOC C-00-044 will be published in the future Phase II investigation report for Upper Los Alamos Canyon Aggregate Area.

A-16.2 Storm Water Monitoring Results

AOC C-00-044 is monitored within LA-SMA-1. Following the installation of baseline control measures, a baseline storm water sample was collected on August 19, 2011. Analytical results from this sample yielded four TAL exceedances (Figure A-16.2-1):

- Aluminum concentration of 6510 µg/L (MTAL is 750 µg/L),
- Copper concentration of 7.8 µg/L (MTAL is 4.3 µg/L),
- Lead concentration of 42.1 µg/L (MTAL is 17 µg/L), and
- Gross-alpha activity of 1800 pCi/L (ATAL is 15 pCi/L).

Following the installation of enhanced control measures at LA-SMA-1, corrective action storm water samples were collected on September 13, 2013, and July 29, 2014. Analytical results from these corrective action monitoring samples yielded five TAL exceedances:

- Aluminum concentration of 800 µg/L (MTAL is 750 µg/L),
- Gross-alpha activities of 434 pCi/L and 73.3 pCi/L (ATAL is 15 pCi/L).
- PCB concentrations of 18 ng/L and 31 ng/L (ATAL is 0.6 ng/L).

Corrective action has resulted in a decrease in copper and lead concentrations and gross-alpha activity detected in storm water samples collected at LA-SMA-1.

These 2013 and 2014 TAL exceedances are the subject of the alternative compliance request for this SMA/Site. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-16.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

LA-SMA-1 is a 1.03-acre watershed that consists of 14% developed areas and 86% undeveloped areas. Developed areas consist of 0.15 acres of pavement. Undeveloped areas consist of 0.55 acres of bare soil and 0.33 acres of grassland. The undeveloped areas are on the south-facing canyon slope under the Omega Bridge that crosses over Los Alamos Canyon (Figure A-15.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

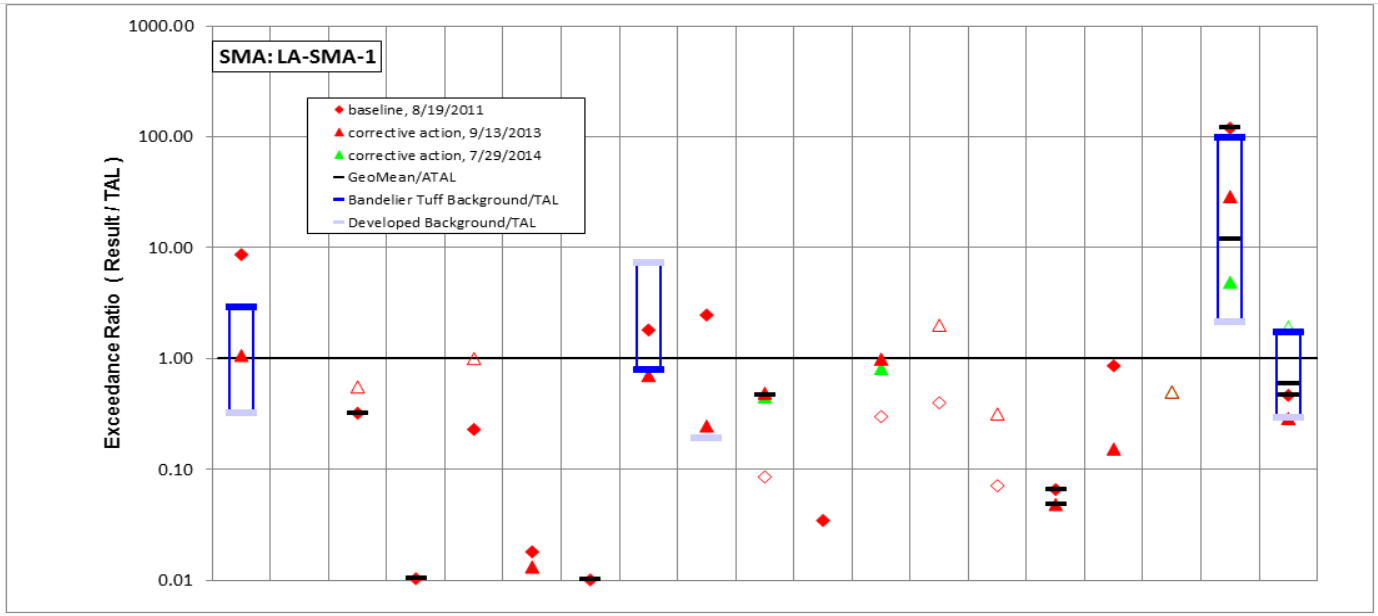
- Aluminum—The aluminum UTL from developed urban landscape storm water run-on is 245 µg/L; the aluminum UTL for background storm water containing sediment derived from Bandelier Tuff is 2210 µg/L. The aluminum result from 2013 is between these values.
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is between these values.
- PCBs—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for background storm water containing sediment derived from Bandelier Tuff is 11.7 ng/L. The PCB result from 2013 is between these values.

A-16.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

AOC C-00-044:

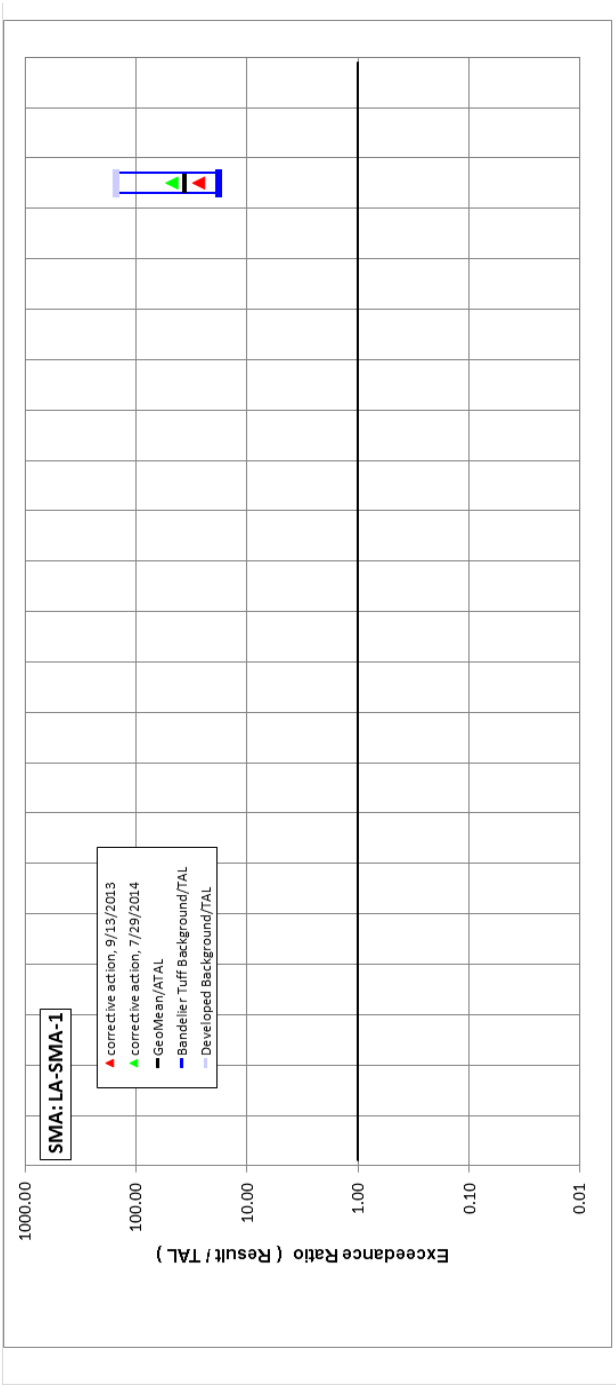
- Aluminum is not known to be associated with industrial materials historically managed at the Site. Aluminum was not detected above BVs in any of the 22 shallow Consent Order samples collected at the Site.
- PCBs are not known to be associated with industrial materials historically managed at the Site. Consent Order samples were not analyzed for PCBs because they were not identified as potential contaminants at this Site.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/29/2014 result	-	-	-	-	-	-	-	-	-	0.347	-	4.08	-	-	-	-	*0.005*	**73.3**	***57.9***
result / TAL	-	-	-	-	-	-	-	-	-	0.45	-	0.82	-	-	-	-	*0.5*	**4.9**	***1.9***
9/13/2013 result	**800**	*3*	*5*	19.3	*1*	2.77	2.18	3.03	4.19	0.376	1.36	4.94	***1***	*2*	4.85	6.43	*0.005*	**434**	8.65
result / TAL	**1.1**	*0.005*	*0.56*	0.0039	*1*	0.013	0.0022	0.7	0.25	0.49	0.008	0.99	***2***	*0.32*	0.048	0.15	*0.5*	**29**	0.29
8/19/2011 result	**6510**	*1*	2.9	51.8	0.23	3.8	10.1	**7.8**	**42.1**	*0.066*	5.9	*1.5*	*0.2*	*0.45*	6.6	36.2	-	**1800**	14
result / TAL	**8.7**	*0.002*	0.32	0.01	0.23	0.018	0.01	**1.8**	**2.5**	*0.086*	0.035	*0.3*	*0.4*	*0.071*	0.066	0.86	-	**120**	0.47

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-16.2-1 TAL exceedance plot for LA-SMA-1



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
7/29/2014 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.031**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**48**	-	-
9/13/2013 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.018**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**27**	-	-
8/19/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; " - " is used if no analytical results were available.

Figure A-16.2-1 (continued) TAL exceedance plot for LA-SMA-1

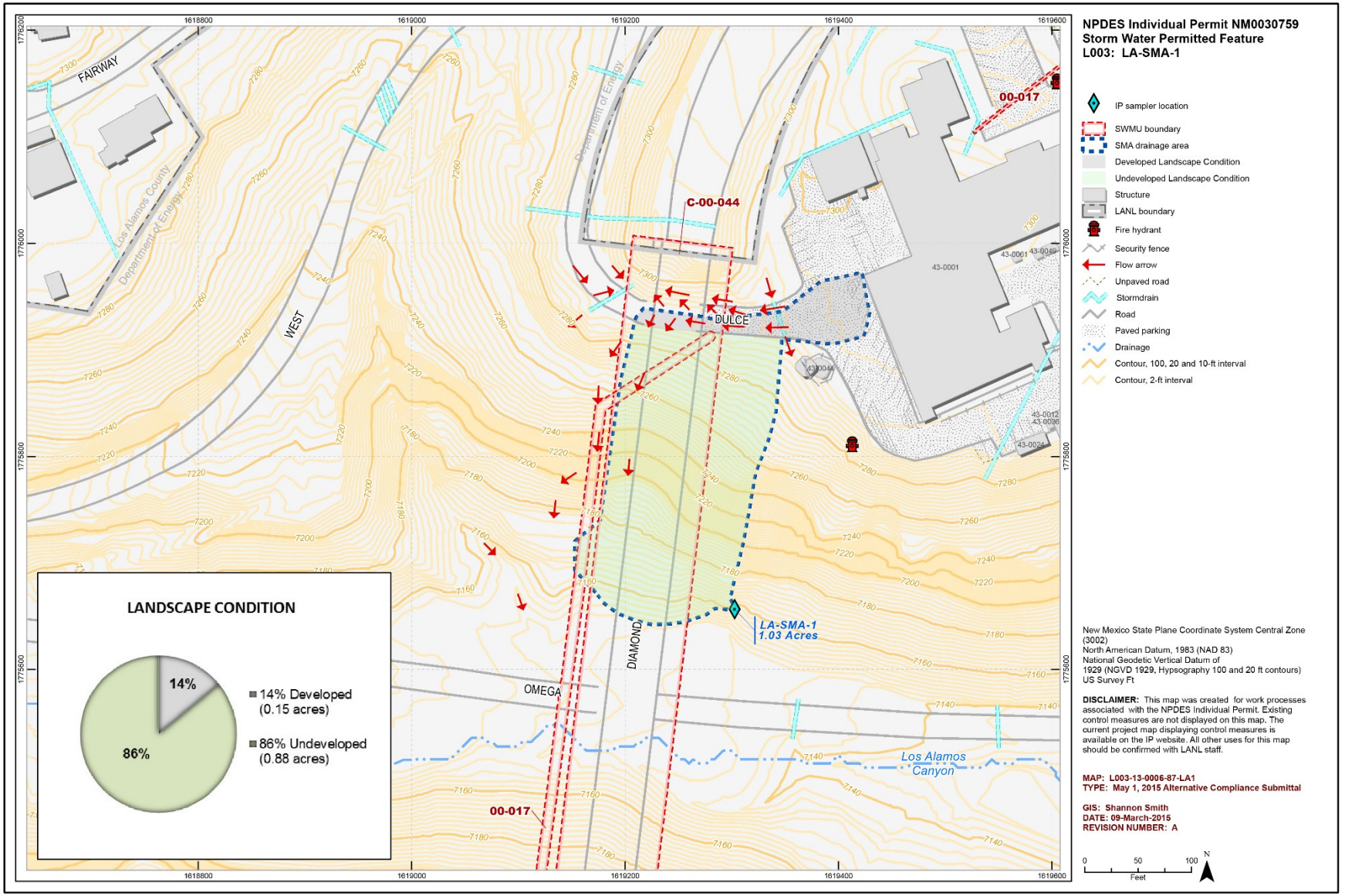


Figure A-16.3-1 SMA map for LA-SMA-1

A-17.0 LA-SMA-1.25

A-17.1 Site Description

LA-SMA-1.25, located in the Los Alamos/Pueblo watershed, includes AOC C-43-001, a storm drain outfall that flows into Los Alamos Canyon. It collects runoff from the Health Research Laboratory (HRL) (building 43-1) loading dock and also functions as the overflow from the lift station (structure 43-10). The overflow line is an 8-in.-diameter VCP that extends 130 ft south from structure 43-10 to a manhole. A 12-in.-diameter CMP, which receives discharge from two storm drains and any effluent from the overflow, flows southwest for 160 ft and drains into the canyon south of the HRL. The sanitary waste lines for the HRL [SWMU 43-001(a1) and AOC 43-001(a2)] may have become clogged at some time, causing an overflow. Any sanitary waste carried through the sewer lines could have discharged into the storm drains. Although no documentation was found to confirm any routine non–storm water releases into the storm drains, the outfall may have received non–sanitary cooling water. Currently, the outfall is located on the undeveloped north slope of Los Alamos Canyon on U.S. Department of Energy (DOE) property.

Phase I Consent Order investigations have been completed at this Site and Phase II investigations are being implemented. Detailed Phase I sampling results are presented in the Investigation Report for Upper Los Alamos Canyon Aggregate Area, Revision 1 (LANL 2010b). 2012 Phase II Consent Order sampling data has not yet been published in an investigation report.

A-17.2 Storm Water Monitoring Results

AOC C-43-001 is monitored within LA-SMA-1.25. Following the installation of baseline control measures, two baseline storm water samples were collected on July 30, 2011, and August 28, 2011. Analytical results from these samples yielded four TAL exceedances (Figure A-17.2-1):

- Copper concentrations of 13.8 µg/L and 33.3 µg/L (MTAL is 4.3 µg/L) and
- Zinc concentrations of 109 µg/L and 112 µg/L (MTAL is 42 µg/L).

Following the installation of enhanced control measures at LA-SMA-1.25, two corrective action storm water samples were collected on September 10, 2012, and October 12, 2012. Analytical results from these corrective action monitoring samples yielded four TAL exceedances:

- Copper concentrations of 7.31 µg/L and 25 µg/L (MTAL is 4.3 µg/L) and
- Zinc concentrations of 53.2 µg/L and 111 µg/L (MTAL is 42 µg/L).

These 2012 TAL exceedances are the subject of the alternative compliance request for this SMA/Site. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-17.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

LA-SMA-1.25 is a 0.92-acre watershed that consists of 12% developed areas and 88% undeveloped areas. Developed areas consist of 0.81 acres of building rooftop and pavement. Undeveloped areas consist of 0.11 acres of grassland (Figure A-17.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

Monitoring location LA-SMA-1.25 receives storm water run-on from developed environments, including paved parking lots, roads, and buildings, as well as landscapes containing sediment derived from Bandelier Tuff. Metals including copper and zinc are associated with building materials, parking lots, and automobiles as well as low concentrations in the Bandelier Tuff.

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. One of the copper results from the 2012 corrective action sample is between these two values, and the other is greater than both of them.
- Zinc—The zinc UTL from developed urban landscape storm water run-on is 1120 µg/L; the zinc UTL for background storm water containing sediment derived from Bandelier Tuff is 109 µg/L. One of the zinc results from the 2012 corrective action sample is between these two values, and the other is less than both of them.

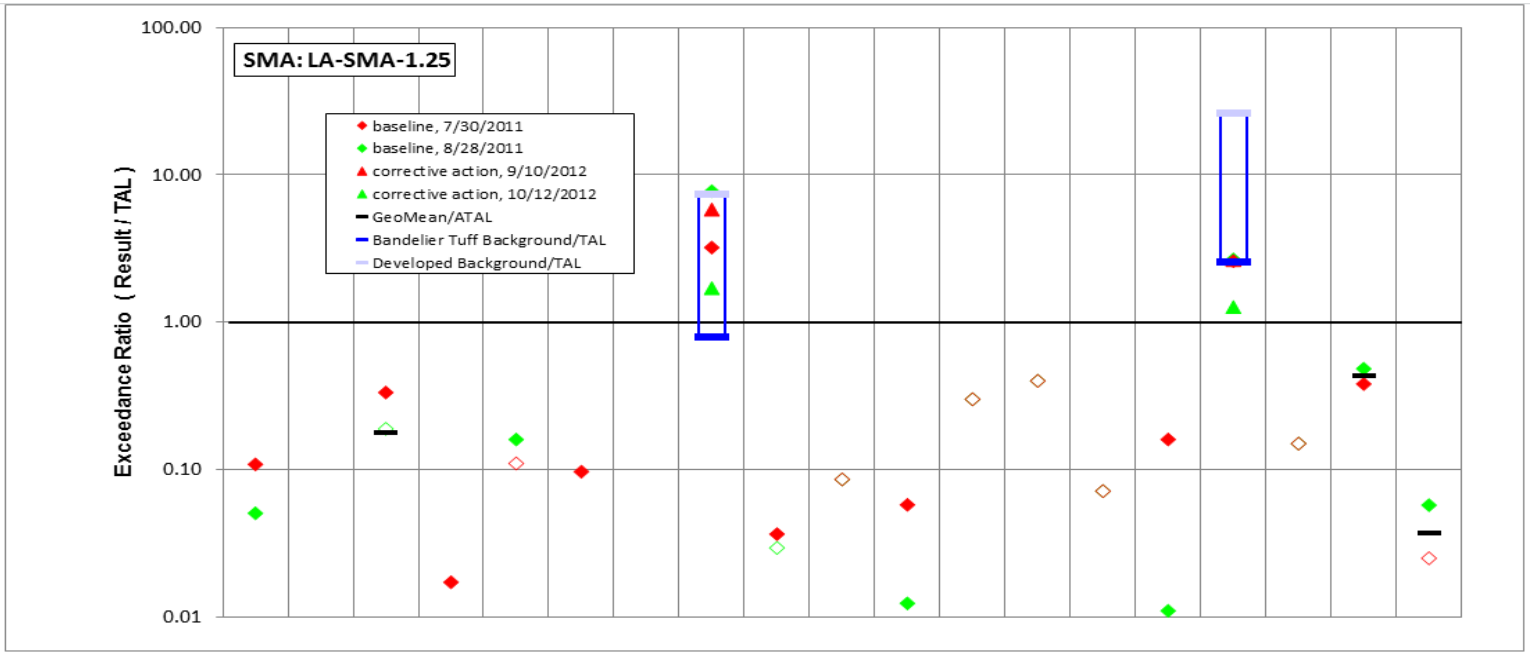
The LA-SMA-1.25 monitoring station was relocated. The new location of the sampler is positioned to provide a more representative sample of storm water discharge from the SMA.

A-17.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

AOC C-43-001:

- Copper is not known to have been associated with industrial materials historically managed at this Site. Copper was detected above sediment and tuff BVs in shallow (i.e., less than 3 ft bgs) soil, sediment, and tuff samples collected during 2008 and 2009 Consent Order investigations. Copper was detected above BVs in 8 of 20 shallow samples with a maximum concentration 4.6 times the sediment BV.
- Zinc is not known to have been associated with industrial materials historically managed at this Site. Zinc was detected above soil and sediment BVs in 8 of 20 shallow soil, sediment, and tuff samples with a maximum concentration 2.4 times the sediment BV.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
10/12/2012 result	-	-	-	-	-	-	-	**7.31**	-	-	-	-	-	-	-	**53.2**	-	-	-
result / TAL	-	-	-	-	-	-	-	**1.7**	-	-	-	-	-	-	-	**1.3**	-	-	-
9/10/2012 result	-	-	-	-	-	-	-	**25**	-	-	-	-	-	-	-	**111**	-	-	-
result / TAL	-	-	-	-	-	-	-	**5.8**	-	-	-	-	-	-	-	**2.6**	-	-	-
8/28/2011 result	37.9	*1*	*1.7*	15.6	0.16	*2*	*1*	**33.3**	*0.5*	*0.066*	2.1	*1.5*	*0.2*	*0.45*	1.1	**112**	*0.002*	7.25	1.72
result / TAL	0.051	*0.002*	*0.19*	0.0031	0.16	*0.01*	*0.001*	**7.7**	*0.029*	*0.086*	0.012	*0.3*	*0.4*	*0.071*	0.011	**2.7**	*0.15*	0.48	0.057
7/30/2011 result	81.3	2.7	3	86	*0.11*	20.3	3.8	**13.8**	0.62	*0.066*	9.8	*1.5*	*0.2*	*0.45*	16	**109**	*0.002*	5.71	*0.75*
result / TAL	0.11	0.0042	0.33	0.017	*0.11*	0.097	0.0038	**3.2**	0.036	*0.086*	0.058	*0.3*	*0.4*	*0.071*	0.16	**2.6**	*0.15*	0.38	*0.025*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-17.2-1 TAL exceedance plot for LA-SMA-1.25

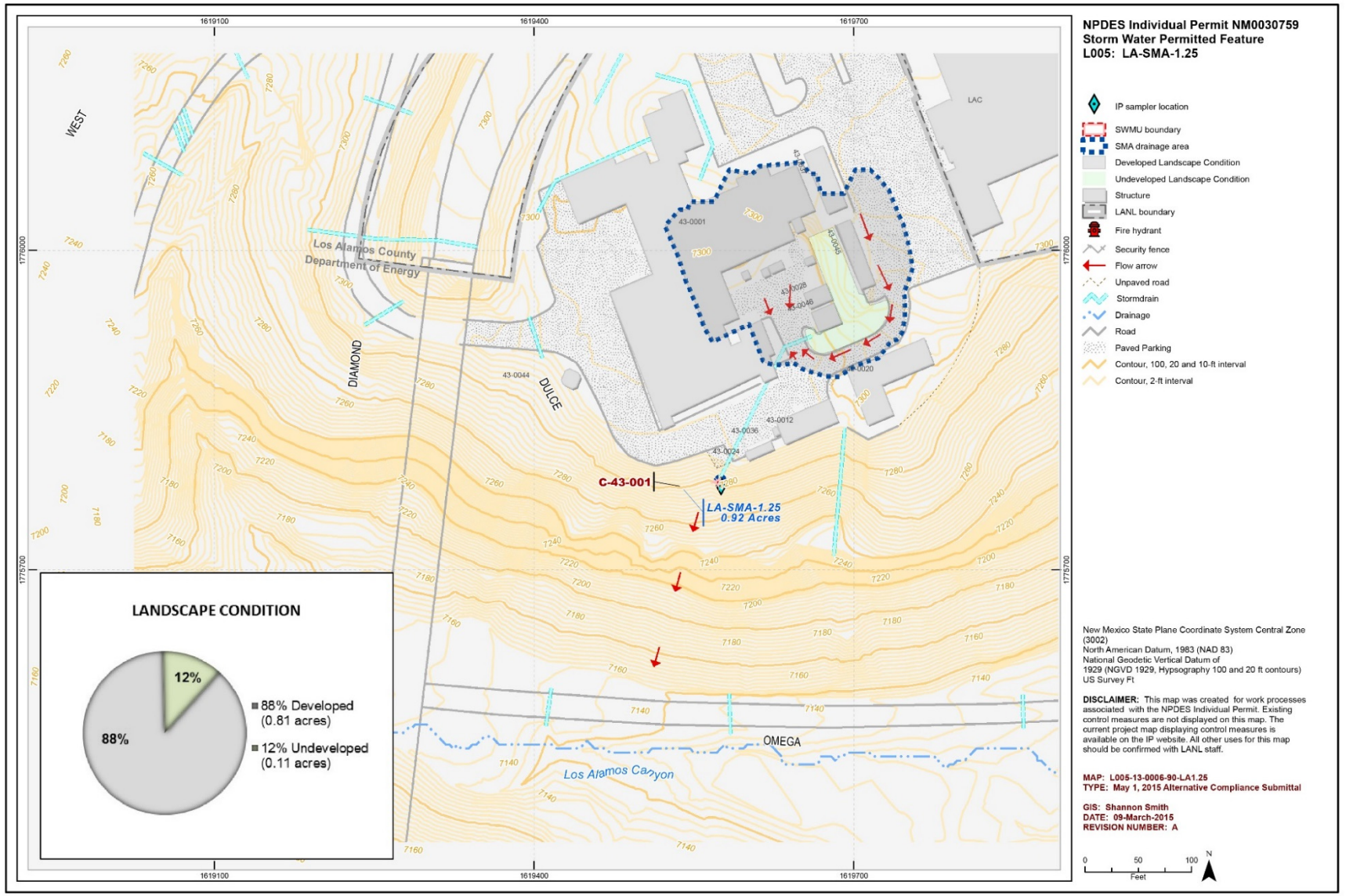


Figure A-17.3-1 SMA map for LA-SMA-1.25

A-18.0 LA-SMA-4.1

A-18.1 Site Description

LA-SMA-4.1, located in the Los Alamos/Pueblo watershed, includes SWMU 01-006(b) and AOC 01-003(b). SWMU 01-006(b) consists of the former TA-01 D Building (01-6) drainline and outfall that discharged to Los Alamos Canyon. Before its removal, D Building was used primarily to process plutonium. The types and quantities of liquids handled by the drainline are not known. During the 1974 to 1976 excavation of the D Building area, all drainlines were removed along with the areas of elevated radioactivity.

