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Alternative Compliance Request for 19 Site Monitoring Area/ Site Combinations Exceeding Target Action Levels for Gross-Alpha Radioactivity

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 19 SITE MONITORING AREA/SITE COMBINATIONS EXCEEDING TARGET ACTION LEVELS FOR GROSS-ALPHA RADIOACTIVITY

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

4-27-2015
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 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 19 site monitoring area (SMA)/Site combinations under the Individual Permit. Although the Permittees have installed control measures to minimize pollutants in their storm water discharges as required by Part I.A of the Permit, alternative compliance is being requested because DOE and LANS have determined it will not be possible to certify completion of corrective action under Part I.E.2 because of the natural background concentrations of pollutants of concern.

The SMA/Sites addressed in this request all exceed the target action level (TAL) for adjusted gross-alpha radioactivity. There are no sources of adjusted gross-alpha radioactivity associated with any of the Sites contained in this request. While some Sites in this request have historically managed and released significant industrial materials containing alpha-emitting radionuclides, any alpha-emitting radionuclides managed and/or released by the Permittees are exempt from regulation under the Clean Water Act and are excluded from the definition of adjusted gross-alpha radioactivity. 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.”

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ACRONYMS AND ABBREVIATIONS

AOC	area of concern
ATAL	average target action level
bgs	below ground surface
BV	background value
CFR	Code of Federal Regulations
COC	certificate of completion
Consent Order	Compliance Order on Consent\
CWA	Clean Water Act
DOE	Department of Energy (U.S.)
EPA	Environmental Protection Agency (U.S.)
HE	high explosives
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
Permit	NPDES Permit No. NM0030759
Permittees	U.S. Department of Energy and Los Alamos National Security, LLC
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
SMA	site monitoring area
SWMU	solid waste management unit
TA	technical area
TAL	target action level
UTL	upper tolerance limit
VCA	voluntary corrective action
VCP	vitrified clay pipe

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 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).

Although the Permittees have installed control measures to minimize pollutants for the 19 SMA/Sites in this request, alternative compliance is being requested because DOE and LANS have determined it will not be possible to certify completion of corrective action under Part I.E.2of the Permit because of the natural background concentrations of pollutants of concern.

The SMA/Sites addressed in this request all exceed the TAL for adjusted gross-alpha radioactivity. There are no sources of adjusted gross-alpha radioactivity associated with any of the Sites contained in this request. While some Sites in this request have historically managed and released significant industrial materials containing alpha-emitting radionuclides, any alpha-emitting radionuclides managed and/or released by the Permittees are exempt from regulation under the Clean Water Act (CWA) and are excluded from the definition of adjusted gross-alpha radioactivity. 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.”

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, an area 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, 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, 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 on 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 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 19 SMA/Site combinations. These Sites/SMAs and the relative TAL exceedances 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, and SMA drainage areas and surface conditions (percentage of developed/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, developed dirt or gravel areas. Undeveloped areas consist of areas such as bare soil, bare rock, riprap, grassland, ponderosa, piñon, juniper, chamisa, gambel oak brush, willows, and mulch.

5.0 BASIS FOR ALTERNATIVE COMPLIANCE REQUEST

Alternative compliance is being requested because DOE and LANS have determined it will not be possible to certify completion of corrective action under Part I.E.2 because of the natural background concentrations of pollutants of concern.

The SMA/Sites addressed in this request all exceed the TAL for adjusted gross-alpha radioactivity. There are no sources of adjusted gross-alpha radioactivity associated with any of the Sites contained in this request. While some Sites in this request have historically managed and released significant industrial materials containing alpha-emitting radionuclides, any alpha-emitting radionuclides managed and/or released by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity. 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." The following sections provide additional information to support this conclusion.

5.1 Potential Sources of TAL Exceedances

At all the SMAs included in this alternative compliance request, the SMA contains non-Site-affected undeveloped areas that contribute storm water to the SMA sampler. Storm water samples collected at these SMAs, therefore, represent runoff from undeveloped 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 gross-alpha radioactivity in storm water samples are summarized below.