AOC 01-003(b) is described in the 1990 SWMU report as a surface disposal area for construction debris reported to be below the north rim of Los Alamos Canyon, approximately 450 ft east of Bailey Bridge Canyon. Site visits performed to locate the disposal area identified a few pieces of metal debris, but there was no evidence of a surface disposal area.

Phase I Consent Order investigations have been completed at this Site and Phase II investigations are being implemented. Detailed Phase I sampling results are presented in the Investigation Report for Upper Los Alamos Canyon Aggregate Area, Revision 1 (LANL 2010b). The 2012 Phase II Consent Order sampling data have not yet been published in an investigation report.

A-18.2 Storm Water Monitoring Results

AOC 01-003(b) and SWMU 01-006(b) are monitored within LA-SMA-4.1. Following the installation of baseline control measures, two baseline storm water samples were collected on August 19, 2011, and September 4, 2011. Analytical results from these samples yielded five TAL exceedances (Figure A-18.2-1):

- Copper concentrations of 5.3 µg/L and 6.7 µg/L (MTAL is 4.3 µg/L),
- Gross-alpha activity of 111 pCi/L (ATAL is 15 pCi/L), and
- PCB concentrations of 8 ng/L and 63 ng/L (ATAL is 0.6 ng/L).

These 2011 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites.

A-18.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

LA-SMA-4.1 is a 4.86-acre watershed that consists of 89% developed areas and 11% undeveloped areas. Developed areas consist of 4.32 acres of building rooftop and pavement. Undeveloped areas consist of 0.27 acres of bare soil and 0.27 acres of ponderosa woodland (Figure A-18.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2011 are between these two values.
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2011 gross-alpha result is between these two values.

- PCBs—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; PCB UTL for background storm water containing sediment derived from Bandelier Tuff is 11.7 ng/L. One of the PCB results from 2011 is between these two values and the other is less than both of them.

A-18.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

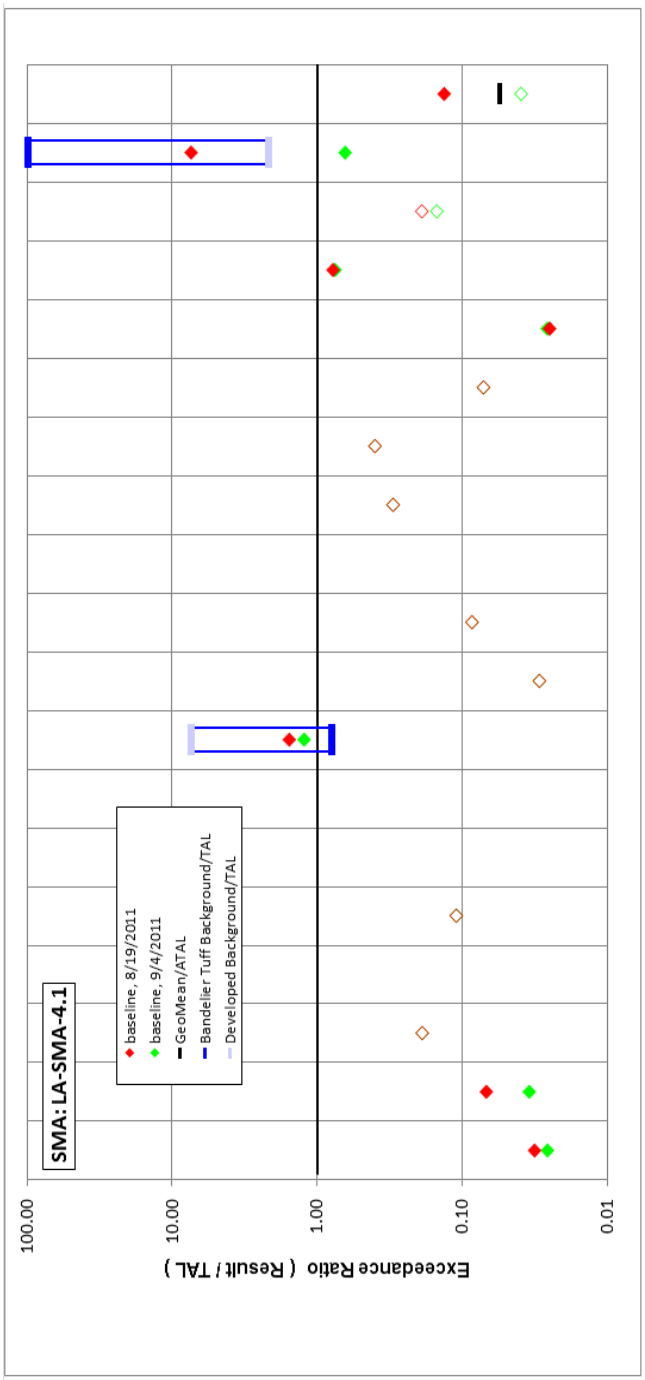
AOC 01-003(b):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was not detected above BVs in any of the 7 shallow (i.e., less than 3 ft bgs) Consent Order soil, sediment, and tuff samples.
- PCBs are not known to be associated with industrial materials historically managed at the Site. Consent Order samples were not analyzed for PCBs because they were not identified as potential contaminants at this Site.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.

SWMU 01-006(b):

Consent Order investigations have been conducted at the Site and detailed reporting on soil sample results are presented in the Investigation Report for Upper Los Alamos Canyon (LANL 2010b).

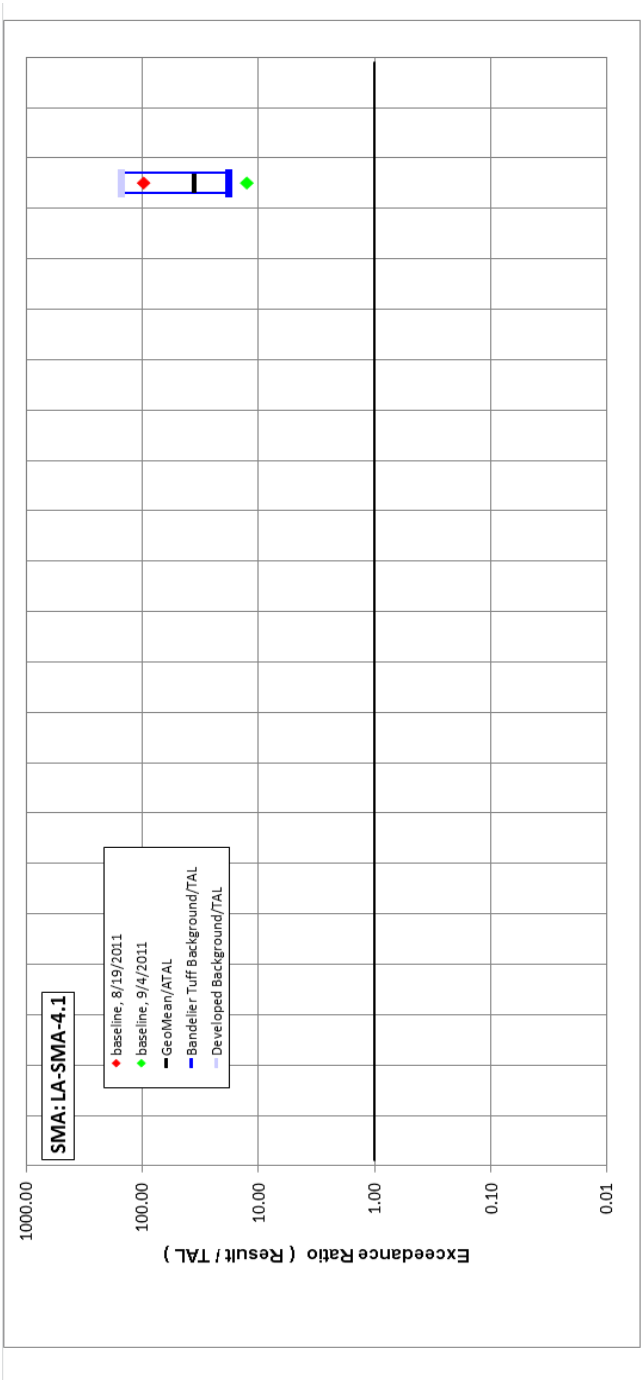
- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above the tuff BV in shallow (i.e., less than 3 ft bgs) Consent Order soil, sediment, and tuff samples. Copper was detected in 1 of 8 shallow Consent Order samples at a concentration equal to the tuff BV.
- PCBs are not known to be associated with industrial materials historically managed at the Site. Two PCB mixtures (Aroclor-1254 and Aroclor-1260) were detected in 2 to 5 shallow samples below the estimated quantitation limits (below the level at which concentrations can be reliably quantified).
- Alpha-emitting radionuclides are known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
9/4/2011 result	19.4	22.1	1.7	15	0.11	2	2.1	**5.3**	*0.5*	*0.066*	0.61	*1.5*	*0.2*	*0.45*	2.6	31.6	*0.002*	9.63	*1.18*
result / TAL	0.026	0.035	*0.19*	*0.003*	*0.11*	*0.01*	0.0021	**1.2**	*0.029*	*0.086*	0.0036	*0.3*	*0.4*	*0.071*	0.026	0.75	*0.15*	0.64	*0.039*
8/19/2011 result	23.8	43.7	*1.7*	16.2	*0.11*	2	2.6	**6.7**	*0.5*	*0.066*	1.2	*1.5*	*0.2*	*0.45*	2.5	32.7	*0.002*	**111**	4
result / TAL	0.032	0.068	*0.19*	0.0032	*0.11*	*0.01*	0.0026	**1.6**	*0.029*	*0.086*	0.0071	*0.3*	*0.4*	*0.071*	0.025	0.78	*0.19*	**7.4**	0.13

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-18.2-1 TAL exceedance plot for LA-SMA-4.1



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6E-04	-	-
unit	ug/L	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
9/4/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.008**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**13**	-	-
8/19/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.063**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**98**	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-18.2-1 (continued) TAL exceedance plot for LA-SMA-4.1

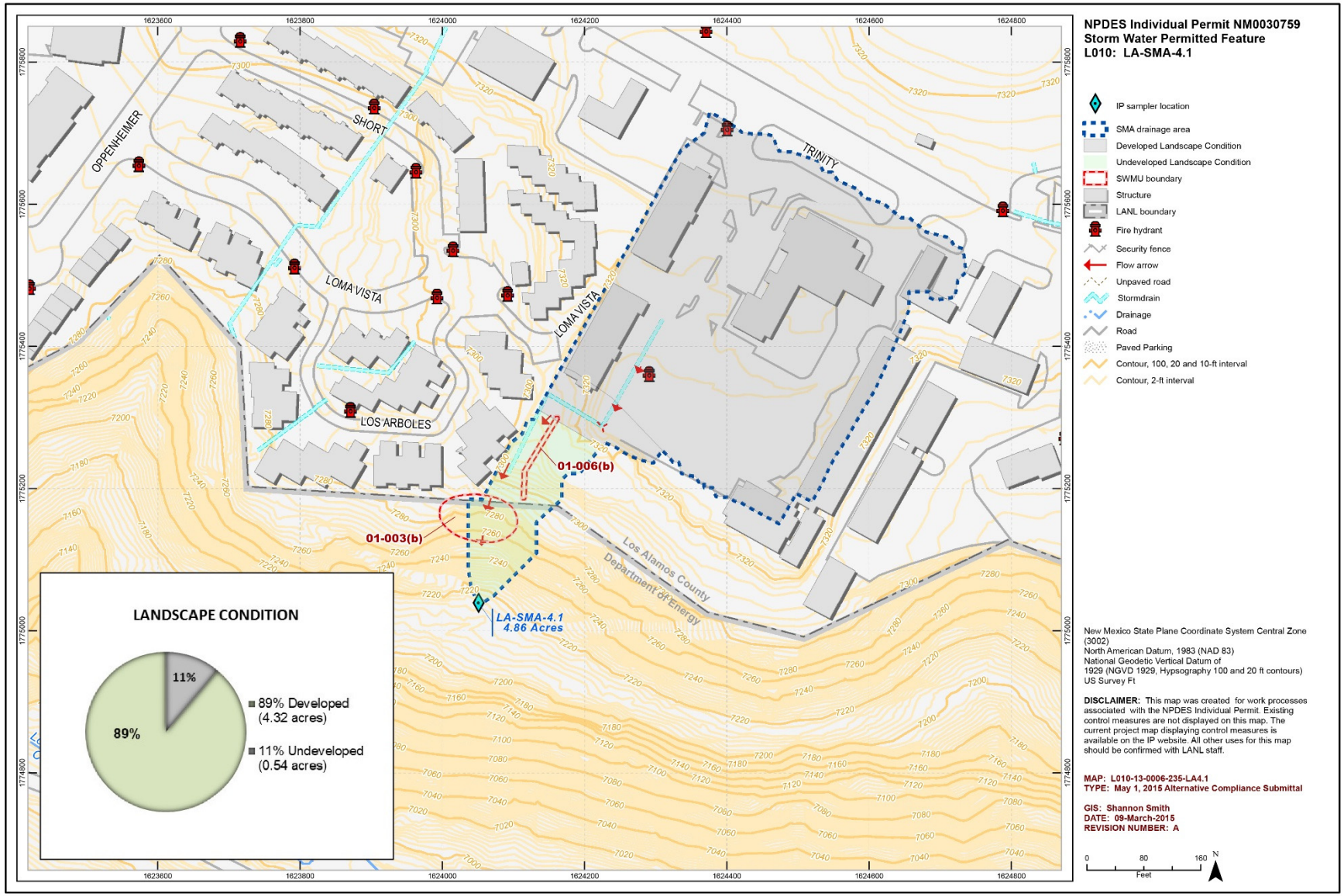


Figure A-18.3-1 SMA map for LA-SMA-4.1

A-19.0 LA-SMA-5.35

A-19.1 Site Description

LA-SMA-5.35, located in the Los Alamos/Pueblo watershed, includes AOC C-41-004, the active storm drain system surrounding laboratory building 41-4. The drain system has seven storm drainage catch basins/manholes (structures 41-22 through 41-28). Although there are no indications of historical or current contaminant releases to the system, operational tritium releases from the emission stacks located between buildings 41-4 and 41-30 (office building) may have introduced surface (beta) contamination into the storm drain system.

Consent Order sampling is delayed for AOC C-41-004 until building 41-4 undergoes D&D; building 41-4 is an active facility. However, screening-level data are available from samples collected during the 1995 RFI conducted at the Site. Detailed sampling results are presented in the Historical Investigation Report for Upper Los Alamos Canyon Aggregate Area (LANL 2006).

A-19.2 Storm Water Monitoring Results

AOC C-41-004 is monitored within LA-SMA-5.35. Following the installation of baseline control measures, a baseline storm water sample was collected on August 4, 2011, and September 7, 2011. Analytical results from these samples yielded two TAL exceedances (Figure A-19.2-1):

- Copper concentration of 5.9 µg/L (MTAL is 4.3 µg/L) and
- Gross-alpha activity of 874 pCi/L (ATAL is 15 pCi/L).

Following the installation of enhanced control measures at LA-SMA-5.35, corrective action storm water samples were collected on June 21, 2014, and July 19 2014. Analytical results from the June 21, 2014, corrective action monitoring sample yielded two TAL exceedances:

- Copper concentrations of 11.3 µg/L (MTAL is 4.3 µg/L) and
- Gross-alpha activity of 118 pCi/L (ATAL is 15 pCi/L).

These 2014 TAL exceedances are the subject of the alternative compliance request for this SMA/Site. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-19.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

LA-SMA-5.35 is a 22.76-acre watershed that consists of 44% developed areas and 55% undeveloped areas. Developed areas consist of 1.51 acres of building rooftop and 8.60 acres of concrete/pavement. Undeveloped areas consist of 5.73 acres of bare rock, 0.21 acres of bare soil, 6.64 acres of ponderosa, and 0.07 acres of grassland (Figure A-19.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2014 is between these values.

- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2014 gross-alpha result is between these two values.

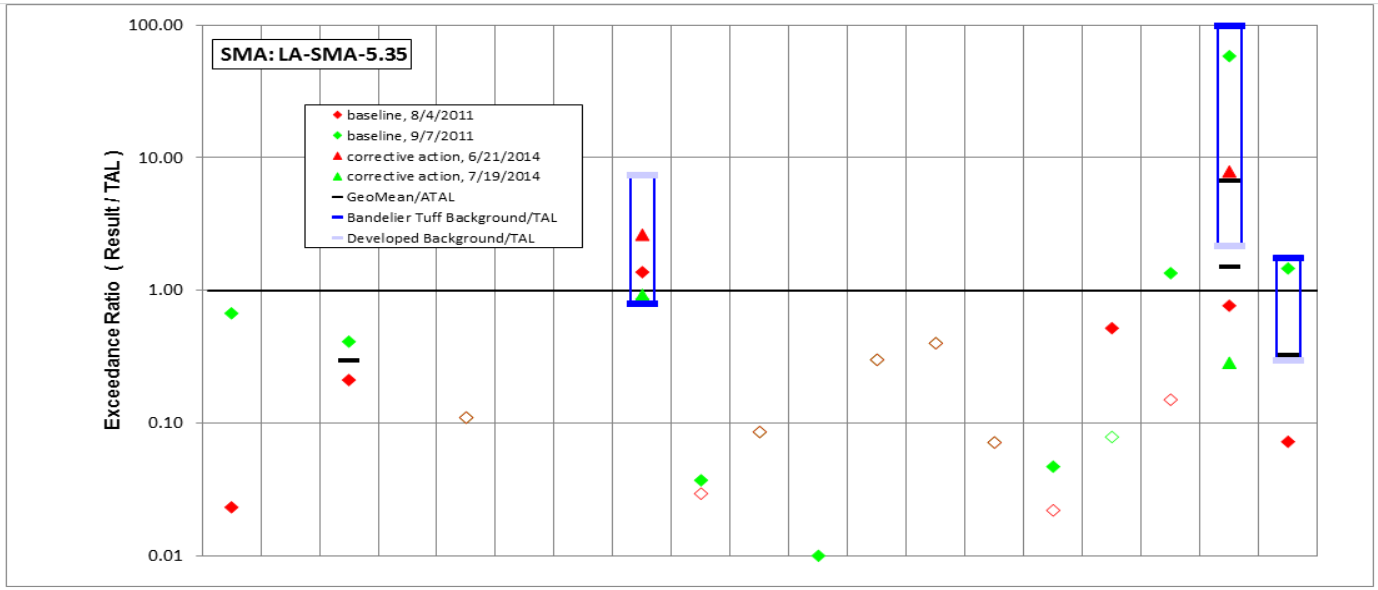
A-19.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

AOC C-41-004:

- Copper is not known to be associated with industrial materials historically managed at the Site. The single shallow (i.e., less than 3 ft bgs) RFI sample collected at the AOC C-41-004 was not analyzed for copper because it is not known to be associated with industrial materials historically managed at the Site.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.

The SMA receives runoff from undeveloped areas and from developed areas including the Los Alamos townsite and TA-41. The concentration of copper detected in the SMA sample is slightly greater than the UTL for runoff from undeveloped areas and well below the UTL for runoff from developed areas. The concentration of gross-alpha radioactivity detected in the SMA sample is less than the UTL for runoff from undeveloped areas and above the UTL for runoff from developed areas.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/19/2014 result	-	-	-	-	-	-	-	3.98	-	-	-	-	-	-	-	-	-	4.27	-
result / TAL	-	-	-	-	-	-	-	0.93	-	-	-	-	-	-	-	-	-	0.28	-
6/21/2014 result	-	-	-	-	-	-	-	**11.3**	-	-	-	-	-	-	-	-	-	**118**	-
result / TAL	-	-	-	-	-	-	-	**2.6**	-	-	-	-	-	-	-	-	-	**7.9**	-
9/7/2011 result	504	*1*	3.7	22.9	*0.11*	*2*	3.5	3.7	0.63	*0.066*	1.7	*1.5*	*0.2*	*0.45*	4.7	*3.3*	**0.0135**	**874**	**43.9**
result / TAL	0.67	*0.002*	0.41	0.0046	*0.11*	*0.01*	0.0035	0.86	0.037	*0.086*	0.01	*0.3*	*0.4*	*0.071*	0.047	*0.079*	**1.3**	**58**	**1.5**
8/4/2011 result	17.4	*1*	1.9	*15*	*0.11*	*2*	*1*	**5.9**	*0.5*	*0.066*	0.64	*1.5*	*0.2*	*0.45*	*2.2*	21.8	*0.002*	11.5	2.17
result / TAL	0.023	*0.002*	0.21	*0.003*	*0.11*	*0.01*	*0.001*	**1.4**	*0.029*	*0.086*	0.0038	*0.3*	*0.4*	*0.071*	*0.022*	0.52	*0.15*	0.77	0.072

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-19.2-1 TAL exceedance plot for LA-SMA-5.35

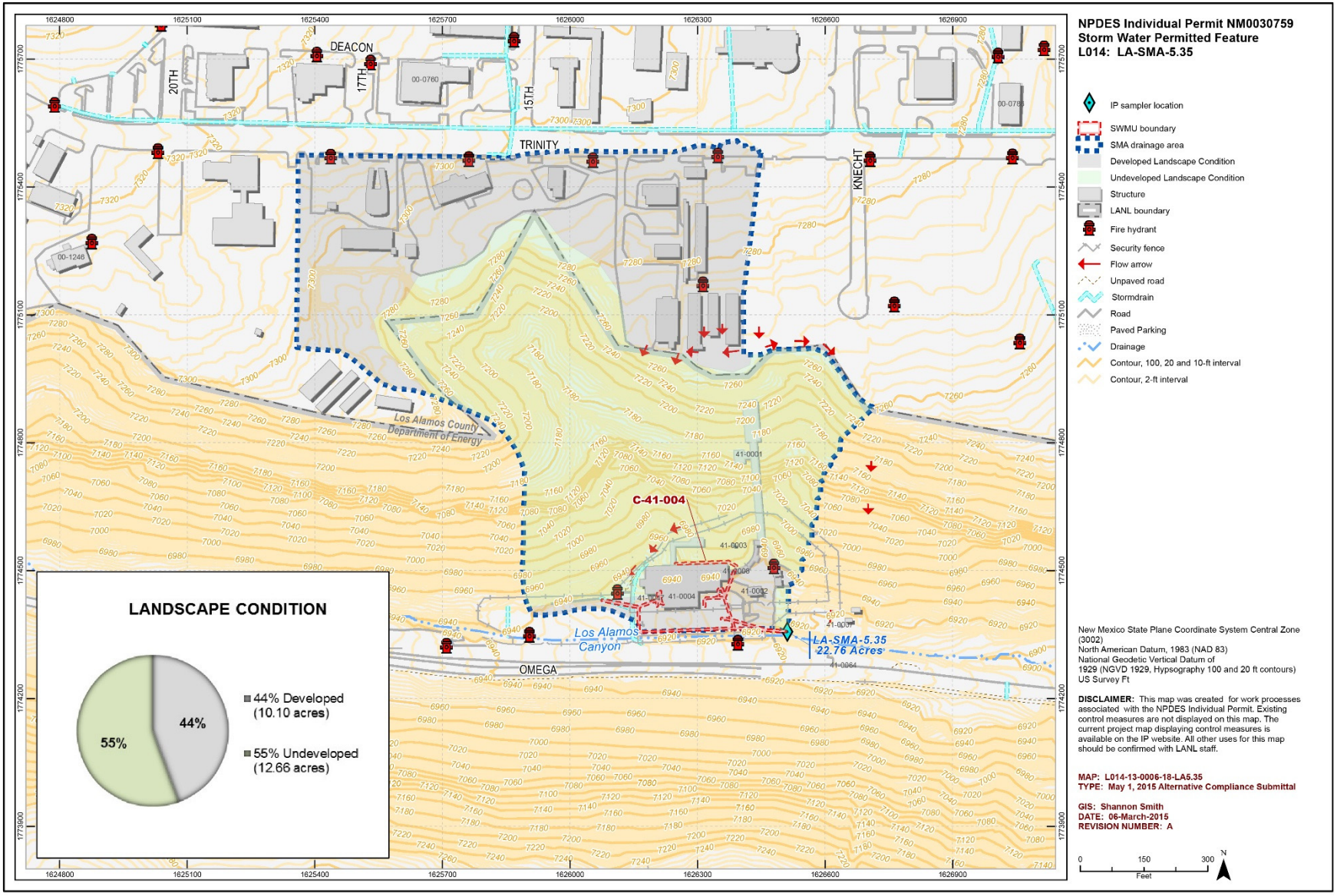


Figure A-19.3-1 SMA map for LA-SMA-5.35

A-20.0 M-SMA-1

A-20.1 Site Description

M-SMA-1, located in the Sandia/Mortandad watershed, includes SWMUs 03-050(a) and 03-054(e). SWMU 03-050(a) is an area of potential soil contamination associated with the exhaust emissions from 24 active stacks on the roof of building 03-29. Building 03-29, the Chemical and Metallurgy Research (CMR) facility, was constructed in 1961 and houses an irradiated-fuel examination facility and analytical chemistry operations that involve handling radioactive materials containing uranium, plutonium, iodine, mixed-fission products, and tritium. The original Individual Permit Site narrative erroneously stated that the CMR building was constructed in 1952. High-efficiency particulate air, Aerosolve 95, and charcoal filters are used to remove radioactive particulates from stack effluent gas.

No Consent Order, RFI, or other environmental investigations have been performed at SWMU 03-050(a).

SWMU 03-054(e) is an outfall located in upper Mortandad Canyon that typically discharges a steady, low-volume flow of effluent that originates from several sources at the CMR building. These sources include drainage from roofs over the west wing, where towers vent filtered exhaust, and surface water runoff from the asphalt area around the building. SWMU 03-054(e) received effluent from an unintentional one-time release in 1974 from an industrial waste manhole (AOC C-03-006). The overflow resulted from a plug in the industrial waste line and was estimated to be between 500 gal. and 1000 gal. of radioactive liquid waste. The overflow spilled to the surrounding paved area, traveled north along Diamond Drive, flowed into the storm sewer through a storm drain grate, and ultimately discharged into Upper Mortandad Canyon through the SWMU 03-054(e) outfall. A small dam was built in the streambed at the base of the canyon to contain the effluent. Subsequent cleanup action, based on residual radioactive contamination cleanup levels of 25 pCi/g, removed approximately 142 ft^3 of contaminated soil from Mortandad Canyon.

Phase I Consent Order sampling is complete for SWMU 03-054(e). SWMU 03-054(e) will be recommended for corrective action complete in the supplemental investigation report for Upper Mortandad Canyon Aggregate Area. SWMU 03-054(e) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1 (LANL 2010c).

A-20.2 Storm Water Monitoring Results

SWMUs 03-050(a) and 03-054(e) are monitored within M-SMA-1. Following the installation of baseline control measures, a baseline storm water sample was collected on August 19, 2011, and September 7, 2011. Analytical results from this sample yielded four TAL exceedances (Figure A-20.2-1):

- Gross-alpha activities of 18.1 pCi/L and 35 pCi/L (ATAL is 15 pCi/L), and
- PCB concentrations of 28 ng/L and 75 ng/L (ATAL is 0.6 ng/L).

Following the installation of enhanced control measures at M-SMA-1, corrective action storm water samples were collected on June 14, 2013, and July 2, 2013. Analytical results from these corrective action monitoring samples yielded seven TAL exceedances:

- Copper concentrations of 9.66 µg/L and 31.2 µg/L (MTAL is 4.3 µg/L),
- Zinc concentrations of 53.4 µg/L and 264 µg/L (MTAL is 42 µg/L),
- Gross-alpha activity of 32.5 pCi/L (ATAL is 15 pCi/L), and
- PCB concentrations of 10 ng/L and 11 ng/L (ATAL is 0.6 ng/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for this SMA/Site. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-20.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

M-SMA-1 is a 29.67-acre watershed that consists of 61% developed areas and 39% undeveloped areas. Developed areas consist of 18.19 acres of building rooftop and pavement. Undeveloped areas consist of 11.48 acres of grassland (Figure A-20.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2013 are between these two values.
- Zinc—The zinc UTL from developed urban landscape storm water run-on is 1120 µg/L; the zinc UTL for background storm water containing sediment derived from Bandelier Tuff is 109 µg/L. One of the zinc results from 2013 is between these two values, and the other 2103 result is below both of them.
- Gross alpha—The gross-alpha UTL from developed urban landscape storm water run-on is 32.5 pCi/L; the gross-alpha UTL for storm water containing sediments derived from Bandelier Tuff is 1490 pCi/L. One of the 2011 gross-alpha results is less than both values, and the other result is between them. The 2013 gross-alpha result is equal to the lower value.
- PCB—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for storm water containing sediments derived from Bandelier Tuff is 11.7 ng/L. The PCB results from 2011 are between these two values, and the PCB results from 2013 are below both values

A-20.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

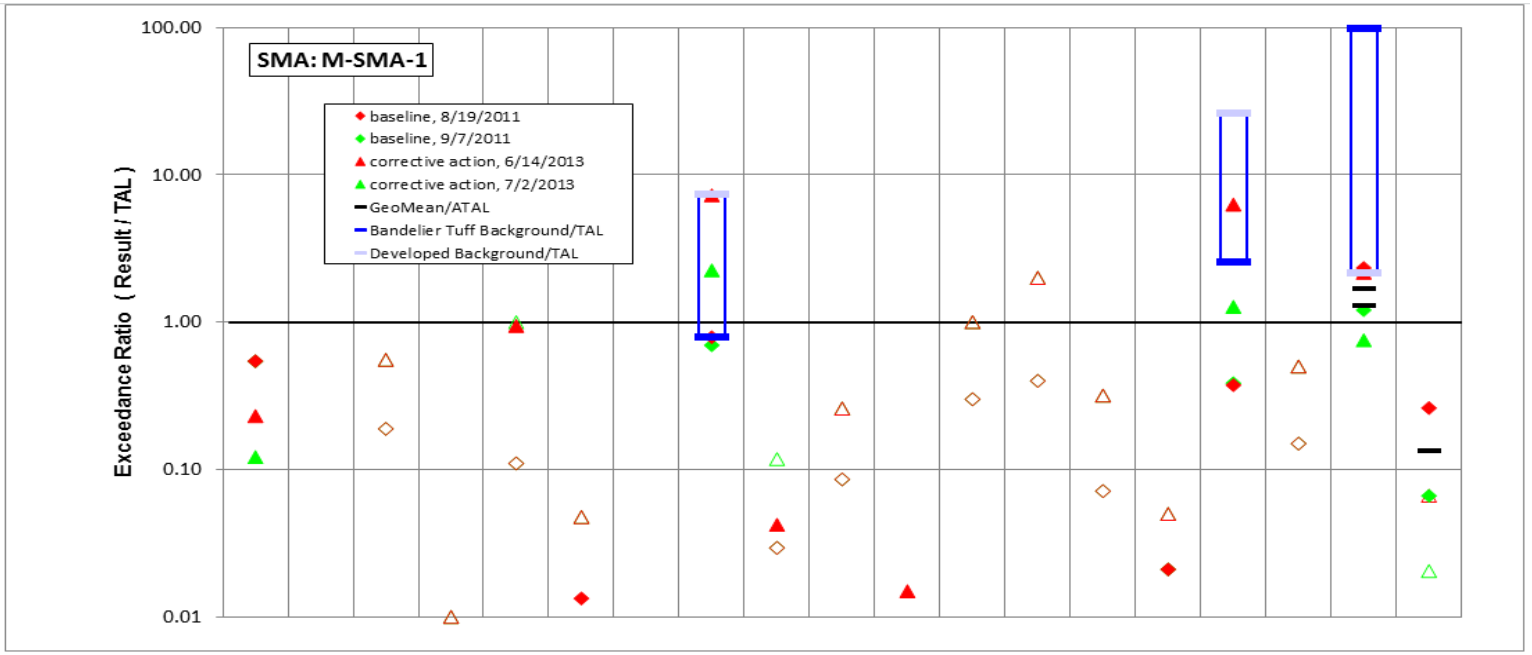
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 03-050(a):

- Copper is not known to be associated with industrial materials historically managed at the Site. No investigation data are available for SWMU 03-050(a).
- Zinc is not known to have been associated with industrial materials historically managed at this Site. No investigation data are available for SWMU 03-050(a).
- PCBs are not known to have been associated with industrial materials historically managed at the Site. No investigation data are available for SWMU 03-050(a).
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.

SWMU 03-054(e):

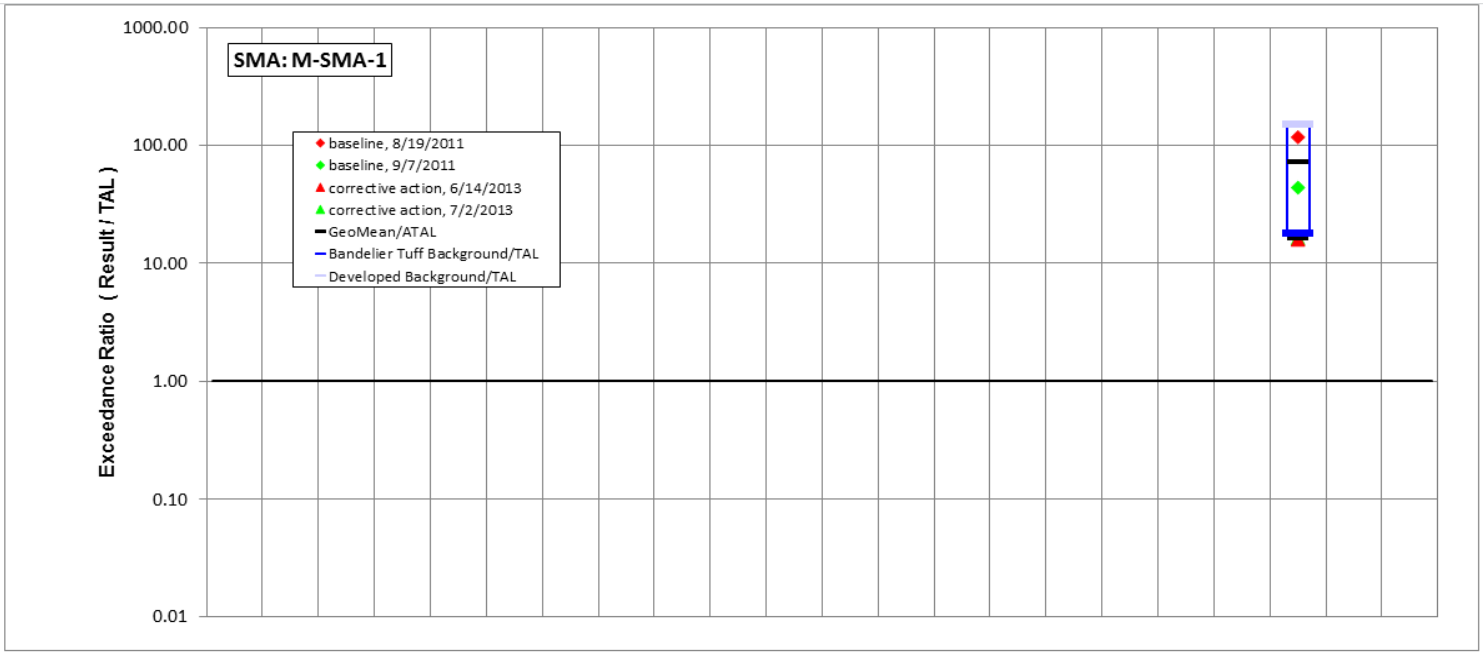
- Copper is not known to have been associated with industrial materials historically managed at this Site. Copper was detected above the sediment BV in shallow (i.e., less than 3 ft bgs) Consent Order and RFI samples. Copper was detected above BV in 1 of 14 shallow soil, sediment, and tuff samples at a concentration 1.1 times the sediment BV.
- Zinc is not known to have been associated with industrial materials historically managed at this Site. Zinc was detected above soil, sediment, and tuff BVs in shallow Consent Order and RFI samples. Zinc was detected above BVs in 12 of 14 shallow samples, and the maximum detection above BV was 2.3 times the soil BV.
- PCBs are not known to have been associated with industrial materials historically managed at the Site. The PCB mixtures Aroclor-1242, Aroclor-1254, and Aroclor-1260 were detected in shallow Consent Order and RFI samples. Aroclor-1242 and Aroclor-1254 were detected in 1 of 14 shallow samples each at concentrations 2.1% and 0.2% of the residential SSLs, respectively. Aroclor-1260 was detected in 4 of 14 shallow samples at a maximum concentration 2.7% of the residential SSL.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/2/2013 result	91.2	*3*	*5*	*50*	*1*	*10*	*5*	**9.66**	*2*	*0.2*	0.817	*5*	***1***	*2*	*5*	**53.4**	*0.005*	11.3	*0.614*
result / TAL	0.12	*0.005*	*0.56*	*0.01*	*1*	*0.048*	*0.005*	**2.2**	*0.12*	*0.26*	0.0048	*1*	***2***	*0.32*	*0.05*	**1.3**	*0.5*	0.75	*0.02*
6/14/2013 result	173	*3*	*5*	*50*	0.944	*10*	3.23	**31.2**	0.717	*0.2*	2.54	*5*	***1***	*2*	*5*	**264**	*0.005*	**32.5**	*1.99*
result / TAL	0.23	*0.005*	*0.56*	*0.01*	0.94	*0.048*	0.0032	**7.3**	0.042	*0.26*	0.015	*1*	***2***	*0.32*	*0.05*	**6.3**	*0.5*	**2.2**	*0.066*
9/7/2011 result	407	*1*	*1.7*	*15*	*0.11*	*2*	3	3	*0.5*	*0.066*	0.65	*1.5*	*0.2*	*0.45*	2.1	16.2	*0.002*	**18.1**	1.99
result / TAL	0.54	*0.002*	*0.19*	*0.003*	*0.11*	*0.01*	0.003	0.7	*0.029*	*0.086*	0.0038	*0.3*	*0.4*	*0.071*	0.021	0.39	*0.15*	**1.2**	0.066
8/19/2011 result	408	*1*	*1.7*	*15*	*0.11*	2.8	2.1	3.4	*0.5*	*0.066*	1	*1.5*	*0.2*	*0.45*	2.1	15.7	*0.002*	**35**	7.84
result / TAL	0.54	*0.002*	*0.19*	*0.003*	*0.11*	0.013	0.0021	0.79	*0.029*	*0.086*	0.0059	*0.3*	*0.4*	*0.071*	0.021	0.37	*0.15*	**2.3**	0.26

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-20.2-1 TAL exceedance plot for M-SMA-1



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
7/2/2013 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.011**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**16**	-	-
6/14/2013 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.01**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**16**	-	-
9/7/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.028**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**44**	-	-
8/19/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.075**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**120**	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-20.2-1 (continued) TAL exceedance plot for M-SMA-1

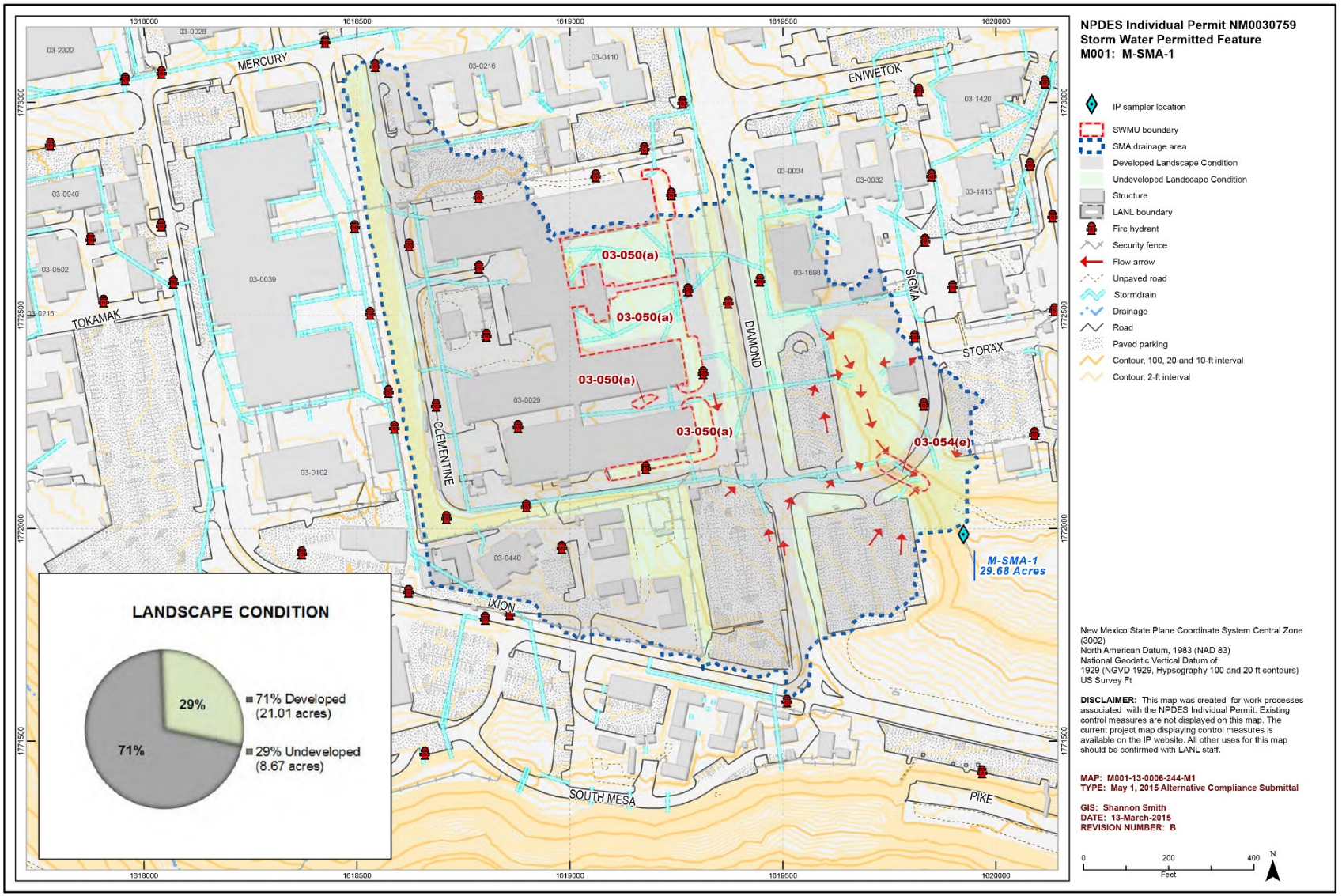


Figure A-20.3-1 SMA map for M-SMA-1

A-21.0 M-SMA-1.22

A-21.1 Site Description

M-SMA-1.22, located in the Sandia/Mortandad watershed, includes SWMU 03-045(h), a former NPDES-permitted outfall (EPA 03A024) located in TA-03 at the north perimeter of the Sigma Complex security fence, approximately 50 ft north of a cooling tower (structure 03-187). The outfall was formerly permitted for the discharge of treated cooling water and storm water. It served a former cooling tower from 1953 until the late 1980s when the cooling tower became inactive. The cooling tower remained inactive until early 1995, when it was reactivated. In 1997, the cooling tower was removed and the outfall pipe plugged. The outfall was removed from the NPDES permit in 2007. The area at the outfall pipe is about 3 ft wide × 6 ft long. Effluent drained into a corrugated metal storm drainpipe that trended northeast and east of structure 03-187 where it combined with more storm water runoff from surrounding areas. The drainage continued south and joined a channel north of Eniwetok Drive that ultimately drained into Sandia Canyon. Routine water treatment began in 1968. Treatment included biocides and fungicides to reduce algae growth and chelating agents such as ethylenediaminetetraacetic acid to inhibit corrosion.

Consent Order sampling is complete for SWMU 03-045(h). Detailed sampling results are presented in the Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1 (LANL 2010c).

A-21.2 Storm Water Monitoring Results

SWMU 03-045(h) is monitored within M-SMA-1.22. Following the installation of baseline control measures, a baseline storm water sample was collected on September 15, 2011. Analytical results from this sample yielded two TAL exceedances (Figure A-21.2-1):

- Aluminum concentration of 904 µg/L (MTAL is 750 µg/L) and
- Copper concentration of 6 µg/L (MTAL is 4.3 µg/L).

Following the installation of enhanced control measures at M-SMA-1.22, corrective action storm water samples were collected on September 12, 2013, and July 29, 2014. Analytical results from the September 12, 2013 corrective action monitoring sample yielded one TAL exceedance:

- Copper concentration of 5.96 µg/L (MTAL is 4.3 µg/L).

This 2013 TAL exceedance is the subject of the alternative compliance request for this SMA/Site. All TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-21.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

M-SMA-1.22 is a 1.84-acre watershed that consists of 68% developed areas and 32% undeveloped areas. Developed areas consist of 0.01 acres of building and 1.24 acres of pavement. Undeveloped areas consist of 0.43 acres of grassland, 0.04 acres of ponderosa woodland, and 0.12 acres of seed and mulch (Figure A-21.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

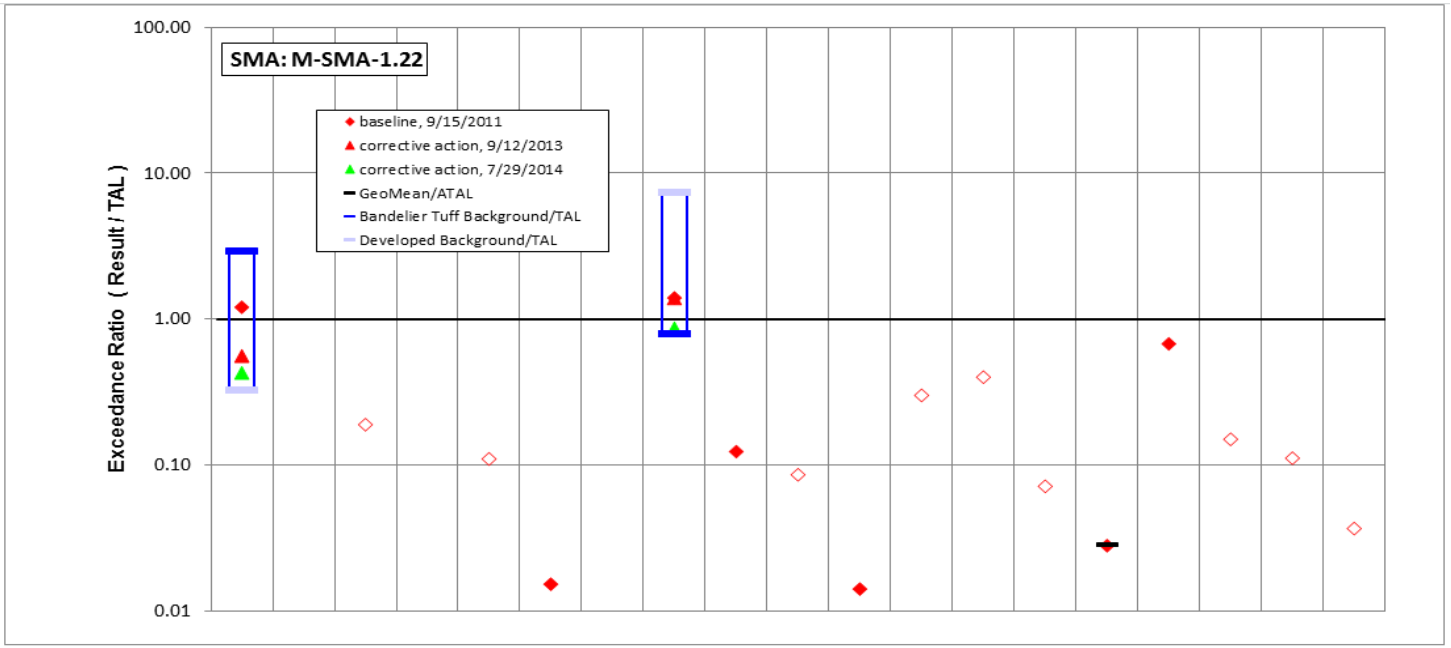
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2011 and 2013 are between these two values.