5.1.1 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 radionuclides 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 from 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 publication analyzing background and baseline metals in northern New Mexico entitled “Background Metals Concentrations and Radioactivity in Storm Water on the Pajarito Plateau, Northern New Mexico” (hereafter, the Background Metals Report [LANL 2013]). Sampling locations were selected to avoid any known contamination or developed areas and to provide reasonable estimates of runoff from a variety of bedrock source areas and sediment texture.

In the Background Metals Report, the 95% upper tolerance limit (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 UTL for gross-alpha radioactivity calculated for storm water runoff from remote watersheds composed primarily of weathered Bandelier Tuff is 1490 pCi/L (LANL 2013). This value is considered the upper limit of natural background concentration for undeveloped areas, and it applies to SMAs in the Individual Permit because the geology underlying Laboratory and surround area is also composed of Bandelier Tuff.

Table 5.1-1 compares the gross-alpha values detected in storm water samples at each SMA for the current stage of compliance to the UTL for gross-alpha radioactivity in storm water runoff from the undeveloped landscape by dividing the value by the UTL for gross alpha. As shown in Table 5.1-1, the gross-alpha radioactivity detected in the storm water samples ranged from 1.03% to 20.1% of the UTL. For comparison, the TAL is approximately 1.01% of the UTL. Therefore, the gross-alpha radioactivity in storm water runoff from these Sites, although above the TAL, is not different than natural background.

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 Figure 5.1-1. The data plots show that all TAL exceedances are below Bandelier Tuff background values (BVs).

Table 5.1-3 summarizes the percentages of undeveloped and developed landscapes in each SMA. Appendix A shows a detailed delineation of the undeveloped and developed landscape areas within each SMA.

5.1.2 Site-Related Sources of Gross-Alpha Radioactivity

Storm water samples collected at the SMAs addressed by this request for alternative compliance were analyzed for gross-alpha radioactivity, which is a measure of the alpha radioactivity associated with all alpha-emitting radionuclides present 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 CWA 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 with 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 industrial 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 have significant contributions from undeveloped landscapes. The gross-alpha radioactivity detected in storm water runoff from these SMAs is not different from the gross-alpha radioactivity detected in areas of undeveloped landscape unaffected by Laboratory operations. In addition, the Sites subject to this alternative compliance request are not considered sources of adjusted gross-alpha radioactivity subject to regulation under the Individual Permit.

The compliance actions specified in Section E.2 of the Individual Permit are not likely to achieve levels of adjusted gross-alpha radioactivity in storm water runoff that are different than natural background. 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 SMAs in this request all have significant percentages of undeveloped areas. The gross-alpha radioactivity in storm water samples is within the range of background expected for Sites receiving runoff from undeveloped areas (Table 5.1-3). Although the gross-alpha radioactivity in storm water samples exceeds the TAL, the TAL exceedance value is no different than the naturally occurring background expected for these Sites. In addition, the Site is not considered a source of adjusted gross-alpha radioactivity. 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 undeveloped areas within the SMA and from surrounding areas. The naturally occurring background levels of gross-alpha radioactivity in this runoff would exceed the TAL.

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 undeveloped areas within the SMA and from surrounding areas. The naturally occurring background levels of gross-alpha radioactivity in this runoff would likely exceed the TAL.

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

Any alpha-emitting radionuclides associated with industrial activities conducted at any of the Sites in this request would be exempt from the definition of adjusted gross-alpha radioactivity. Therefore, significant materials containing Site-related alpha-emitting radionuclides would not be regulated under the Individual Permit or considered to be a source of the adjusted gross-alpha radioactivity TAL exceedance. No exposure of adjusted gross alpha radioactivity from the Sites to storm water is currently occurring. Therefore, no exposure controls, such as a cap or cover, would not reduce the concentrations of adjusted gross alpha in storm water from the Sites.

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

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

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 adjusted gross-alpha TAL exceedance for the Sites listed in the request for alternative compliance because the Sites are not considered a source of adjusted gross-alpha radioactivity. The primary source of adjusted gross-alpha radioactivity in the SMAs and surrounding areas is natural background Bandelier Tuff. 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 contained 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), April 2013. "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.