A-21.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 03-045(h):

- Copper is not known to be associated with industrial materials historically managed at the Site and was not detected above the BV in the single shallow (i.e., less than 3 ft bgs) Consent Order sample collected at the Site.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/29/2014 result	321	-	-	-	-	-	-	3.72	-	-	-	-	-	-	-	-	-	-	-
result / TAL	0.43	-	-	-	-	-	-	0.87	-	-	-	-	-	-	-	-	-	-	-
9/12/2013 result	419	-	-	-	-	-	-	**5.96**	-	-	-	-	-	-	-	-	-	-	-
result / TAL	0.56	-	-	-	-	-	-	**1.4**	-	-	-	-	-	-	-	-	-	-	-
9/15/2011 result	**904**	*1*	*1.7*	*15*	*0.11*	3.2	4.1	**6**	2.1	*0.066*	2.4	*1.5*	*0.2*	*0.45*	2.8	28.4	*0.002*	*1.67*	*1.1*
result / TAL	**1.2**	*0.002*	*0.19*	*0.003*	*0.11*	0.015	0.0041	**1.4**	0.12	*0.086*	0.014	*0.3*	*0.4*	*0.071*	0.028	0.68	*0.15*	*0.11*	*0.037*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-21.2-1 TAL exceedance plot for M-SMA-1.22

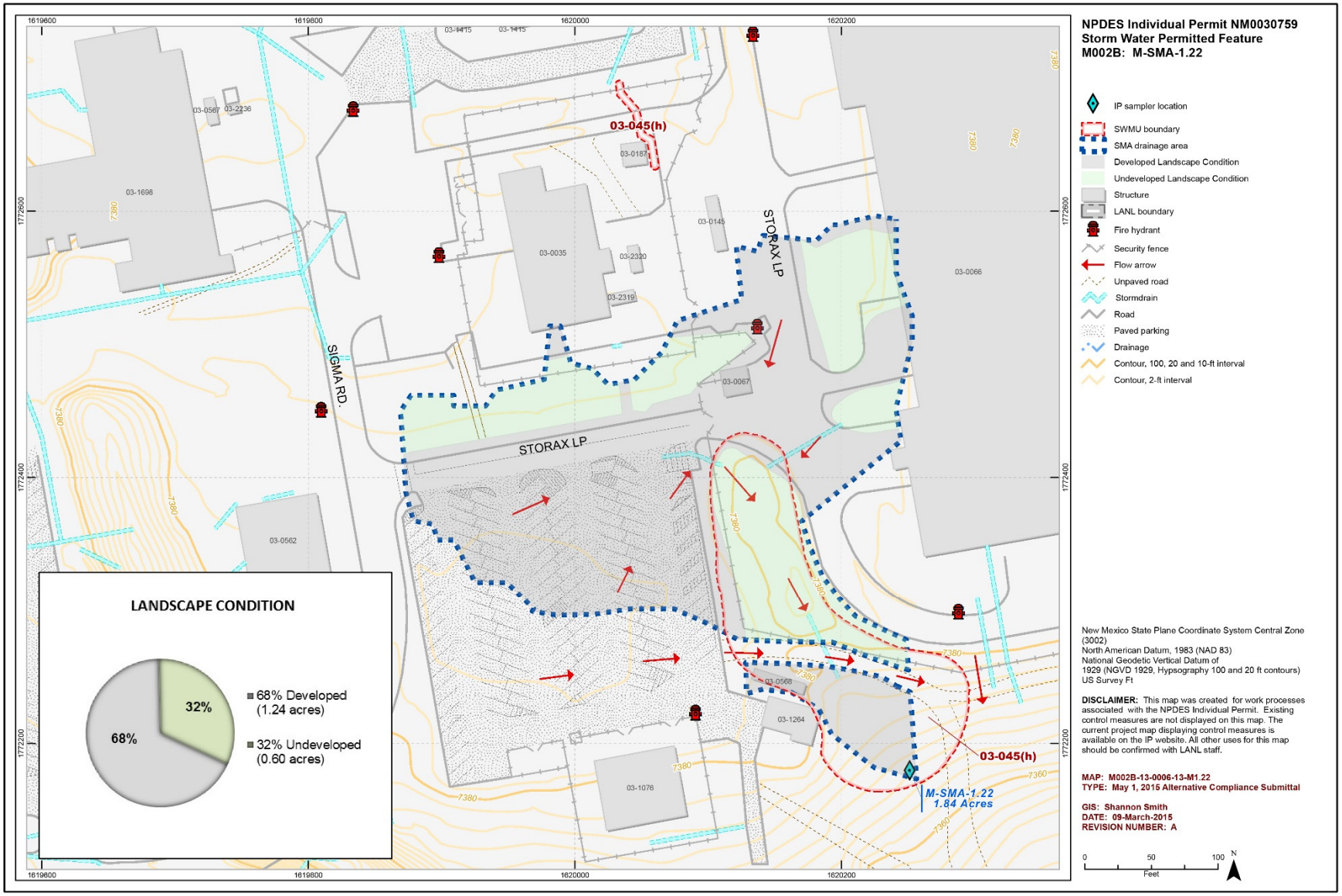


Figure A-21.3-1 SMA map for M-SMA-1.22

A-22.0 M-SMA-3

A-22.1 Site Description

M-SMA-3, located in the Sandia/Mortandad watershed, includes SWMU 48-007(c) and AOC 48-001. SWMU 48-007(c) is a outfall that formerly received discharges from nine floor drains, a trench drain, and six roof drains at building 48-1. This outfall is located north of building 48-1 and discharges into Mortandad Canyon. Former sources of discharge to the floor drains included floor washings, backflow preventers, drainage and condensate from a vacuum pump, steam condensate, a boiler drain, a fire drain, and a water-heater pressure-relief valve. This outfall formerly operated as an NPDES-permitted outfall (131 EPA 04A) but was removed from the permit on January 14, 1998, because industrial wastewater discharges were discontinued. Currently, this outfall receives only storm water.

Consent Order sampling is complete for SWMU 48-007(c). Detailed sampling results are presented in the investigation report for Upper Mortandad Canyon Aggregate Area, Revision 1 (LANL 2010c).

AOC 48-001 consists of the air exhaust system at the main radiochemistry laboratory in building 48-1 and surface soil potentially impacted by deposition from the stack emissions. The radiochemistry laboratory in building 48-1 was constructed in 1957 to analyze samples collected from nuclear weapons tests. Currently, radiochemical analyses are conducted at the laboratory to support a variety of programs. The building 48-1 exhaust system consists of nine stacks. Three stacks exhaust unfiltered discharges from chemical hoods, three stacks are associated with combustion boilers, one stack exhausts individually filtered gloveboxes, one stack exhausts filtered air from hot cell laboratories, and one stack exhausts air from a welding and degreasing booth. Discharges from the chemical hoods are not filtered because the chemicals used in the hoods (e.g., perchloric acid) degrade filters. However, these hoods are equipped with wet scrubbers. The glovebox stack (stack FE54) is permitted and monitored under the National Emissions Standards for Hazardous Air Pollutants Program of the Clean Air Act. Monitoring data for stack FE54 were collected beginning in 1967 for plutonium and beginning in 1974 for uranium and fission products. These data indicate releases of plutonium isotopes, uranium isotopes, and fission products, principally cesium-137, cerium-144, and strontium-90.

Consent Order and RFI sampling has been performed at AOC 48-001. No shallow (i.e., less than 3 ft bgs) samples have been collected for AOC 48-001 within the boundary of the M-SMA-3 drainage area, however. Therefore, no soil data are available to evaluate AOC 48-001 with respect to potential sources of TAL exceedances for M-SMA-3.

A-22.2 Storm Water Monitoring Results

SWMU 48-007(c) and AOC 48-001 are monitored within M-SMA-3. Following the installation of baseline control measures, a baseline storm water sample was collected on July 12, 2013. Analytical results from this sample yielded two TAL exceedances (Figure A-22.2-1):

- Gross-alpha activity of 25.4 pCi/L (ATAL is 15 pCi/L) and
- PCB concentration of 18 ng/L (ATAL is 0.6 ng/L).

These 2013 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites.

A-22.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

M-SMA-3 is a 0.37-acre watershed that consists of 81% developed areas and 19% undeveloped areas. Developed areas consist of 0.20 acres of building and 0.10 acres of building rooftop and pavement. Undeveloped areas consist of 0.01 acres of riprap and 0.06 acres of grassland (Figure A-22.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is less than both of these values.
- PCBs—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for background storm water containing sediment derived from Bandelier Tuff is 11.7 ng/L. The PCB result from 2013 is between these values.

A-22.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

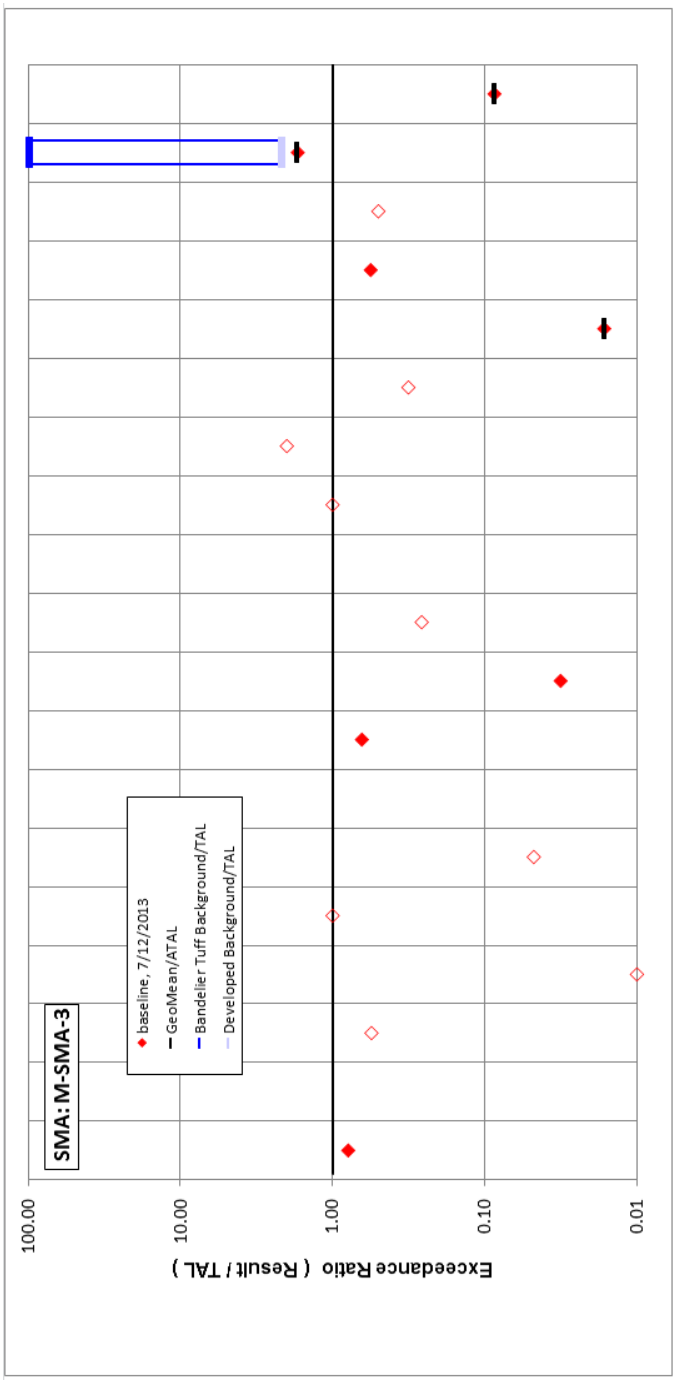
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 48-007(c):

- PCBs are not known to have been associated with industrial materials historically managed at the Site. Two PCB mixtures (Aroclor-1254 and Aroclor-1260) were detected in shallow (i.e. less than 3 ft bgs) Consent Order samples. Aroclor-1254 was detected in five of six shallow samples with a maximum concentration 1.6% of the residential SSL. Aroclor-1260 was detected in four of six shallow samples with a maximum concentration 0.3% of the residential SSL.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.

AOC 48-001:

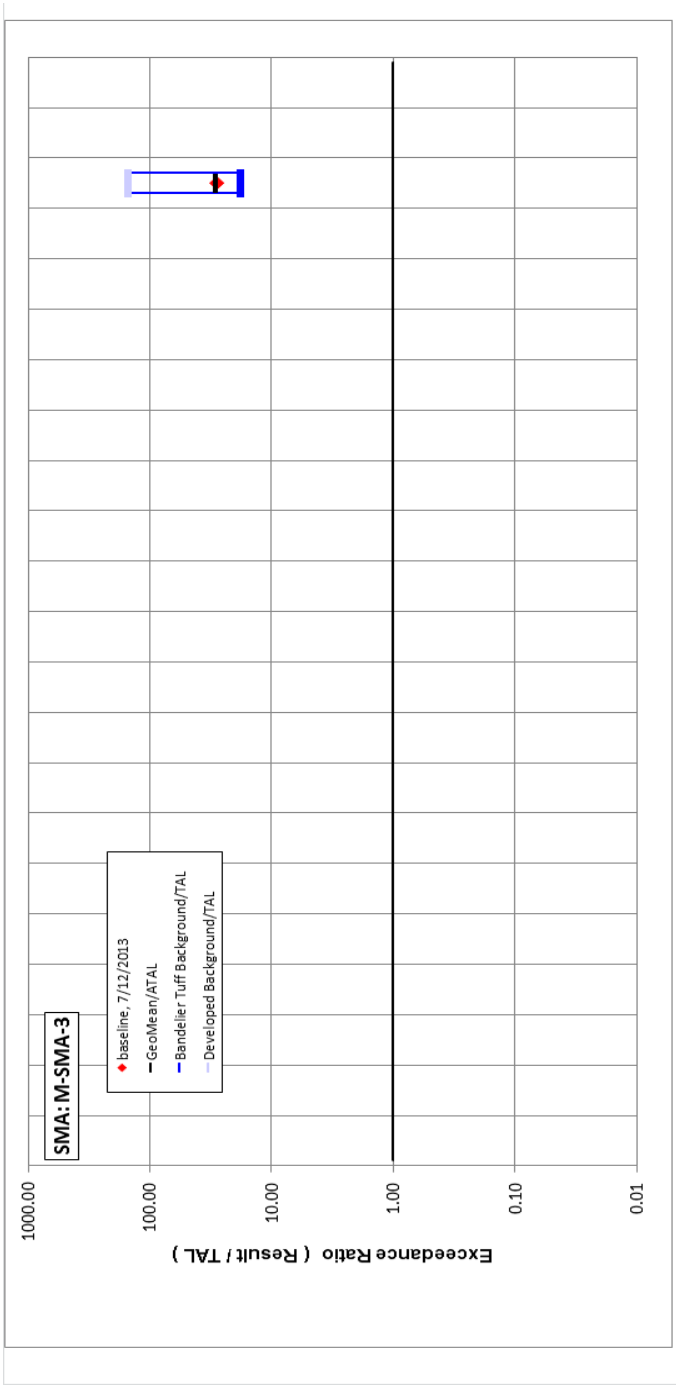
- PCBs are not known to have been associated with industrial materials historically managed at the Site but may be associated with other Sites within the footprint of AOC 48-001. No shallow (i.e., less than 3 ft bgs) samples have been collected for AOC 48-001 within the boundary of the M-SMA-3 drainage area, however. Therefore, no soil data are available to evaluate AOC 48-001 with respect to potential sources of TAL exceedances for M-SMA-3.
- Alpha-emitting radionuclides are known to be associated with the stack emissions historically associated with this Site, although stack emissions would not be considered management of industrial materials. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/12/2013 result	592	3	5	*50*	*1*	*10*	*3.96*	2.76	0.539	*0.2*	0.693	5	***1***	2	1.64	23.6	*0.005*	***25.4***	2.59
result / TAL	0.79	*0.005*	*0.56*	*0.01*	*1*	*0.048*	*0.004*	0.64	0.032	*0.26*	0.0041	*1*	***2***	*0.32*	0.016	0.56	*0.5*	***1.7***	0.086

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-22.2-1 TAL exceedance plot for M-SMA-3



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
7/12/2013 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.018**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**28**	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-22.2-1 (continued) TAL exceedance plot for M-SMA-3

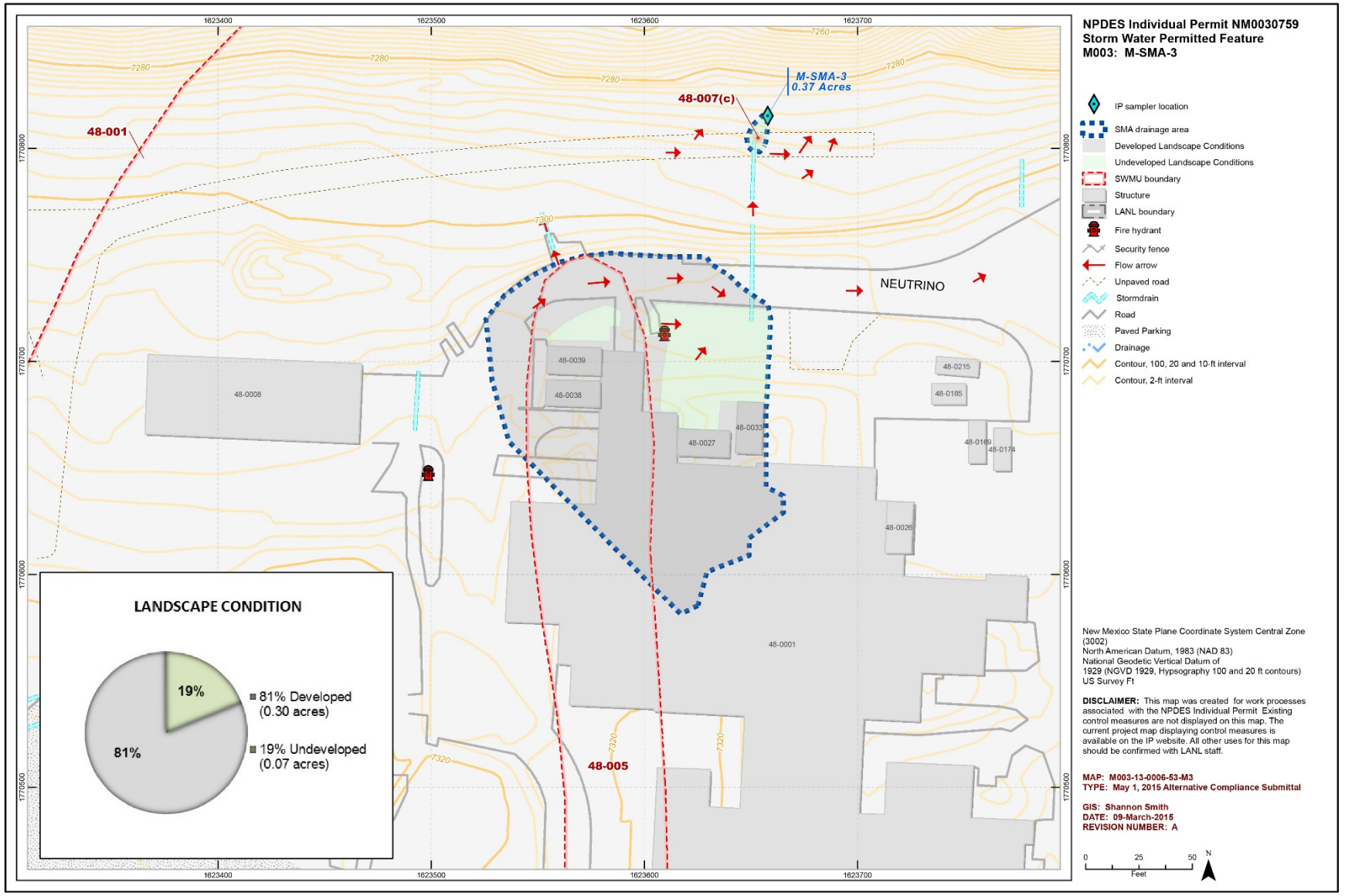


Figure A-22.3-1 SMA map for M-SMA-3

A-23.0 M-SMA-4

A-23.1 Site Description

M-SMA-4, located in the Sandia/Mortandad watershed, includes AOC 48-001, the air exhaust system at the main radiochemistry laboratory in building 48-1 and surface soil potentially impacted by deposition from the stack emissions. The radiochemistry laboratory in building 48-1 was constructed in 1957 to analyze samples collected from nuclear weapons tests. Currently, radiochemical analyses are conducted at the laboratory to support a variety of programs. The building 48-1 exhaust system consists of nine stacks. Three stacks exhaust unfiltered discharges from chemical hoods, three stacks are associated with combustion boilers, one stack exhausts individually filtered gloveboxes, one stack exhausts filtered air from hot cell laboratories, and one stack exhausts air from a welding and degreasing booth. Discharges from the chemical hoods are not filtered because the chemicals used in the hoods (e.g., perchloric acid) degrade filters. However, these hoods are equipped with wet scrubbers. The glovebox stack (stack FE54) is permitted and monitored under the National Emissions Standards for Hazardous Air Pollutants Program of the Clean Air Act. Monitoring data for stack FE54 were collected beginning in 1967 for plutonium and beginning in 1974 for uranium and fission products. These data indicate releases of plutonium isotopes, uranium isotopes, and fission products, principally cesium-137, cerium-144, and strontium-90.

Consent Order and RFI sampling has been performed at AOC 48-001. No shallow (i.e., less than 3 ft bgs) samples have been collected for AOC 48-001 within the boundary of the M-SMA-4 drainage area, however. Therefore, no soil data are available to evaluate AOC 48-001 with respect to potential sources of TAL exceedances for M-SMA-4.

A-23.2 Storm Water Monitoring Results

AOC 48-001 is monitored within M-SMA-4. Following the installation of baseline control measures, a baseline storm water sample was collected on August 19, 2011. Analytical results from this sample yielded three TAL exceedances (Figure A-23.2-1):

- Copper concentration of 6 µg/L (MTAL is 4.3 µg/L),
- Radium-226 and radium-228 activity of 70.3 pCi/L (ATAL is 30 pCi/L), and
- PCB concentration of 58 ng/L (ATAL is 0.6 ng/L).

These 2011 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-23.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

M-SMA-4 is a 7.52-acre watershed that consists of 71% developed areas and 29% undeveloped areas. Developed areas consist of 5.37 acres of building rooftop and pavement. Undeveloped areas consist of 0.86 acres of ponderosa woodland and 1.29 acres of grassland (Figure A-23.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

Monitoring location M-SMA-4 receives storm water run-on from developed environments, including paved parking lots, roads, and buildings, as well as from landscape consisting of Bandelier Tuff sediment. Metals including copper are associated with building materials, parking lots, and automobiles as well as low concentrations in the Bandelier Tuff. PCBs are associated with building materials including paint, caulking, asphalt, solvents, transformers, and cutting oils.

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

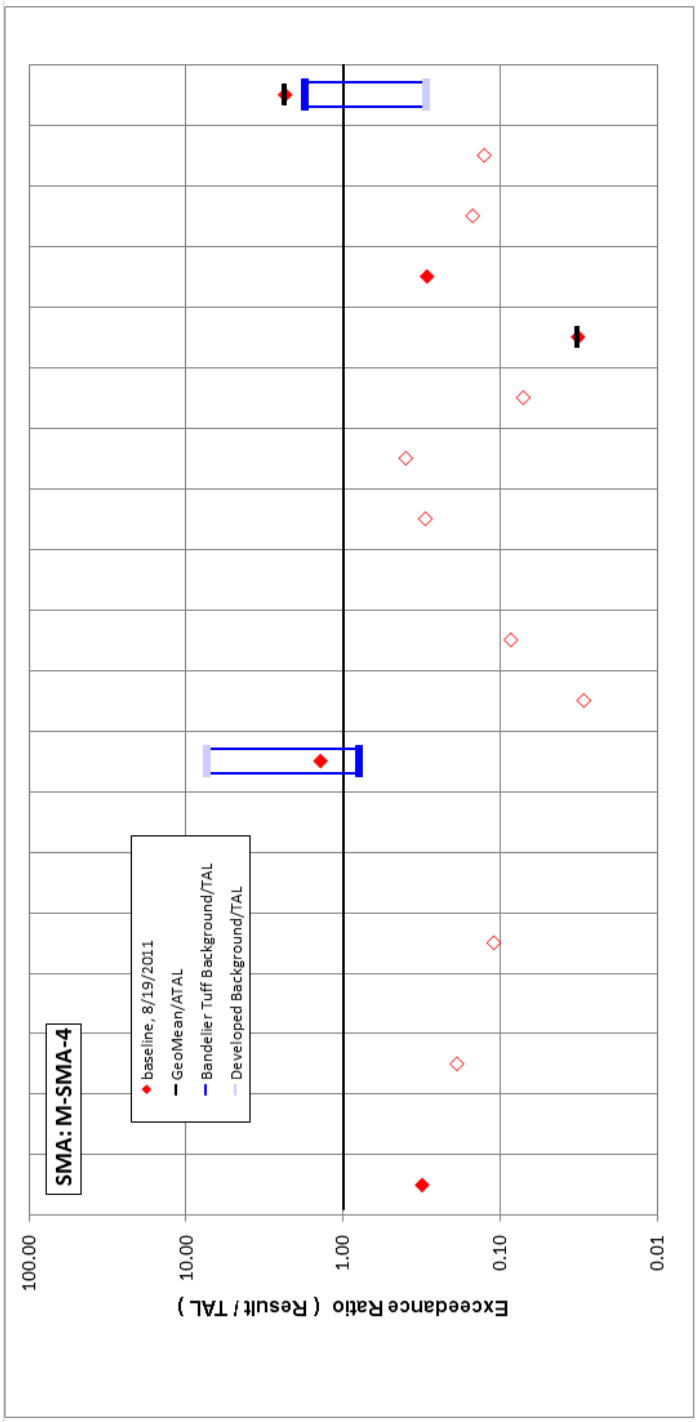
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2011 is between these two values.
- Radium-226 and radium-228—The radium-226 and radium-228 activity UTLs from developed urban landscape storm water run-on is 8.94; the UTL for storm water containing sediments derived from Bandelier Tuff is UTL 52. The radium-226 and radium-228 result from 2011 exceeds these two values.
- PCB—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for storm water containing sediments derived from Bandelier Tuff is 11.7 ng/L. The PCB result from 2011 is between these two values.

A-23.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

AOC 48-001:

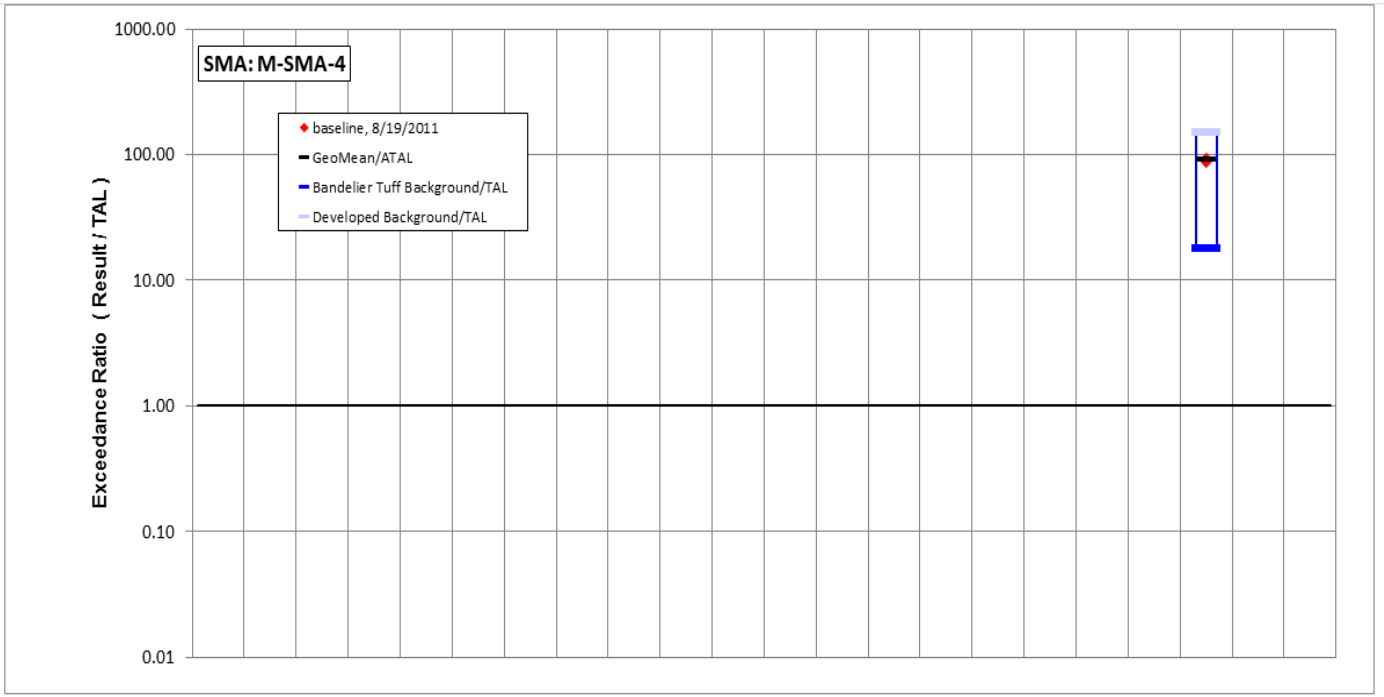
- Copper is not known to have been associated with industrial materials historically managed at the Site. No shallow (i.e., less than 3 ft bgs) samples have been collected for AOC 48-001 within the boundary of the M-SMA-4 drainage area, however. Therefore, no soil data are available to evaluate AOC 48-001 with respect to potential sources of TAL exceedances for M-SMA-4.
- PCBs are not known to have been associated with industrial materials historically managed at the Site but may be associated with other Sites within the footprint of AOC 48-001. However, no shallow (i.e., less than 3 ft bgs) samples have been collected for AOC 48-001 within the boundary of the M-SMA-4 drainage area. Therefore, no soil data are available to evaluate AOC 48-001 with respect to potential sources of TAL exceedances for M-SMA-4.
- Radium-226 and radium-228 may have been associated with industrial materials historically managed at the Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.



std used in ratio calculations	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**	
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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	
8/19/2011 result	236	*1*	*1.7*	18.5	*0.11*	*2*	2.3	**6**	*0.5*	*0.066*	0.96	*1.5*	*0.2*	*0.45*	3.2	12.3	*0.002*	*1.9*	**70.3**	
result / TAL	0.31	*0.002*	*0.19*	0.0037	*0.11*	*0.01*	0.0023	**1.4**	*0.029*	*0.086*	0.0056	*0.3*	*0.4*	*0.071*	0.032	0.29	*0.15*	*0.13*	**2.3**	

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-23.2-1 TAL exceedance plot for M-SMA-4



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
8/19/2011 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.058**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**90**	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-23.2-1 (continued) TAL exceedance plot for M-SMA-4

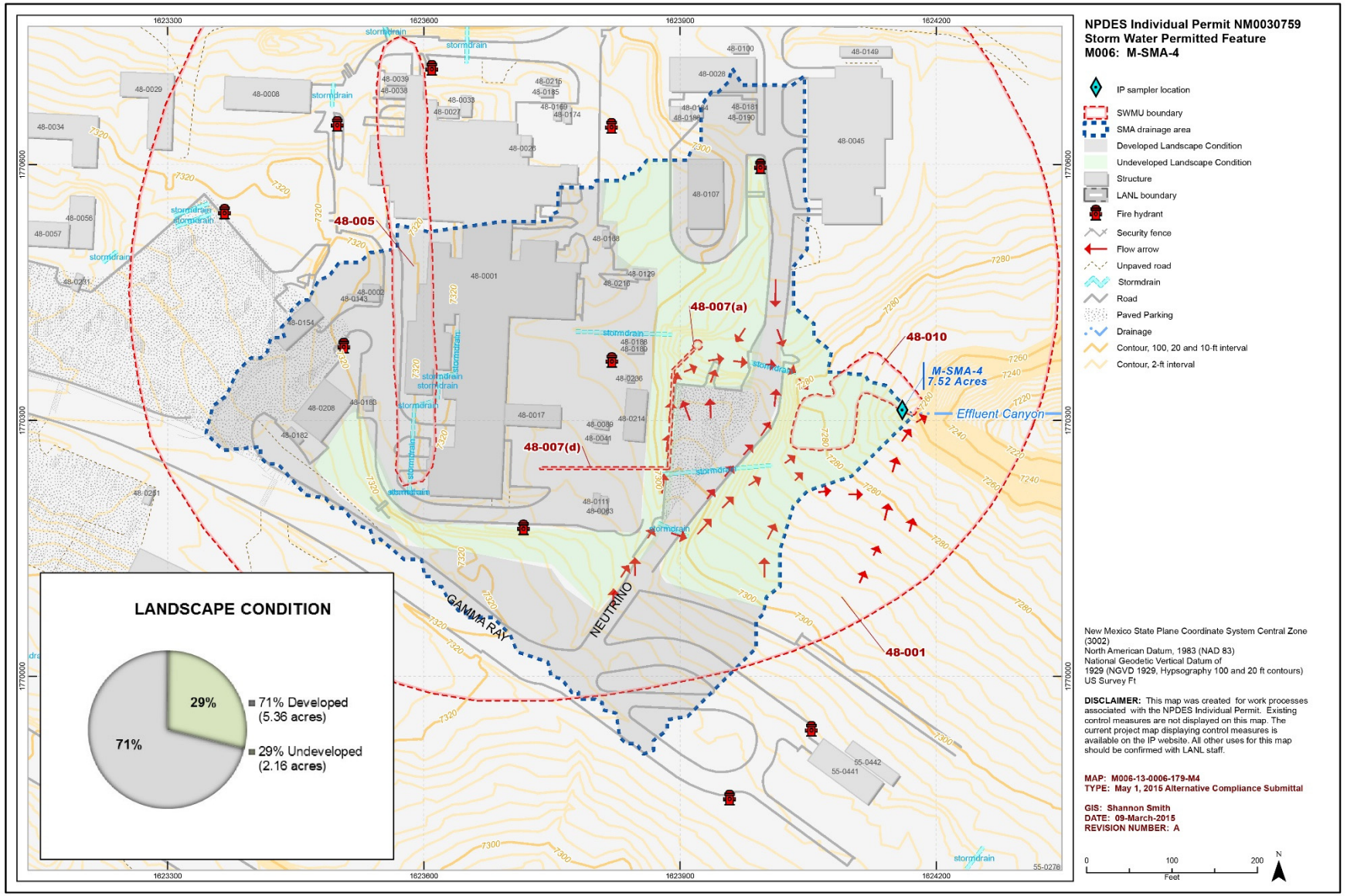


Figure A-23.3-1 SMA map for M-SMA-4

A-24.0 M-SMA-6

A-24.1 Site Description

Site M-SMA-6, located in the Sandia/Mortandad watershed, includes AOC 35-016(h), three storm drains located north of building 35-213. The storm drains were installed in 1979 to handle storm water runoff from roof drains of building 35-213, the nearby parking lot, and discharge from a water deionizer in building 35-213. The drain from the water deionizer was rerouted to the radioactive liquid waste drain system in the mid-1990s and no longer discharges to the storm water system. The storm drain that handles the runoff from roof drains is located on the north side of building 35-213. The storm drain that handled discharges from the water deionizer is located on the northeast side of building 35-213. This storm drain currently only handles storm water runoff from the area around building 35-213. The third storm drain that handles storm water from the nearby parking lot is located northwest of building 35-213. All three storm drains discharge into Mortandad Canyon.

Reevaluation of nature and extent of contamination for AOC 35-016(h) will be completed in the supplemental investigation report for Upper Mortandad Canyon Aggregate Area, scheduled to be submitted to NMED in 2015. It is anticipated this Site will be recommended for corrective action complete and will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the investigation report for Upper Mortandad Canyon Aggregate Area, Revision 1 (LANL 2010c).

A-24.2 Storm Water Monitoring Results

AOC 35-016(h) is monitored within M-SMA-6. Following the installation of baseline control measures, a baseline storm water sample was collected on October 12, 2012. Analytical results from this sample yielded three TAL exceedances (Figure A-24.2-1):

- Copper concentration of 13 µg/L (MTAL is 4.3 µg/L),
- Gross-alpha activity of 168 pCi/L (ATAL is 15 pCi/L), and
- PCB concentration of 35 ng/L (ATAL is 0.6 ng/L).

These 2012 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-24.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

M-SMA-6 is a 0.16-acre watershed that consists of 29% developed areas and 71% undeveloped areas. Developed areas consist of 0.05 acres of pavement. Undeveloped areas consist of 0.11 acres of grassland. The watershed area includes one of the three storm drains comprising AOC 35-016(h). Existing controls are in place to manage run-on and runoff at all three storm drain locations (Figure A-24.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2012 is between these two values.

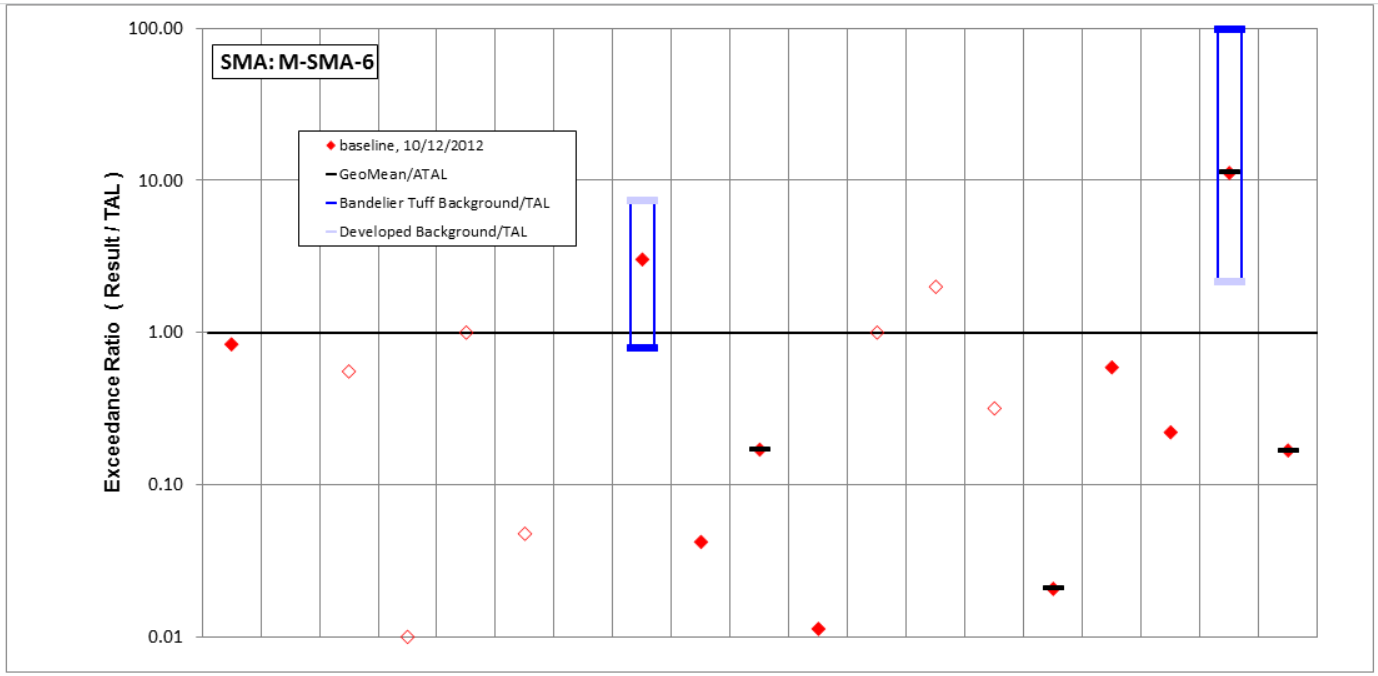
- Gross alpha—The gross-alpha UTL from developed urban landscape storm water run-on is 32.5 pCi/L; the gross-alpha UTL for storm water containing sediments derived from Bandelier Tuff is 1490 pCi/L. The 2012 gross-alpha result is between these two values.
- PCB—The PCB UTL from developed urban landscape storm water run-on is 98 ng/L; the PCB UTL for storm water containing sediments derived from Bandelier Tuff is 11.7 ng/L. The PCB result from 2012 is between these two values.

A-24.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

AOC 35-016(h):

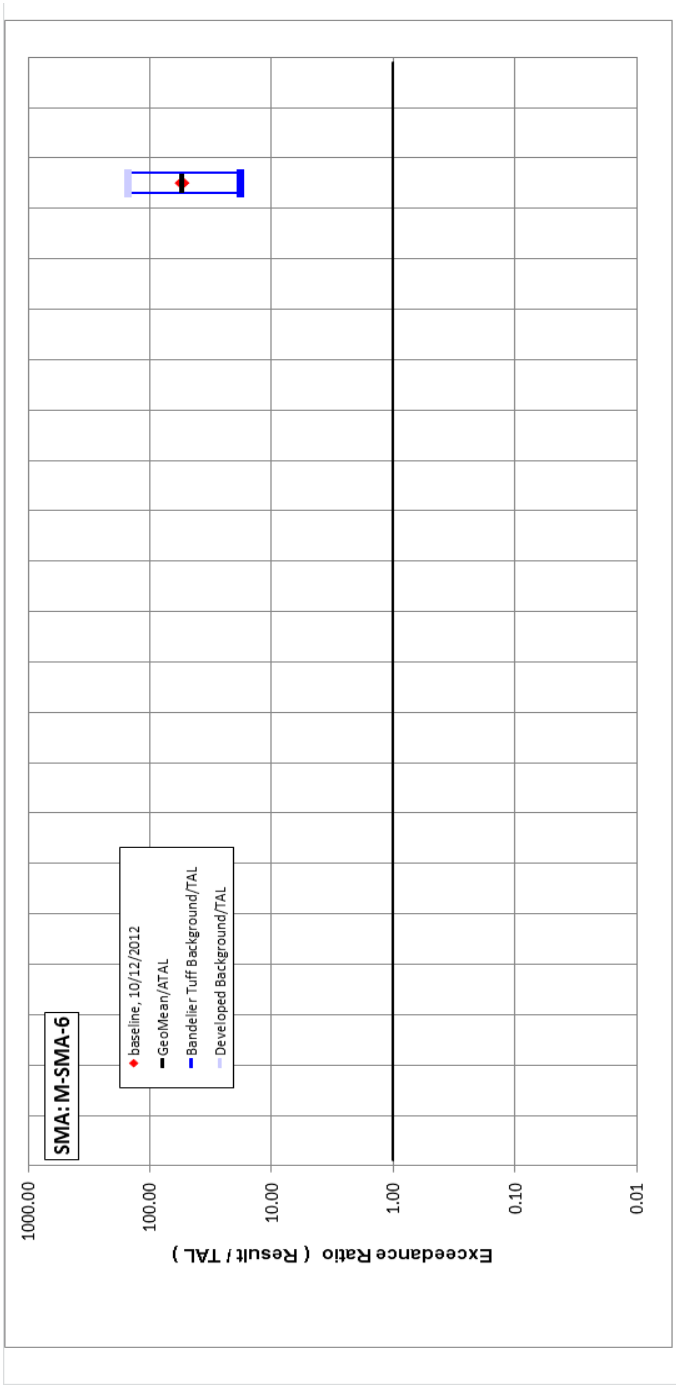
- Copper is not known to have been associated with industrial materials historically managed at this Site. Copper was detected above soil, sediment, and tuff BVs in shallow (i.e., less than 3 ft bgs) Consent Order and RFI samples. Copper was detected above BV in 6 of 21 shallow samples at a maximum concentration 2.3 times the soil BV.
- PCBs are not known to have been associated with industrial materials historically managed at this Site. Consent Order and RFI samples were not analyzed for PCBs because PCBs were not known to have been associated with industrial materials historically managed at this Site.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
10/12/2012 result	628	*3*	*5*	*50*	*1*	*10*	2.91	**13**	0.715	0.131	1.92	*5*	***1***	*2*	2.07	24.8	0.0022	**168**	5.04
result / TAL	0.84	*0.005*	*0.56*	*0.01*	*1*	*0.048*	0.0029	**3**	0.042	0.17	0.011	*1*	***2***	*0.32*	0.021	0.59	0.22	**11**	0.17

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-24.2-1 TAL exceedance plot for M-SMA-6



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6E-04	-	-
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
10/12/2012 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.035**	-	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	-	-

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-24.2-1 (continued) TAL exceedance plot for M-SMA-6

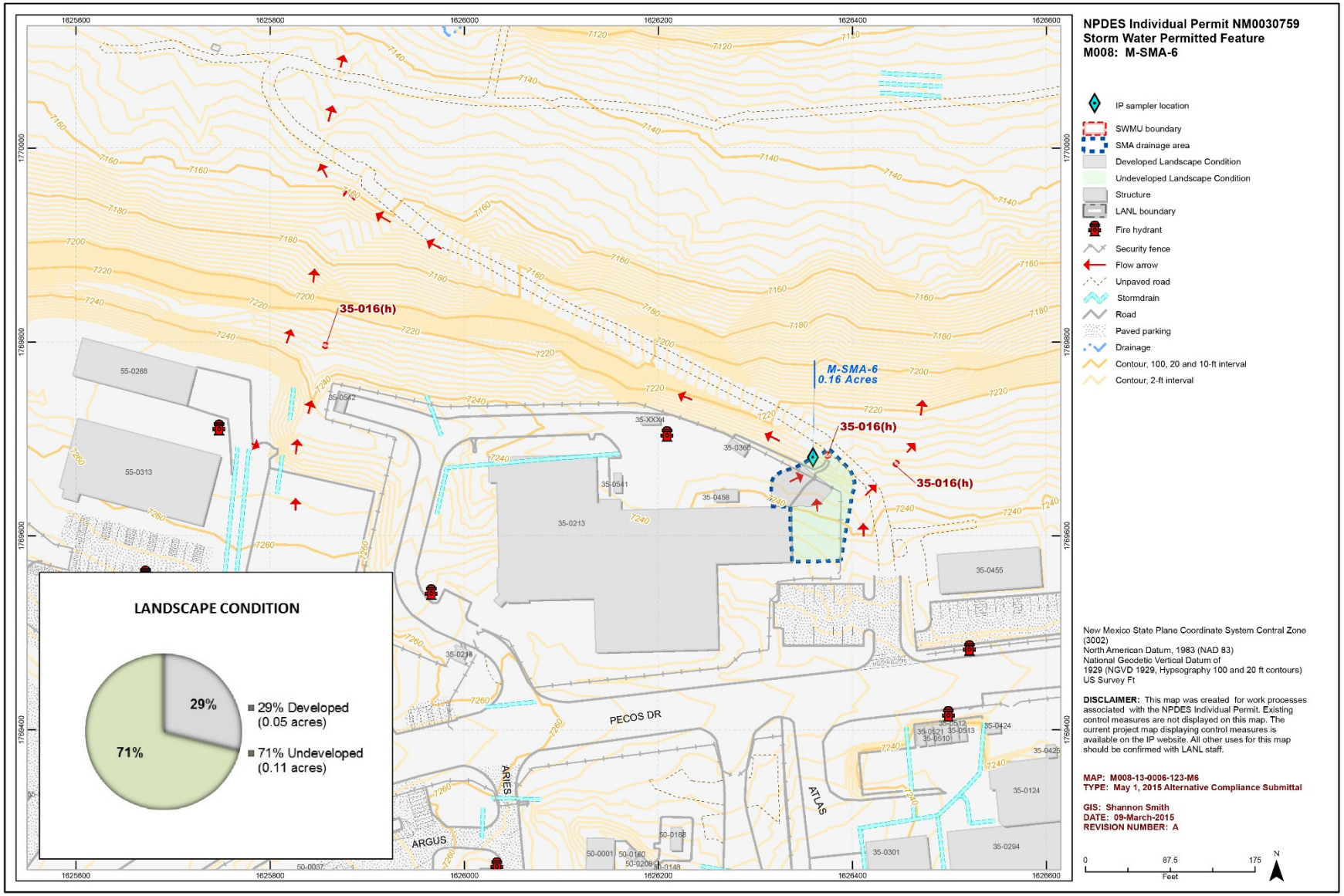


Figure A-24.3-1 SMA map for M-SMA-6

A-25.0 M-SMA-7

A-25.1 Site Description

M-SMA-7, located in the Sandia/Mortandad watershed, includes AOC 35-016(g), a former NPDES-permitted discharge from a CMP culvert, which collected discharge from a reverse osmosis plant and cooling tower blowdown as well as roof and parking lot drainage. Non–storm water discharges from the outfall ceased in 1997 when it was removed from the NPDES permit. The CMP still collects the roof and parking lot storm water drainage. Discharge from the CMP flows in a steep channel incised into bedrock until it reaches an access road to the canyon bottom, where it combines with water from a portion of M-SMA-6 and continues along the access road ditch, ultimately combining with flow from the TA-55 retention basin.