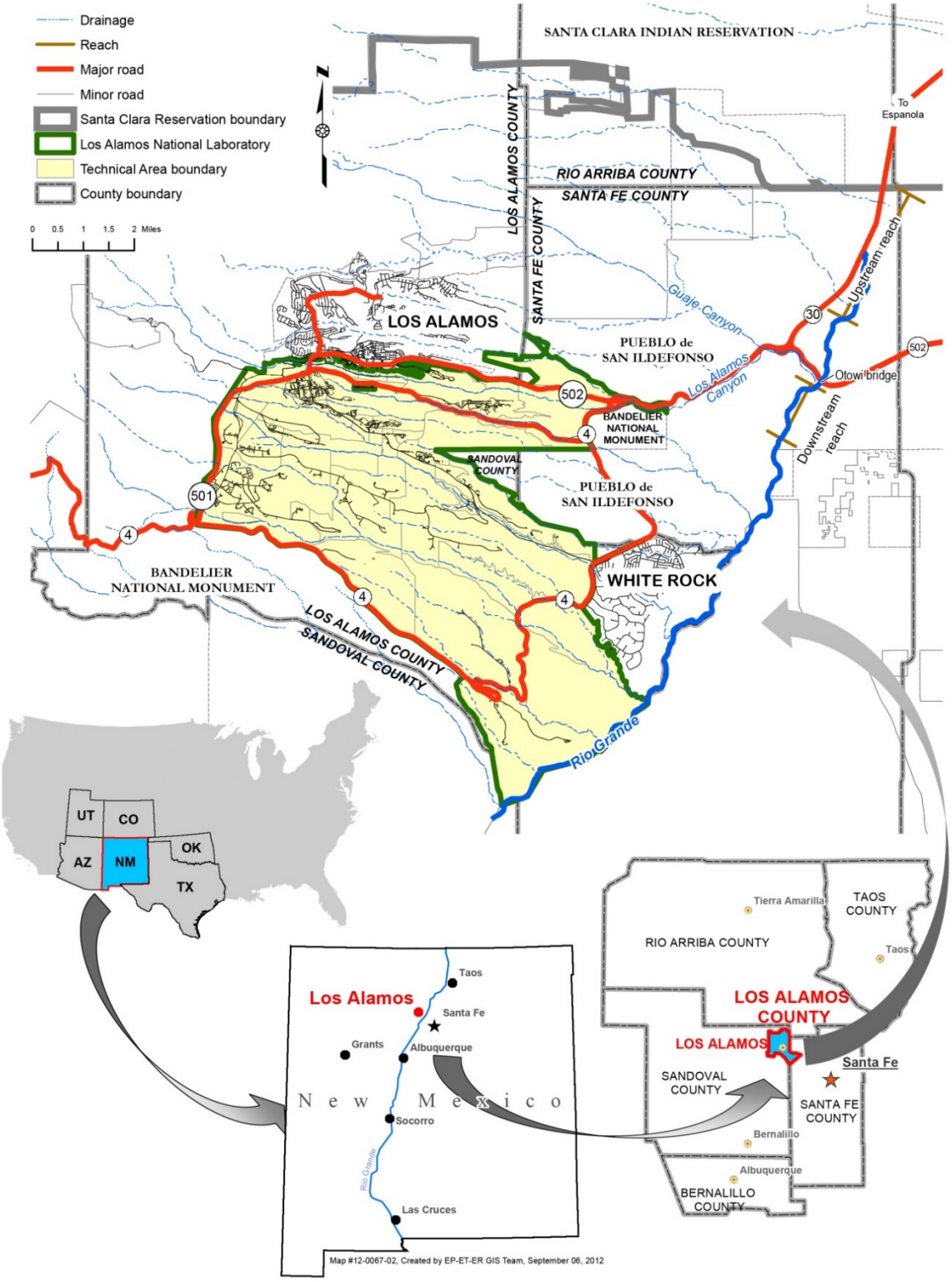
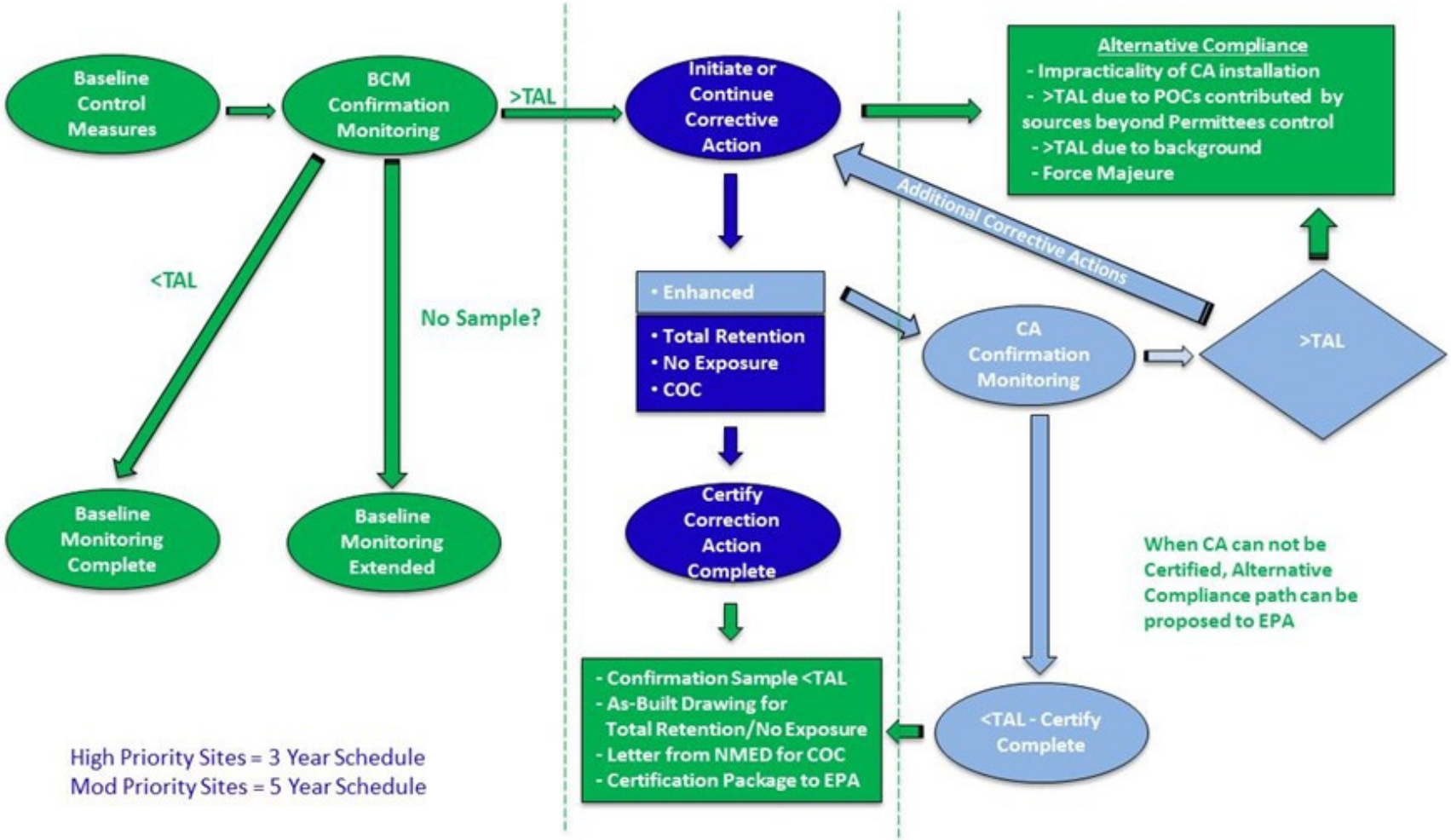