Reevaluation of nature and extent of contamination for AOC 35-016(g) will be completed in the supplemental investigation report for Upper Mortandad Canyon Aggregate Area, scheduled to be submitted to NMED in 2015. AOC 35-016(g) will be recommended for corrective action complete and will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1 (LANL 2010c).

A-25.2 Storm Water Monitoring Results

AOC 35-016(g) is monitored within M-SMA-7. Following the installation of baseline control measures, a baseline storm water sample was collected on July 7, 2012. Analytical results from this sample yielded two TAL exceedances (Figure A-25.2-1):

- Zinc concentration of 60.6 µg/L (MTAL is 42 µg/L) and
- Gross-alpha activity of 46.3 pCi/L (ATAL is 15 pCi/L).

These 2012 TAL exceedances are the subject of the alternative compliance request for this SMA/Site.

A-25.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

M-SMA-7 is a 0.25-acre watershed that consists of 28% developed areas and 72% undeveloped areas. Developed areas consist of 0.07 acres of pavement. Undeveloped areas consist of 0.01 acres of bare rock, 0.07 acres of grassland, and 0.10 acres of willows (Figure A-25.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

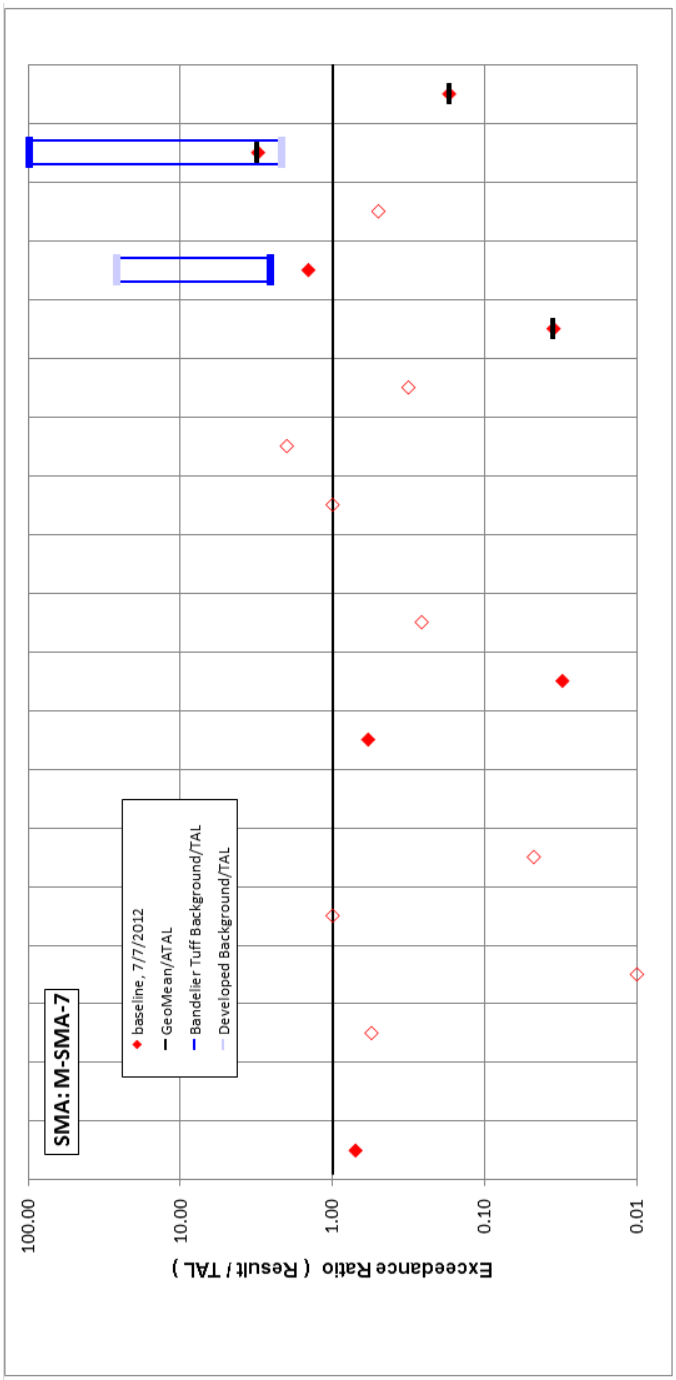
- Zinc—The zinc UTL from developed urban landscape storm water run-on is 1120 µg/L; the zinc UTL for storm water containing sediments derived from Bandelier Tuff is 109 µg/L. The zinc result from the 2012 sample is less than both of these values.
- Gross alpha—The gross-alpha UTL from developed urban landscape storm water run-on is 32.5 pCi/L; the gross-alpha UTL for storm water containing sediments derived from Bandelier Tuff is 1490 pCi/L. The 2012 gross-alpha result is between these two values.

A-25.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

AOC 35-016(g):

- Zinc is not known to have been associated with industrial materials historically managed at this Site but may be present from corrosion of the galvanized CMP. Zinc was detected above sediment and tuff BVs in shallow (i.e., less than 3 ft bgs) Consent Order and RFI samples. Zinc was detected above BV in 5 of 20 shallow samples at a maximum concentration 5.4 times the sediment BV.
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross alpha radioactivity.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/7/2012 result	530	4.84	5	*50*	*1*	*10*	2.15	2.51	0.525	*0.2*	1.07	5	***1***	2	3.53	**60.6**	*0.005*	**46.3**	5.14
result / TAL	0.71	0.0076	0.56	*0.01*	*1*	*0.048*	0.0022	0.58	0.031	*0.26*	0.0063	*1*	***2***	*0.32*	0.035	**1.4**	*0.5*	**3.1**	0.17

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-25.2-1 TAL exceedance plot for M-SMA-7

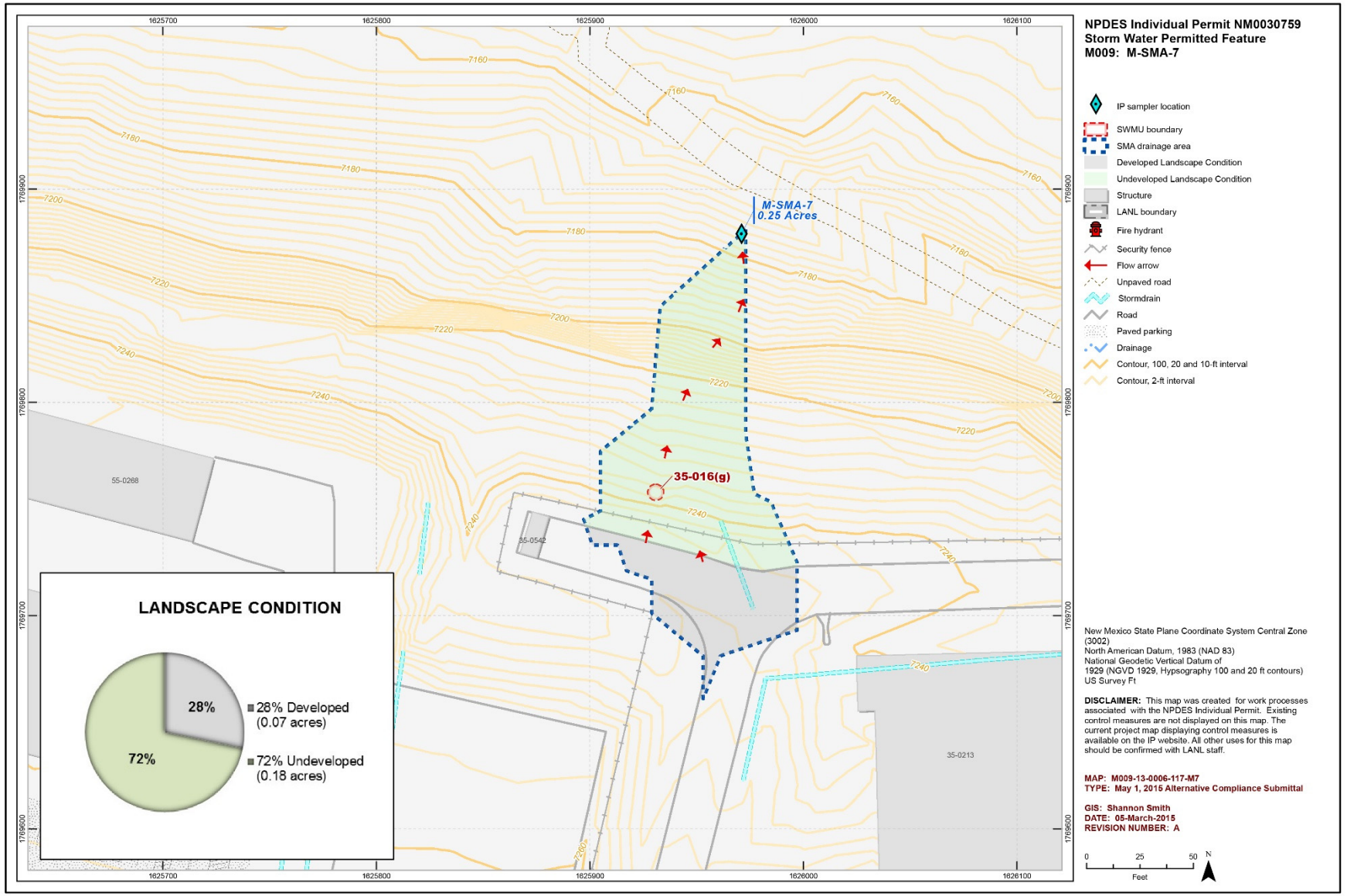


Figure A-25.3-1 SMA map for M-SMA-7

A-26.0 STRM-SMA-1.05

A-26.1 Site Description

STRM-SMA-1.05, located in the Pajarito watershed, includes AOC 08-009(f), an inactive outfall located approximately 40 ft southeast of building 08-22 (the x-ray building). Fluorescent penetrants (mixtures of dyes and surfactants) were used in building 08-22 to detect cracks in parts being prepared for installation into a weapons assembly; copper was not a component in the fluorescent penetrants. Historically, fluorescent penetrants, developers, and emulsifiers were discharged to the outfall through drains and drainlines located within building 08-22. The valves to the sinks that discharged to the drains were disconnected in 1992, and the drains were rerouted to the building 08-22 sanitary sewer system. After 1992, secondary containers were used to collect the chemicals for disposal.

Consent Order investigations have not been performed at AOC 08-009(f), and no decision-level data are available for this Site. Screening-level data are available from an RFI performed in 1994. Detailed sampling results are presented in the Historical Investigation Report for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1 (LANL 2010e).

A-26.2 Storm Water Monitoring Results

AOC 08-009(f) is monitored within STRM-SMA-1.05. Following the installation of baseline control measures, two baseline storm water samples were was collected on August 5, 2011, and August 26, 2011. Analytical results from these samples yielded two TAL exceedances (Figure A-26.2-1):

- Copper concentrations of 5.7 µg/L and 6.9 µg/L (MTAL is 4.3 µg/L).

Following the installation of enhanced control measures at STRM-SMA-1.05, corrective action storm water samples were collected on July 12, 2013, and August 1, 2013. Analytical results from this corrective action monitoring sample yielded two TAL exceedances:

- Copper concentrations of 9.92 µg/L and 10.8 µg/L (MTAL is 4.3 µg/L).

These 2013 TAL exceedances is the subject of the alternative compliance request for this SMA/Site. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-26.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

STRM-SMA-1.05 is a 3.31-acre watershed that consists of 17% developed areas and 83% undeveloped areas. Developed areas consist of 0.07 acres of building rooftops and 0.49 acres of pavement. Undeveloped areas consist of 2.75 acres of grassland (Figure A-26.3-1 shows the SMA map with the percentage of developed and undeveloped areas shown within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

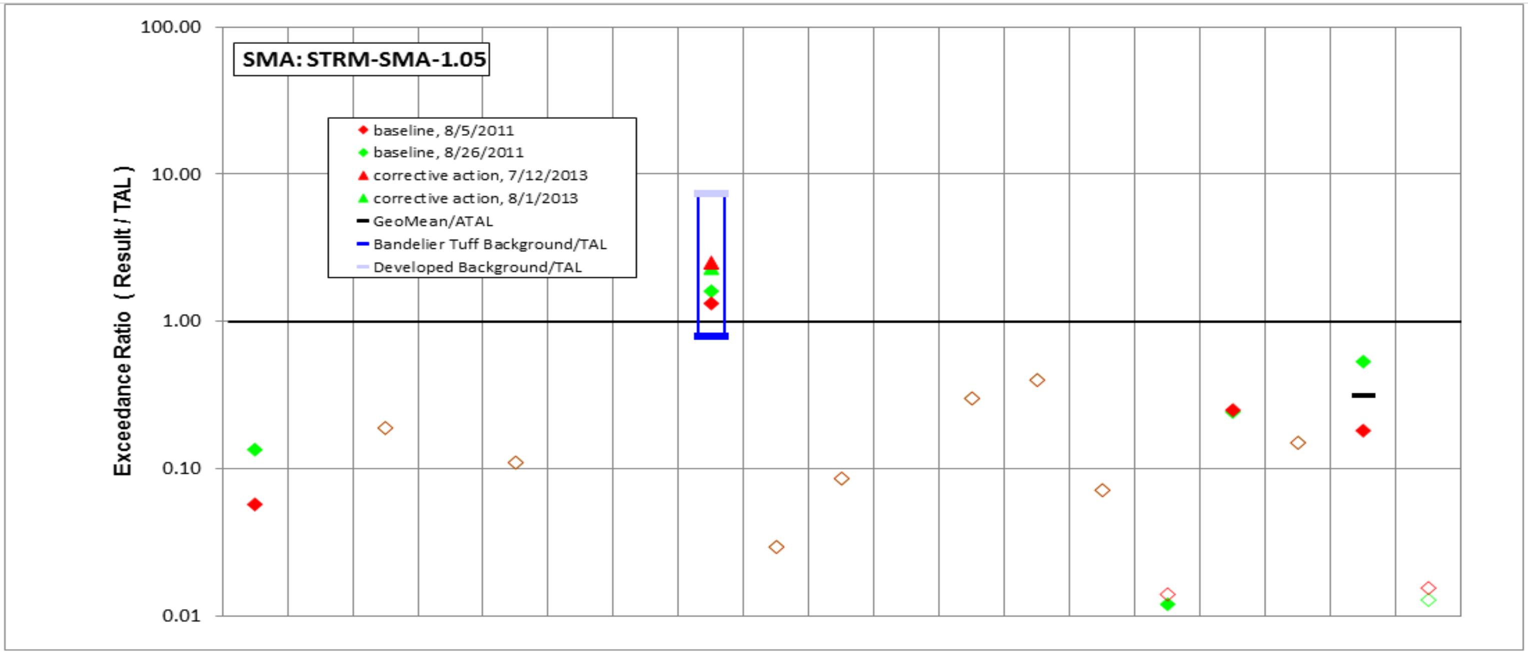
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper results from 2011 and 2013 are between these values.

A-26.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e. less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

AOC 08-009(f):

- Copper is not known to have been associated with industrial materials historically managed at this Site. Copper was not detected above the soil BV in shallow (i.e., less than 3 ft bgs) RFI soil samples. The RFI data are screening level only.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
8/1/2013 result	-	-	-	-	-	-	-	**9.92**	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	**2.3**	-	-	-	-	-	-	-	-	-	-	-
7/12/2013 result	-	-	-	-	-	-	-	**10.8**	-	-	-	-	-	-	-	-	-	-	-
result / TAL	-	-	-	-	-	-	-	**2.5**	-	-	-	-	-	-	-	-	-	-	-
8/26/2011 result	101	3.2	*1.7*	*15*	*0.11*	*2*	1.3	**6.9**	*0.5*	*0.066*	1	*1.5*	*0.2*	*0.45*	1.2	10.2	*0.002*	8	*0.385*
result / TAL	0.13	0.005	*0.19*	*0.003*	*0.11*	*0.01*	0.0013	**1.6**	*0.029*	*0.086*	0.0059	*0.3*	*0.4*	*0.071*	0.012	0.24	*0.15*	0.53	*0.013*
8/5/2011 result	42.9	2.5	*1.7*	*15*	*0.11*	*2*	*1*	**5.7**	*0.5*	*0.066*	1.6	*1.5*	*0.2*	*0.45*	*1.4*	10.5	*0.002*	2.72	*0.464*
result / TAL	0.057	0.0039	*0.19*	*0.003*	*0.11*	*0.01*	*0.001*	**1.3**	*0.029*	*0.086*	0.0094	*0.3*	*0.4*	*0.071*	*0.014*	0.25	*0.15*	0.18	*0.015*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-26.2-1 TAL exceedance plot for STRM-SMA-1.05

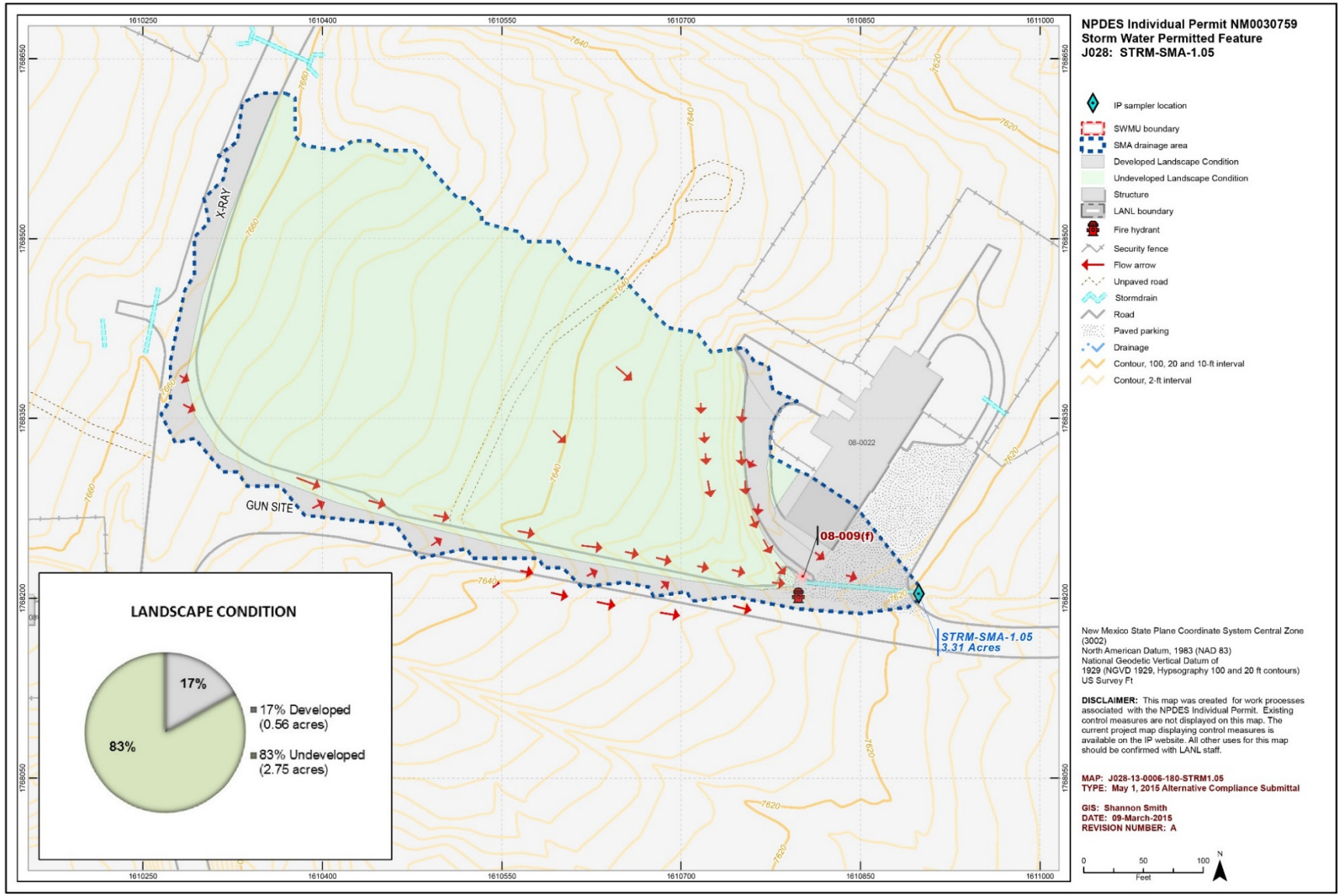


Figure A-26.3-1 SMA map for STRM-SMA-1.05

A-27.0 W-SMA-1

A-27.1 Site Description

W-SMA-1, located in the Water/Cañon de Valle, includes SWMUs 16-026(v), 16-026(c2), and 16-017(j)-99. SWMU 16-026(v) is a former NPDES-permitted outfall (05A072) that served decommissioned analytical chemistry laboratory building 16-460 at TA-16. The outfall is located approximately 60 ft southeast of the building and received effluent from a sump [SWMU 16-003(c)], building floor drains, steam-cup drains, sink drains, and a drinking fountain. The outfall was plugged in 1992. It was removed from the NPDES permit effective September 19, 1997.

Consent Order sampling has not yet been conducted at SWMU 16-026(v); however, decision-level data are available from the 1995 RFI. Detailed sampling results are presented in the Historical Investigation Report for Upper Water Canyon Aggregate Area, Revision 1 (LANL 2010d).

SWMU 16-026(c2) is consists of the two outfalls that served chemical storage building 16-462 at TA-16. The outfalls are located approximately 30 ft southeast of the building. Floor troughs within 16-462 drain to 6-in.-diameter VCP drainlines that exit the south and southeast side of the building. Effluent flowed from the drainlines southeast to a drainage ditch. Building 16-462 was built in 1952 to store chemicals for use in the analytical chemistry laboratory (building 16-460). All drains at building 16-462 were plugged in 1991. There is no record of chemical spills in building 16-462.

Consent Order or other environmental investigations have not been performed at SWMU 16-026(c2); no investigation data are available for this Site.

SWMU 16-017(j)-99 is a former HE magazine (structure 16-63) at TA-16 is also an historical industrial activity associated with this SMA. This Site is planned for completion of corrective action through a no exposure submittal and is not part of this alternative compliance request.

A-27.2 Storm Water Monitoring Results

SWMUs 16-026(c2) and 16-026(v) are monitored within W-SMA-1. Following the installation of baseline control measures, two baseline storm water samples were collected on August 3, 2011, and September 9, 2011 (Figure A-27.2-1). Analytical results from these samples yielded three TAL exceedances:

- Aluminum concentrations of 918 µg/L and 1410 µg/L (MTAL is 750 µg/L) and
- Gross-alpha activity of 50.7 pCi/L (ATAL is 15 pCi/L).

Following the installation of enhanced control measures at W-SMA-1, corrective action storm water samples were collected on September 12, 2013, and July 19, 2014 (Figure A-27.2-1). Analytical results from these corrective action monitoring samples yielded four TAL exceedances:

- Aluminum concentration of 1010 µg/L and 858 µg/L (MTAL is 750 µg/L),
- Copper concentrations of 4.45 µg/L (MTAL is 4.3 µg/L), and
- Gross-alpha activity of 314 pCi/L (ATAL is 15 pCi/L).

The 2013 and 2014 TAL exceedances are the subject of the alternative compliance request for these SMA/Sites. TAL exceedances from the baseline compliance stage are provided for informational purposes only and are not evaluated in the following discussion.

A-27.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

W-SMA-1 is a 5.91-acre watershed that consists of 22% developed areas and 78% undeveloped areas. Developed areas consist of 1.28 acres of building rooftop and pavement. Undeveloped areas consist of 3.23 acres of ponderosa and 1.40 acres of grassland (Figure A-27.3-1 shows the SMA map with the percentage of developed and undeveloped areas shown within the SMA). The watershed area includes two of the three Sites included in W-SMA-1: 16-026(c2) and 16-026(v). Existing controls are in place to manage run-on and runoff at the remaining Site 16-017(j)-99, which is not included of this request for alternative compliance.

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Aluminum—The aluminum UTL for storm water containing sediments derived from Bandelier Tuff is 2210 µg/L and the aluminum background storm water UTL for storm water run-on from a developed urban landscape is 245 µg/L. The two results from 2011 and the result from 2013 are between these values.
- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2014 is between these two values.
- Gross alpha—The gross-alpha UTL for storm water containing sediments derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The result from 2013 is between these two values, and the geometric mean of both gross-alpha results from 2011 is below both of these values.

A-27.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

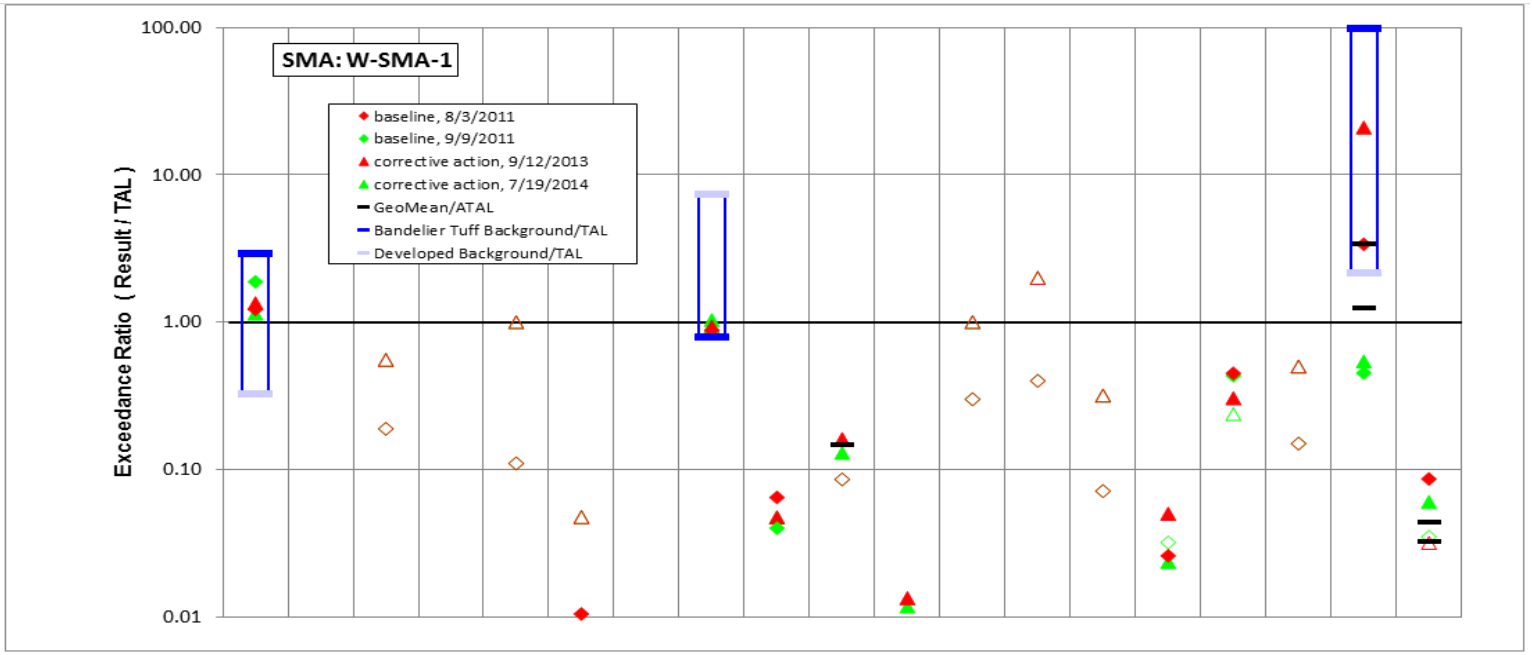
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 16-026(c2):

- Aluminum is not known to be associated with industrial materials historically managed at the Site. No investigation data are available for SWMU 16-026(c2).
- Copper is not known to be associated with industrial materials historically managed at the Site. No investigation data are available for SWMU 16-026(c2).
- Alpha-emitting radionuclides are not known to have been associated with industrial materials historically managed at this Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.

SWMU 16-026(v):

- Aluminum is not known to be associated with industrial materials historically managed at the Site. Aluminum was detected in one of nine shallow RFI samples at a concentration equivalent to the tuff BV.
- Copper is not known to be associated with industrial materials historically managed at the Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.



	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	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/19/2014 result	**858**	*3*	*5*	17.5	*1*	*10*	1.22	**4.45**	0.805	0.1	2	*5*	***1***	*2*	2.36	*10*	*0.005*	8.13	1.81
result / TAL	**1.1**	*0.005*	*0.56*	0.0035	*1*	*0.048*	0.0012	**1**	0.047	0.13	0.012	*1*	***2***	*0.32*	0.024	*0.24*	*0.5*	0.54	0.06
9/12/2013 result	**1010**	*3*	*5*	18.8	*1*	*10*	1.45	4.01	0.806	0.124	2.28	*5*	***1***	*2*	5.01	12.8	*0.005*	**314**	*0.953*
result / TAL	**1.3**	*0.005*	*0.56*	0.0038	*1*	*0.048*	0.0014	0.93	0.047	0.16	0.013	*1*	***2***	*0.32*	0.05	0.3	*0.5*	**21**	*0.032*
9/9/2011 result	**1410**	*1*	*1.7*	*15*	*0.11*	*2*	3.7	3.6	0.68	*0.066*	1.6	*1.5*	*0.2*	*0.45*	*3.2*	18.2	*0.002*	6.78	*1.05*
result / TAL	**1.9**	*0.002*	*0.19*	*0.003*	*0.11*	*0.01*	0.0037	0.84	0.04	*0.086*	0.0094	*0.3*	*0.4*	*0.071*	*0.032*	0.43	*0.15*	0.45	*0.035*
8/3/2011 result	**918**	*1*	*1.7*	*15*	*0.11*	2.2	2.4	3.8	1.1	*0.066*	1.6	*1.5*	*0.2*	*0.45*	2.6	18.9	*0.002*	**50.7**	2.59
result / TAL	**1.2**	*0.002*	*0.19*	*0.003*	*0.11*	0.01	0.0024	0.88	0.065	*0.086*	0.0094	*0.3*	*0.4*	*0.071*	0.026	0.45	*0.15*	**3.4**	0.086

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-27.2-1 TAL exceedance plot for W-SMA-1

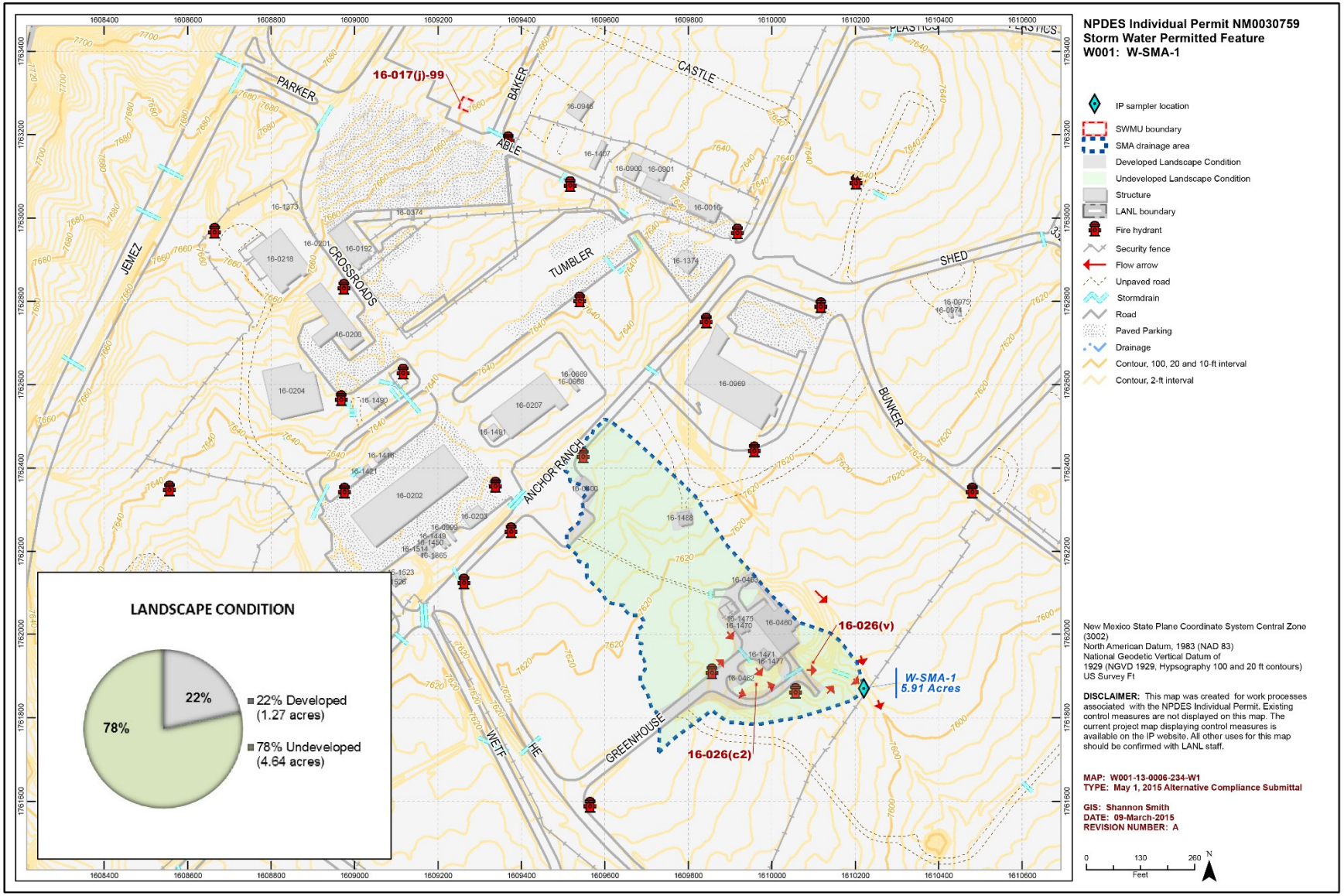


Figure A-27.3-1 SMA map for W-SMA-1

A-28.0 W-SMA-5

A-28.1 Site Description

W-SMA-5, located in the Water/Cañon de Valle, includes SWMUs 16-001(e), 16-003(f), 16-026(b), 16-026(c), 16-026(d), and 16-026(e). SWMU 16-001(e) is an inactive dry well located at TA-16 approximately 170 ft east of HE processing building 16-306. Constructed in the 1980s, the dry well never functioned properly because it drained to impermeable tuff (Qbt 4). Eventually, the dry well was filled with soil and capped with concrete.

Consent Order Phase I investigation sampling is complete. SWMU 16-001(e) will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 16-001(e) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-003(f) consists of two HE sumps at TA-16 that served building 16-304. The sumps discharged to an outfall. Building 16-304 was a plastics and plastic-component development and production facility. Polycarbonate components were fabricated using injection-molding machines. Other components were made using hydraulic presses. Large high-temperature ovens were used to dry-mold powders and to cure thermoset plastics. Solvents also were used at building 16-304. By 1993, solvents were containerized and sent off-site for disposal, and HE operations in the building had ceased.

Consent Order Phase I investigation sampling is complete. SWMU 16-003(f) will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 16-003(f) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-026(b) is an inactive outfall located to the east of a resthouse (building 16-307). The outfall formerly received discharge from two HE sumps [SWMU 16-029(a)] located near the exterior southeast wall of the resthouse. The outfall discharged to Water Canyon. The sumps were plugged in 1990 and 1991. The resthouse was used to store molds and materials for plastics development and also previously housed a solvent disassembly tank used to remove HE from test devices.

Consent Order Phase I investigation sampling is complete. SWMU 16-026(b) will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 16-026(b) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-026(c) is an inactive outfall located at TA-16 to the south of a resthouse (building 16-305). The outfall previously received discharge from two HE sumps [SWMU 16-029(b)] located near the exterior southwest wall of the resthouse. The outfall discharged to Water Canyon. One soil sample was taken from the outfall at structure 16-305 in 1970. Analytical results showed no TNT [trinitrotoluene(2,4,6-)]; RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine); or HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine), although some unknown HE decomposition products may have been present at low levels. The sumps were plugged in 1990 and 1991. The resthouse was used to store chemicals and solvents for plastics development and production and was also used for filament winding of developmental weapons components.

Consent Order Phase I investigation sampling is complete. SWMU 16-026(c) will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 16-026(c) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-026(d) is an inactive outfall located to the southeast of a resthouse (building 16-303). The outfall formerly received discharge from two HE sumps [SWMU 16-029(c)] located on the exterior southwest wall of the resthouse. Potential contaminants were HE, inorganic chemicals, and organic chemicals. The outfall discharged to Martin Spring Canyon. Two samples were collected at the SWMU 16-026(d) outfall in 1970. Samples showed elevated levels of HMX and/or RDX and TNT. The sumps were plugged in 1990 and 1991.

Consent Order Phase I investigation sampling is complete. SWMU 16-026(d) will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 16-026(d) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-026(e) is an inactive outfall located to the south of building 16-301. The outfall formerly received discharge from two HE sumps [SWMU 16-029(d)] located on the exterior west side of building 16-301. The outfall discharged to Martin Spring Canyon. Building 16-301 originally housed mock-HE processing operations and stored raw materials that were used to prepare mock HE. Building 16-301 was later used as an environmental testing laboratory for research into the effects of temperature, pressure, and humidity on weapons and components. The sumps were plugged in 1990 and 1991.

Phase I Consent Order sampling is complete for SWMU 16-026(e). Additional extent sampling at SMWU 16-026(e) is expected to be required as part of the Phase II investigation for S-Site Aggregate Area. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

A-28.2 Storm Water Monitoring Results

SWMUs 16-001(e), 16-003(f), 16-026(b), 16-026(c), 16-026(d), and 16-026(e) are monitored within W-SMA-5. Following the installation of baseline control measures, a baseline storm water sample was collected on July 3, 2012. Analytical results from this sample yielded one TAL exceedance (Figure A-28.2-1):

- Copper concentration of 6.28 µg/L (MTAL is 4.3 µg/L).

This 2012 TAL exceedance is the subject of the alternative compliance request for these SMA/Sites.

A-28.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

W-SMA-5 is a 71.30-acre watershed that consists of 16% developed areas and 84% undeveloped areas. Developed areas consist of 11.43 acres of building rooftops and pavement. Undeveloped areas consist of 51.97 acres of ponderosa woodland and 7.90 acres of grassland (Figure A-28.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL for storm water containing sediments derived from Bandelier Tuff is 3.43 µg/L, and the copper background storm water UTL for storm water run-on from a developed urban landscape is 32.3 µg/L. The result from 2012 is between these values.

A-28.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 16-001(e):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above the soil BV in shallow (i.e., less than 3 ft bgs) Consent Order samples. Copper was detected above BV in 2 of 4 shallow samples with a maximum concentration 1.9 times the soil BV.

SWMU 16-003(f):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was not detected above BV in 1 shallow Consent Order soil sample collected at the Site.

SWMU 16-026(b):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was not detected above BVs in 8 shallow Consent Order and RFI soil, sediment, and tuff samples.

SWMU 16-026(c):

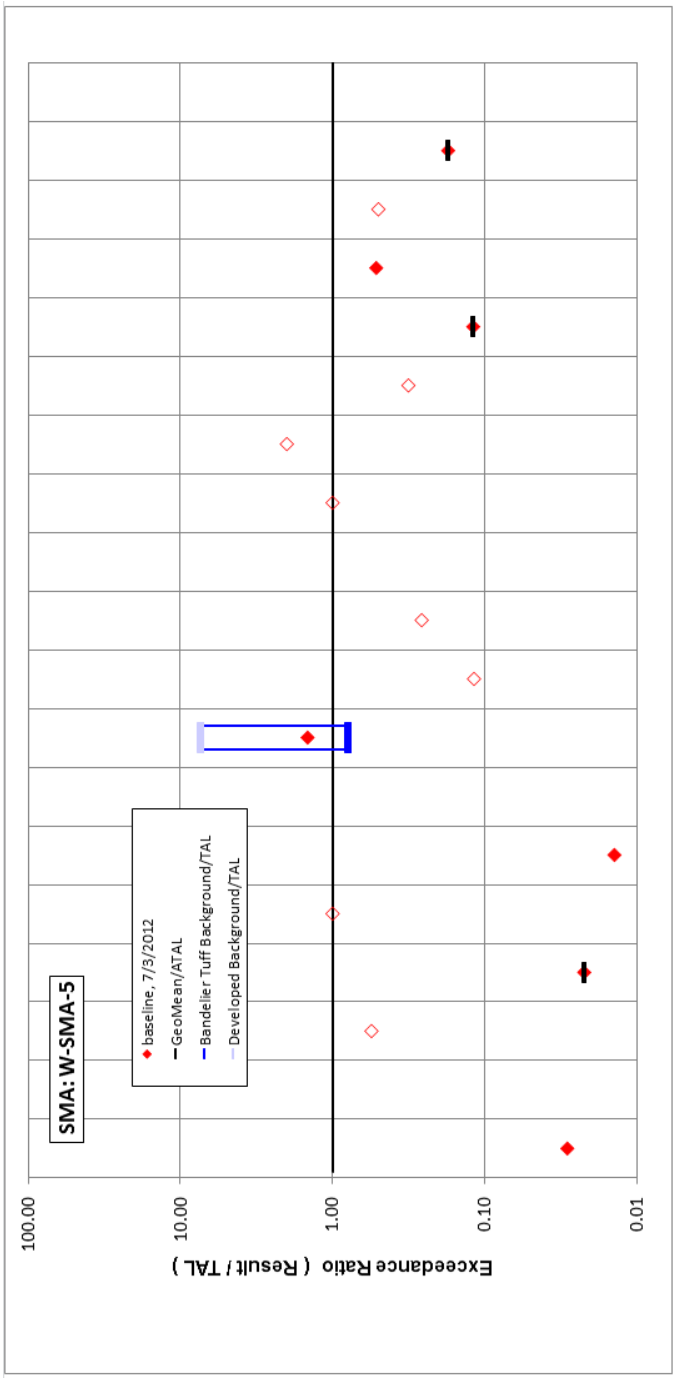
- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above soil, sediment, and tuff BVs in shallow Consent Order and RFI samples. Copper was detected above BVs in 5 of 13 shallow samples with a maximum concentration 3.8 times sediment BV.

SWMU 16-026(d):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above soil and tuff BVs in shallow Consent Order and RFI samples. Copper was detected above the BVs in 3 of 16 shallow soil and tuff samples with a maximum concentration 4.5 times soil BV.

SWMU 16-026(e):

- Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected only slightly above soil and tuff BVs in shallow Consent Order and RFI samples. Copper was detected above the BVs in 3 of 19 shallow soil and tuff samples with a maximum concentration above BV 1.7 times the tuff BV.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
7/3/2012 result	21.5	3	5	111	*1*	2.95	5	**6.28**	2	*0.2*	0.533	5	***1***	2	11.9	21.7	*0.005*	2.61	*0.224*
result / TAL	0.029	*0.005*	*0.56*	0.022	*1*	0.014	*0.005*	**1.5**	*0.12*	*0.26*	0.0031	*1*	***2***	*0.32*	0.12	0.52	*0.5*	0.17	*0.008*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-28.2-1 TAL exceedance plot for W-SMA-5

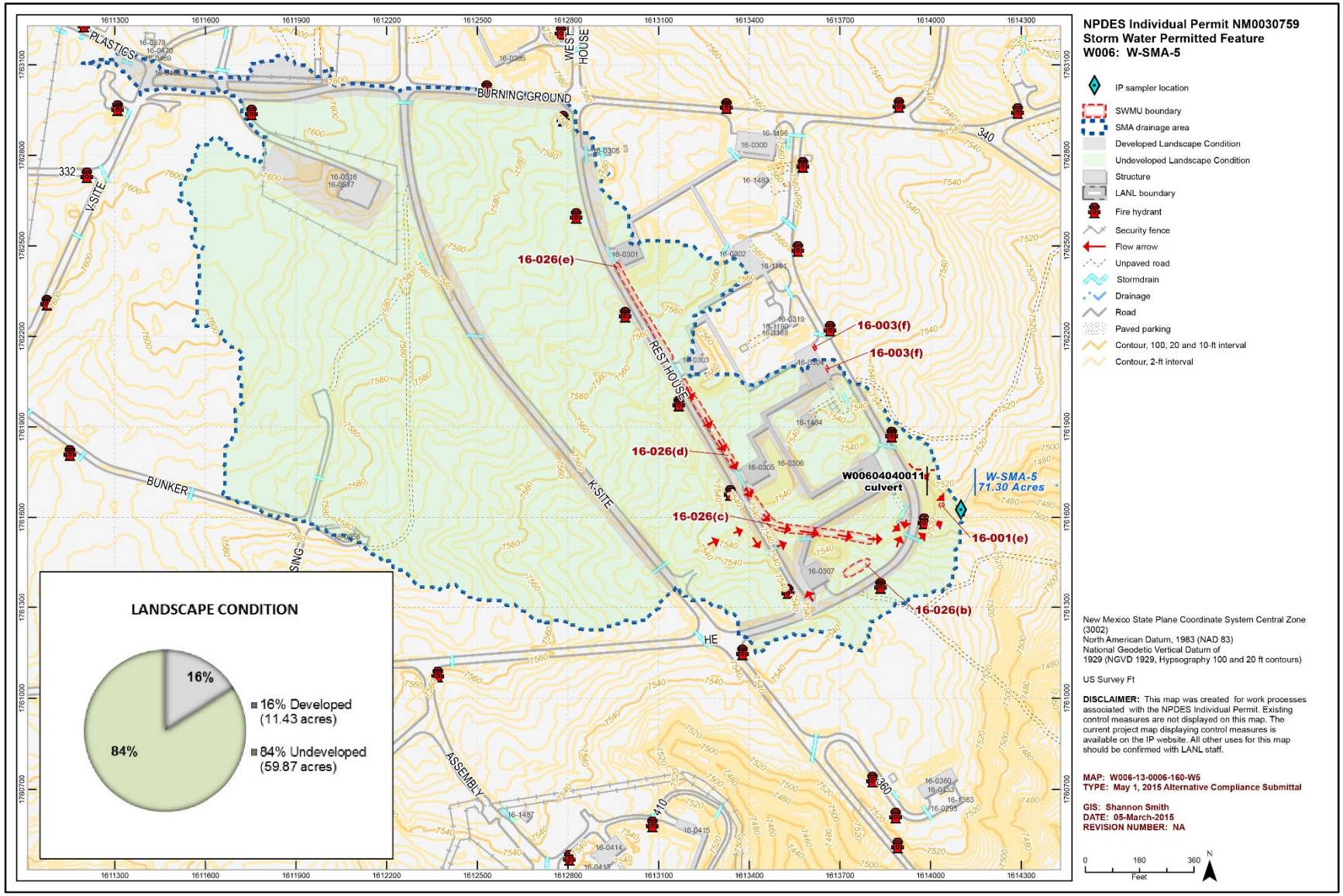


Figure A-28.3-1 SMA map for W-SMA-5

A-29.0 W-SMA-8.7

A-29.1 Site Description

W-SMA-8.7, located in the Water/Cañon de Valle, includes SWMUs 13-001, 13-002, 16-004(a), 16-026(j2), 16-029(h) and 16-035. SWMU 13-001 is an inactive firing site located east of former building 16-340. The firing site is associated with firing activities conducted at P-Site (former TA-13). The area contains shrapnel and debris, including firing cables, lead balls, and chunks of steel and copper.

Phase I Consent Order sampling is complete for SWMU 13-001. All detected inorganic and organic chemical concentrations and radionuclide activities from Consent Order samples were below residential SSLs, except for two detections of arsenic in two subsurface tuff samples. SWMU 13-001 will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 13-001 will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 13-002 is an inactive surface disposal area located east of former building 16-340. The disposal area contains debris ad shrapnel associated with firing activities conducted at P-Site (former TA-13). A portion of the TA-16 WWTP [Consolidated Unit 16-004(a)-99] is located above the southern tip of the surface disposal area.