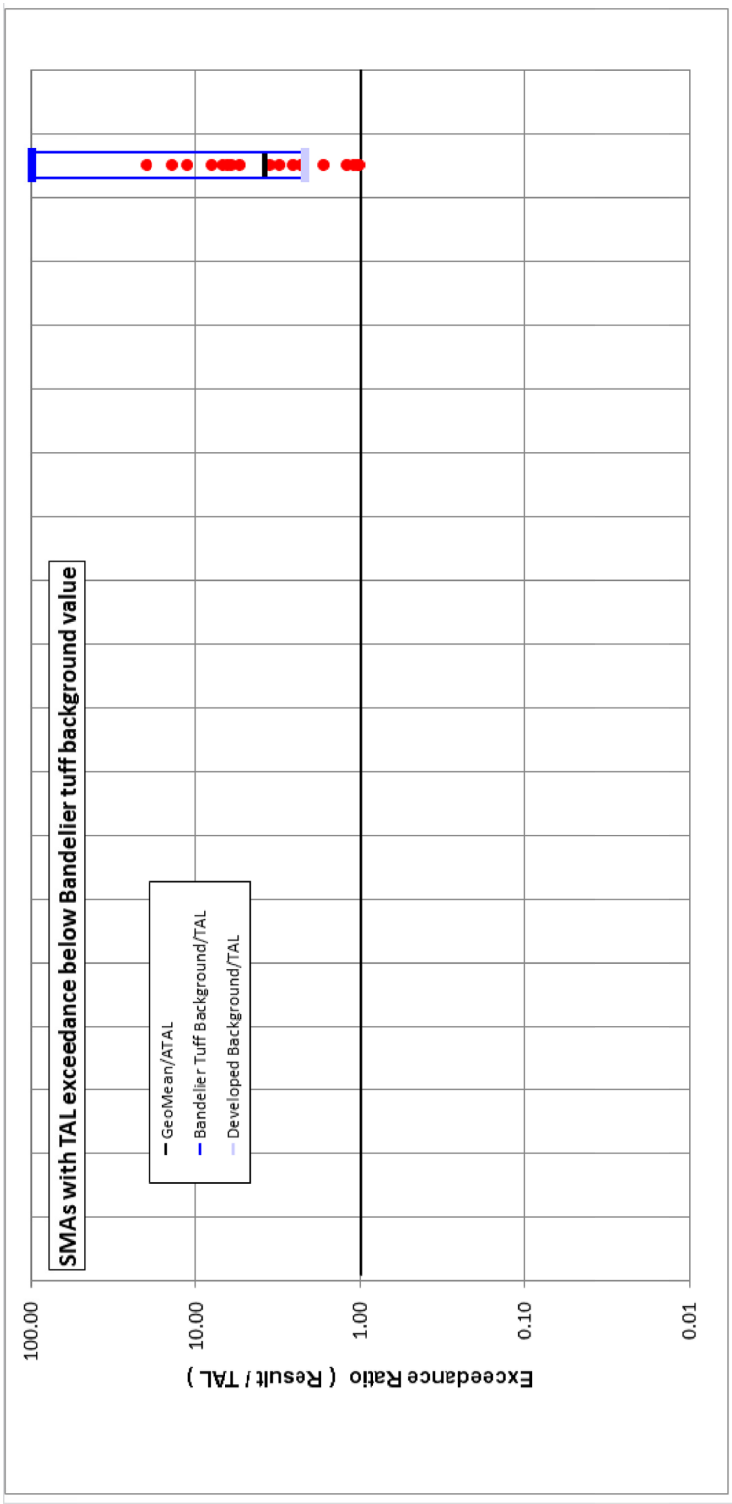