Phase I Consent Order sampling is complete for SWMU 13-002. All detected inorganic and organic chemical concentrations from Consent Order samples were below residential SSLs. SWMU 13-002 will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 13-002 will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-004(a) is the inactive Imhoff tank (structure 16-530) that was used for sewage treatment at the TA-16 sanitary WWTP. The structure is approximately 20 × 35 ft with a total area of 700 ft^2 and a depth of 22 ft. The tank was taken out of service in 1992. Located southeast of the former TA-16-340 Complex and north of the communitor (a cutting device for sewage solids), the Imhoff tank received effluent that flowed over a weir into a dosing siphon. Any sludge that may have collected in the tank was digested it was discharged to drying beds [SWMUs 16-004(d) and 16-004(f)]. The tank had an emergency overflow pipe that discharged onto a slope northeast of the tank.

SWMU 16-004(a) was investigated under the Consent Order and recommended for corrective action complete. NMED did not concur and directed the Laboratory to conduct additional sampling. Existing data for this Site will be reevaluated using the supplemental investigation report process to determine if additional sampling is warranted and whether a COC can be requested. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-026(j2) consists of the former outfall from a former HE sump [SWMU 16-029(f)] associated with a former resthouse (structure 16-345) located on the 340 Line at TA-16. The resthouse and sump were constructed in 1952 and served as a HE storage facility for former building 16-340. The sump was located on the southeast exterior wall and received discharge generated during cleaning activities. The outfall received effluent from the sump and discharged southeast of the sump location. The resthouse, sump, and associated drainlines were all removed in 2005.

SWMU 16-026(j2) was investigated under the Consent Order and recommended for corrective action complete. NMED approved the investigation report but required the Laboratory to conduct additional surface water and groundwater sampling for the TA-16-340 Complex as well as to maintain the best management practices. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-029(h) consists of an inactive outfall and two inactive/former drainlines (one known and one suspected) from the HE sump [AOC 16-003(p)], located on the south side of former building 16-478. The known drainline exits the southeast corner of the sump and extends 80 ft east of the sump to the rim of Cañon de Valle. This drainline discharged directly into Cañon de Valle before it was plugged in 1987. A second drainline is alleged to be present. The second drainline is reportedly a French drain that extends south of the sump. Former building 16-478 was used as a bunker, utility room, control room, and high-speed machining room for tests on experimental HE. When the building was removed in 2005, the sump was left in place. During the investigation activities conducted in 2009–2010, no evidence of the French drain was found.

Phase I Consent Order sampling is complete for SWMU 16-029(h). All detected inorganic and organic chemical concentrations and radionuclide activities from Consent Order samples were below residential SSLs, except for two detections of arsenic in two subsurface tuff samples. SWMU 16-029(h) will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 16-029(h) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 16-035 is an area of potential soil contamination located approximately 200 ft east of former building 16-340. The soil contamination is associated with a former control bunker (former structure 13-2 renumbered to 16-476). The control bunker was one of several buildings constructed at former TA-13 in 1944 to support the Manhattan Project. Former TA-13 was built in 1944 to support the HE project of the Manhattan Project and has been used since then for a variety of Laboratory activities. It was principally designed as a site for counter–x-ray diagnostics of HE lens configurations. Activities that supported the diagnostics included operating counter–x-ray equipment, HE assembly, and research in the magnetic method program. The control bunker was removed during D&D activities in 2005.

Phase I Consent Order sampling is complete for SWMU 16-035. All detected inorganic and organic chemical concentrations and radionuclide activities from Consent Order samples were below residential SSLs, except for two detections of arsenic in two subsurface tuff samples. SWMU 16-035 will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 16-035 will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

A-29.2 Storm Water Monitoring Results

SWMUs 13-001, 13-002, 16-004(a), 16-026(j2), 16-029(h), and 16-035 are monitored within W-SMA-8.7. Following the installation of baseline control measures, a baseline storm water sample was collected on September 12, 2013. Analytical results from this sample yielded one TAL exceedance (Figure A-29.2-1):

- Aluminum concentration of 1920 µg/L (MTAL is 750 µg/L)

This TAL exceedance is the subject of the alternative compliance request for these SMA/Sites.

A-29.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

W-SMA-8.7 is a 17.30-acre watershed that consists of 8% developed areas and 92% undeveloped areas. Developed areas consist of 1.47 acres of pavement. Undeveloped areas consist of 4.88 acres of ponderosa woodland and 10.95 acres of grassland (Figure A-29.3-1 shows the SMA map with the percentage of developed and undeveloped areas shown within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Aluminum—The aluminum UTL from developed urban landscape storm water run-on is 245 µg/L; the aluminum UTL for background storm water containing sediment derived from Bandelier Tuff is 2210 µg/L. The aluminum result from 2013 is between these two values.

A-29.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 13-001:

- Aluminum is not known to be associated with industrial materials historically managed at the Site. Aluminum was not detected above BVs in any of the 8 shallow (i.e., less than 3 ft bgs) soil and tuff samples collected at the Site in 2010.

SWMU 13-002:

- Aluminum is not known to be associated with industrial materials historically managed at the Site. Aluminum was not detected above BVs in any of the 8 shallow (i.e., less than 3 ft bgs) soil and tuff samples collected at the Site in 2010.

SWMU 16-004(a):

- Aluminum is not known to be associated with industrial materials historically managed at this Site. Samples collected during the 2010 Consent Order investigation were all deep (i.e., greater than 22 ft bgs) samples collected beneath the bottom of the Imhoff tank. No shallow sample data are available for this site.

SWMU 16-026(j2):

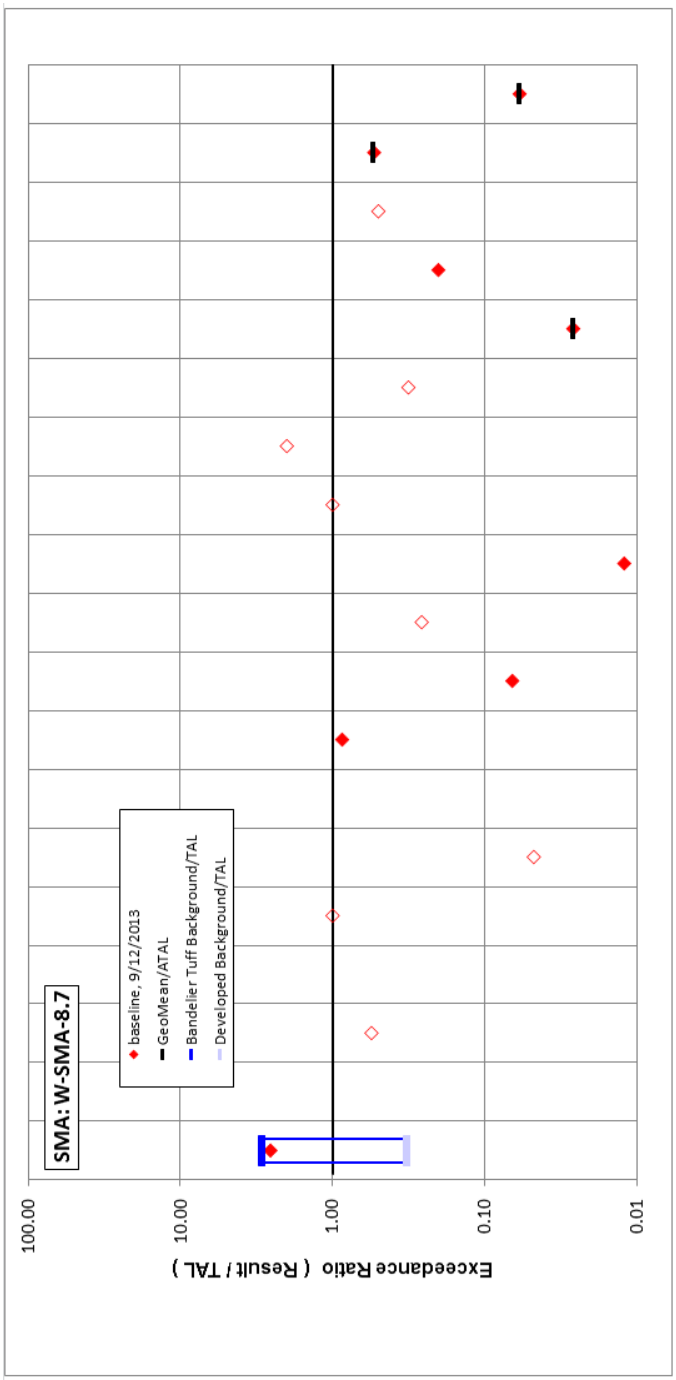
- Aluminum is not known to have been associated with industrial materials historically managed at this Site. Aluminum was detected above sediment and tuff BVs in 2 of 14 shallow soil, sediment, and tuff samples collected during 2005 and 2008 Consent Order investigations. Aluminum was detected at a maximum concentration 2 times the sediment BV.

SWMU 16-029(h):

- Aluminum is not known to be associated with industrial materials historically managed at the Site. Aluminum was not detected above BVs in any of the 17 shallow (i.e., less than 3 ft bgs) soil and tuff samples collected at the Site in 2010.

SWMU 16-035:

- Aluminum is not known to be associated with industrial materials historically managed at this Site. Aluminum was not detected above BVs in 29 shallow (i.e., less than 3 ft bgs) soil and tuff samples collected during the 2010 Consent Order investigation.



std used in ratio calculations	**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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
9/12/2013 result	**1920**	3	5	16.1	*1*	*10*	1.32	3.72	1.12	*0.2*	2.06	5	***1***	2	2.62	8.47	*0.005*	8	1.77
result / TAL	**2.6**	*0.005*	*0.56*	0.0032	*1*	*0.048*	0.0013	0.87	0.066	*0.26*	0.012	*1*	***2***	*0.32*	0.026	0.2	*0.5*	0.53	0.059

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-29.2-1 TAL exceedance plot for W-SMA-8.7

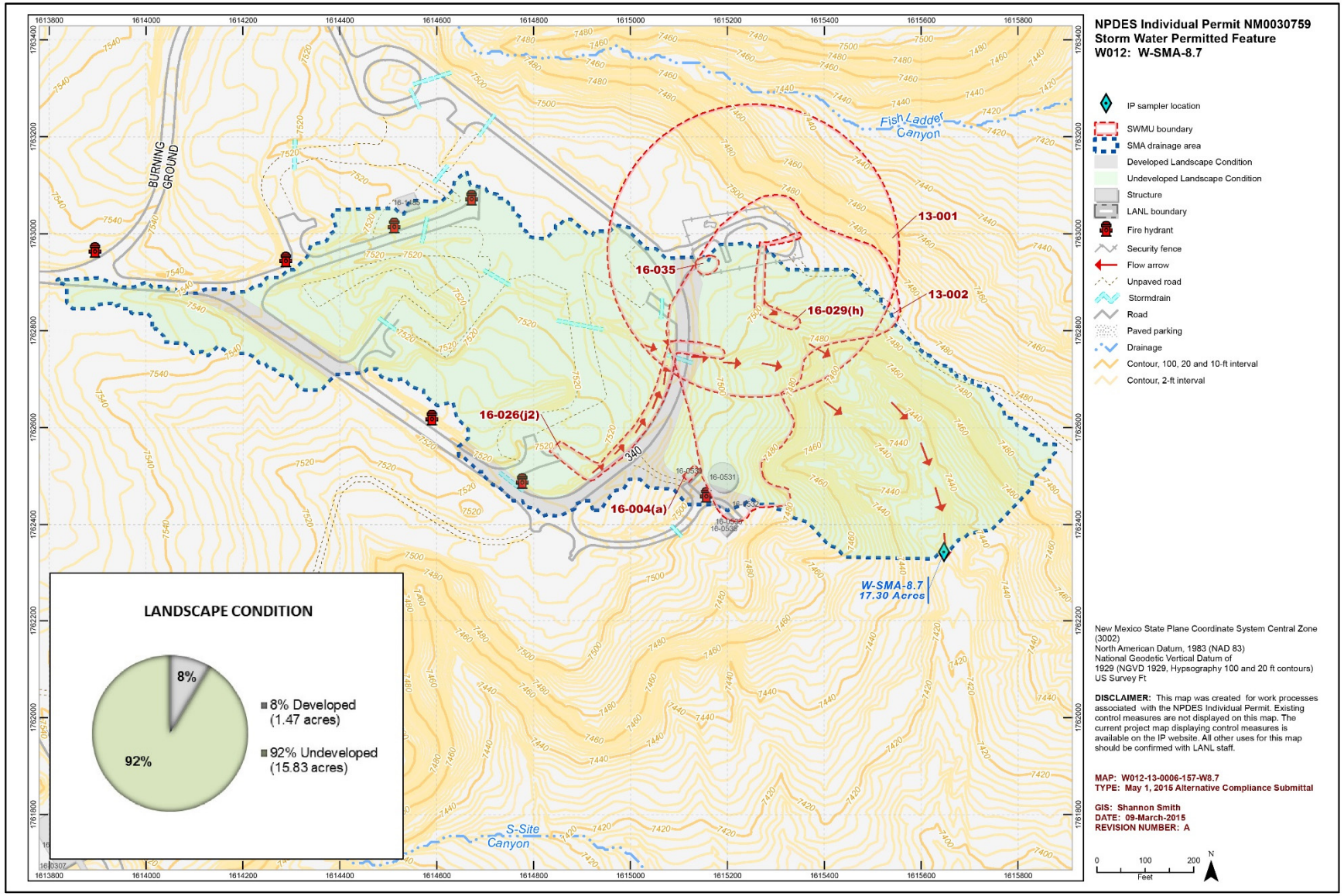


Figure A-29.3-1 SMA map for W-SMA-8.7

A-30.0 W-SMA-9.7

A-30.1 Site Description

W-SMA-9.7, located in the Water/Cañon de Valle, includes SWMUs 11-011(a) and 11-011(b). SWMU 11-011(a) is an inactive NPDES-permitted outfall (EPA-03A130) located at TA-11 north of the K-Site complex and approximately 6 ft northeast of the Electrodynamics Vibration Test Facility (building 11-30), which housed water-cooled electronic equipment. Potential contaminants are organic chemicals. The outfall consisted of a 2-in. pipe that discharged northward to a tributary of Water Canyon. The outfall received untreated cooling tower blowdown from building 11-30. This outfall was removed from the NPDES permit during the 2013 permit renewal.

Consent Order Phase I investigation sampling is complete at this Site. Additional characterization sampling at SWMU 11-011(a) is expected to be required as part of the Phase II investigation for S-Site Aggregate Area. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

SWMU 11-011(b) is an outfall located at TA-11 north of the Electrodynamics Vibration Test Facility (building 11-30). The inactive outfall consists of a 3-in. pipe that extends about 10 in. beyond the side of a hill. The outfall received discharges from floor drains in building 11-30 from the early 1960s to 1990. A report prepared by Santa Fe Engineering stated the only potential discharges from floor drains would be deionized water and residual HE potentially released from containers processed on shakers in the building.

Consent Order Phase I investigation sampling is complete at this Site. All detected inorganic and organic chemical concentrations and radionuclide activities from Consent Order samples were below residential SSLs, except for two detections of benzo(a)pyrene. SWMU 11-011(b) will be recommended for corrective action complete in the supplemental investigation report for S-Site Aggregate Area, to be submitted to NMED in 2015. SWMU 11-011(b) will be eligible for a COC upon approval of the report by NMED. Detailed sampling results are presented in the Investigation Report for S-Site Aggregate Area, Revision 1 (LANL 2011a).

A-30.2 Storm Water Monitoring Results

SWMUs 11-011(a) and 11-011(b) are monitored within W-SMA-9.7. Following the installation of baseline control measures, a baseline storm water sample was collected on September 13, 2013. Analytical results from this sample yielded one TAL exceedance (Figure A-30.2-1):

- Copper concentrations of 9.74 µg/L (MTAL is 4.3 µg/L),

This 2013 TAL exceedance is the subject of the alternative compliance request for these SMA/Sites.

A-30.3 Developed and Undeveloped Sources of the TAL Exceedance in the SMA Landscape

W-SMA-9.7 is a 0.15-acre watershed that consists of 34% developed areas and 66% undeveloped areas. Developed areas consist of 0.05 acres of building rooftops and pavement. Undeveloped areas consist of 0.03 acres of oak brush and 0.07 acres of grassland (Figure A-30.3-1 shows the SMA map with the percentage of developed and undeveloped areas within the SMA).

The following bullet(s) summarize the comparison of TAL exceedance constituent(s) to potential developed and undeveloped landscape sources:

- Copper—The copper UTL from developed urban landscape storm water run-on is 32.3 µg/L; the copper UTL for background storm water containing sediment derived from Bandelier Tuff is 3.43 µg/L. The copper result from 2013 is between these two values.

A-30.4 Evaluation of Historical Industrial Activities and TAL Exceedance Constituents

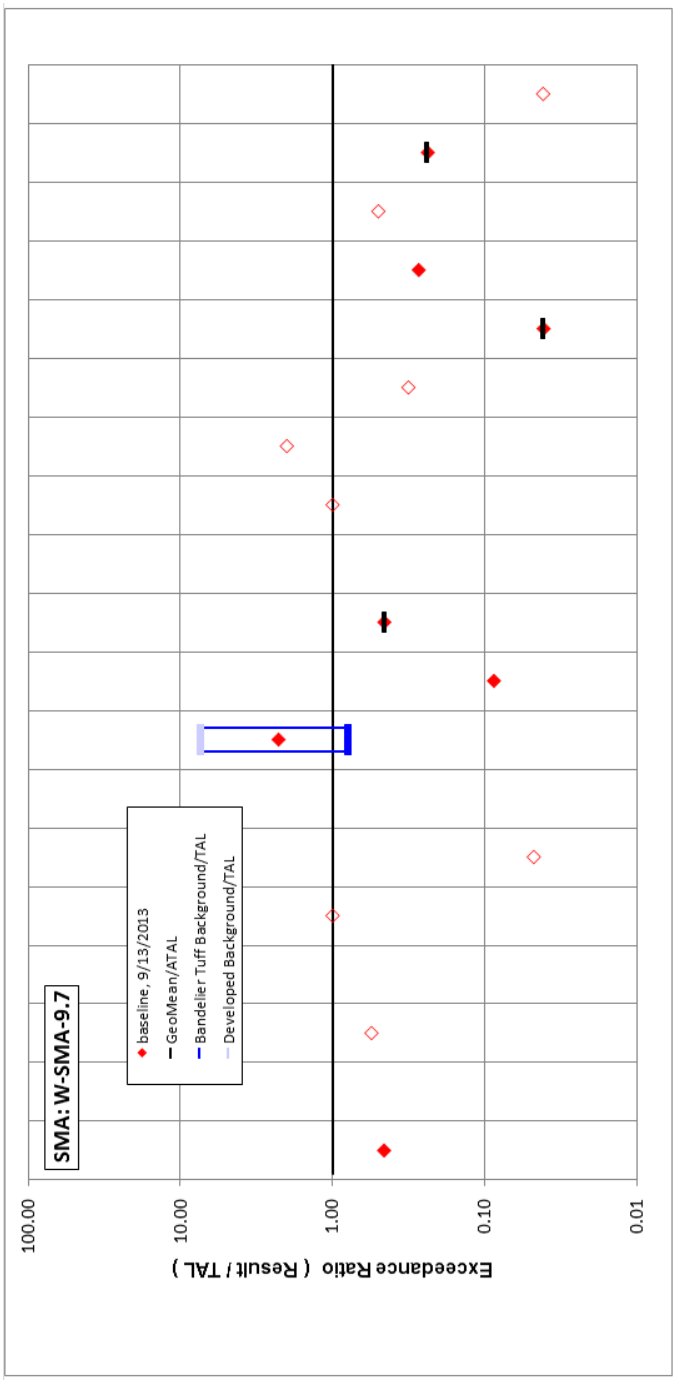
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 11-011(a):

- Copper is not known to have been associated with industrial materials historically managed at the Site. Copper was detected above BV in 4 of 10 shallow (i.e., less than 3 ft bgs) 2010 Consent Order samples at a maximum concentration 6.6 times the soil BV.

SWMU 11-011(b):

- Copper is not known to have been associated with industrial materials historically managed at the Site. Copper was detected above BVs in 2 of 11 shallow 2010 Consent Order samples at a maximum concentration 5.1 times the soil BV.



std used in ratio calculations	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
	MTAL	ATAL	ATAL	ATAL	MQL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MQL	ATAL	ATAL	MTAL	MQL	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
9/13/2013 result	344	3	5	43.2	*1*	*10*	5	**9.74**	1.48	0.352	0.738	5	***1***	2	4.1	11.4	*0.005*	3.55	*1.24*
result / TAL	0.46	*0.005*	*0.56*	0.0086	*1*	*0.048*	*0.005*	**2.3**	0.087	0.46	0.0043	*1*	***2***	*0.32*	0.041	0.27	*0.5*	0.24	*0.041*

Bold font indicates result>TAL/MQL; italic font and hollow symbols indicate undetected results; "-" is used if no analytical results were available.

Figure A-30.2-1 TAL exceedance plot for W-SMA-9.7

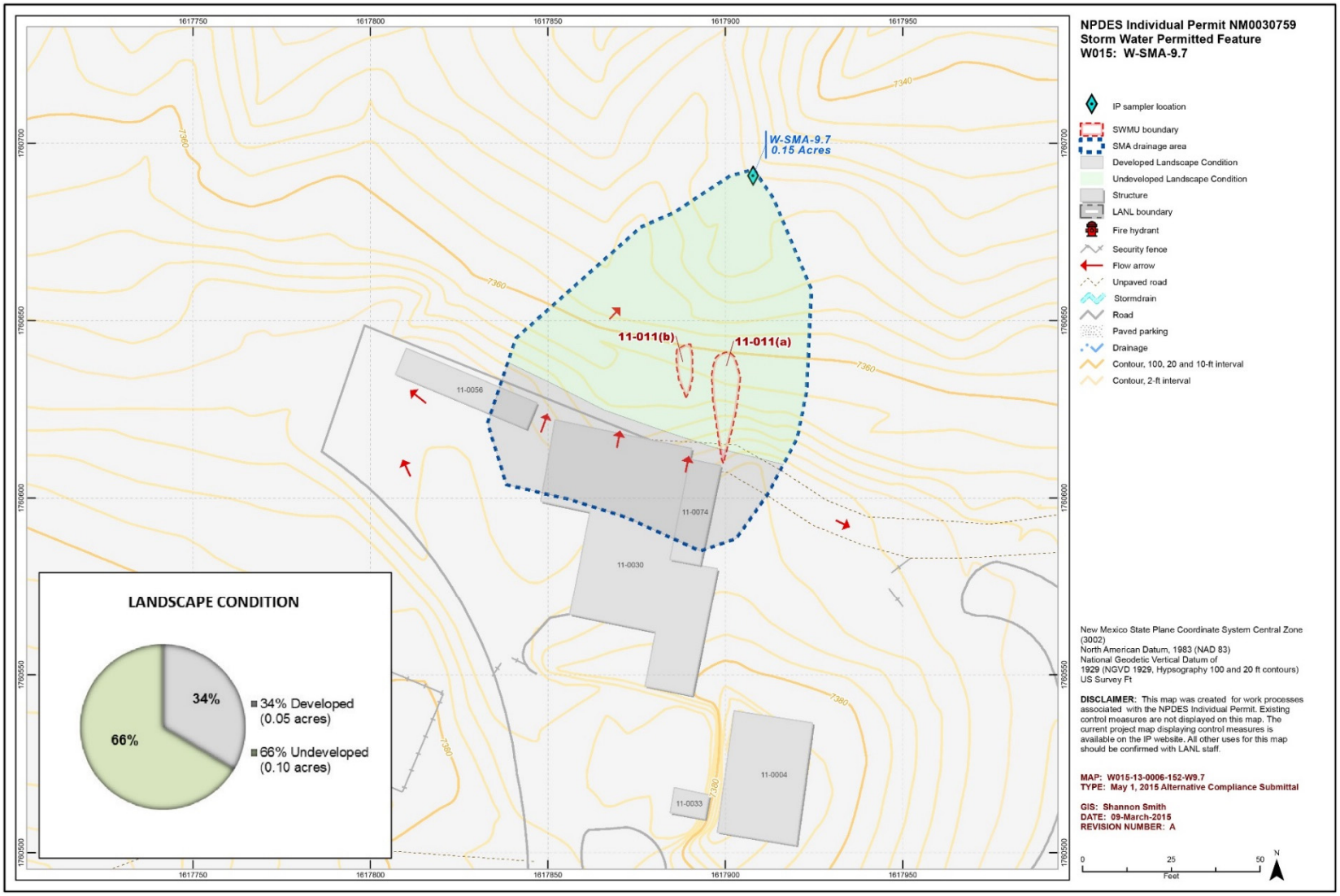


Figure A-30.3-1 SMA map for W-SMA-9.7

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