Figure 1.0-1 Location of the Laboratory with insets of New Mexico State and Los Alamos County



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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	-
std value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**300**	-
Max result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**20**	-

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 radionuclides

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

SMA	Site	Brief Description	TAL Exceedance
3M-SMA-0.4	15-006(b)	Ector Firing Site	GA[a] (8.0)[b]
CDV-SMA-2	16-021(c)	Former NPDES Outfall	GA (1.2)
CDV-SMA-2.51	16-010(i)	Burn Pad	GA (1.1)
CHQ-SMA-4.1	33-016	Sump	GA (2.3)
CHQ-SMA-4.5	33-011(b)	Storage Area	GA (6.9)
DP-SMA-2.35	21-021	Site-wide Air Release	GA (1.7)
DP-SMA-2.35	21-024(n)	Drainline	GA (1.7)
LA-SMA-5.91	21-021	Site-wide Air Release	GA (3.4)
LA-SMA-6.395	21-021	Site-wide Air Release	GA (20.0)
LA-SMA-9	26-001	Surface Disposal Site	GA (13.9)
LA-SMA-9	26-002(a)	Soil Contamination from Former Acid Sump System	GA (13.9)
LA-SMA-9	26-002(b)	Drainline Associated with Sump 26-1	GA (13.9)
LA-SMA-9	26-003	Septic Tank	GA (13.9)
PJ-SMA-4.05	09-004(g)	Sump	GA (3.1)
PJ-SMA-6	40-010	Surface Disposal Site	GA (5.4)
S-SMA-3.95	20-002(a)	Firing Site	GA (1.03)
S-SMA-5.5	20-005	Septic Tanks	GA (6.1)
W-SMA-14.1	15-004(h)	Firing Site H	GA (4.1)
W-SMA-14.1	15-014(l)	Outfall from Building 15-202	GA (4.1)

[a] GA = Gross-alpha radioactivity.

[b] Number in parentheses is the storm water sample concentration divided by the average TAL (ATAL) (i.e., 8.0 indicates storm water concentration was 8.0 times greater than the TAL). If 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 Gross-Alpha Radioactivity Storm Water Monitoring Results to the UTL

SMA	Sample Date	Sample Type	Gross-Alpha Radioactivity (pCi/L)	Comparison to Undeveloped UTL*
3M-SMA-0.4	7/12/2013	Baseline	120	8.1%
CDV-SMA-2	7/12/2013	Baseline	18.2	1.2%
CDV-SMA-2.51	9/13/2013	Baseline	16.4	1.1%
CHQ-SMA-4.1	9/13/2013	Baseline	34.5	2.3%
CHQ-SMA-4.5	7/25/3013	Baseline	103	6.9%
DP-SMA-2.35	9/13/2013	Baseline	25	1.7%
LA-SMA-5.91	9/12/2013	Corrective Action	15.7	1.05%
	7/15/2014	Corrective Action	169	11.3%
LA-SMA-6.395	9/13/2013	Baseline	300	20.1%
LA-SMA-9	8/10/2014	Baseline	208	14.0%
PJ-SMA-4.05	9/13/2014	Baseline	47.2	3.2%
PJ-SMA-6	7/8/2014	Baseline	81.6	5.5%
S-SMA-3.95	9/13/2013	Baseline	15.4	1.03%
S-SMA-5.5	7/31/2014	Baseline	91	6.1%
W-SMA-14.1	9/12/2013	Corrective Action	38.7	2.6%
	7/15/2014	Corrective Action	96.2	6.5%

* — = The values represent the gross-alpha radioactivity present in the storm water sample as a percentage of the UTL. Unfiltered gross-alpha undeveloped landscape runoff UTL = 1490 pCi/L.

Table 5.1-2
SMAs with Gross-Alpha Radioactivity TAL Exceedance below Bandelier Tuff BV

SMA	Analyte	Sample	Detect Flag	Result	Unit	Collection Date	Compliance Stage
3M-SMA-0.4	GROSSA	WT_IPC-13-32065	Y	120	pCi/L	07/12/13	Baseline Monitoring
CDV-SMA-2	GROSSA	WT_IPC-13-32175	Y	18.2	pCi/L	07/12/13	Baseline Monitoring
CDV-SMA-2.51	GROSSA	WT_IPC-13-32087	Y	16.4	pCi/L	09/13/13	Baseline Monitoring
CHQ-SMA-4.1	GROSSA	WT_IPC-13-32034	Y	34.5	pCi/L	09/13/13	Baseline Monitoring
CHQ-SMA-4.5	GROSSA	WT_IPC-13-32219	Y	103	pCi/L	07/25/13	Baseline Monitoring
DP-SMA-2.35	GROSSA	WT_IPC-13-32254	Y	25	pCi/L	09/13/13	Baseline Monitoring
LA-SMA-5.91	GROSSA	WT_IPC-13-40974	Y	15.7	pCi/L	09/12/13	Corrective Action
LA-SMA-5.91	GROSSA	WT_IPC-14-56132	Y	169	pCi/L	07/15/14	Corrective Action
LA-SMA-6.395	GROSSA	WT_IPC-13-32244	Y	300	pCi/L	09/13/13	Baseline Monitoring
LA-SMA-9	GROSSA	WT_IPC-14-56054	Y	208	pCi/L	08/10/14	Baseline Monitoring
PJ-SMA-4.05	GROSSA	WT_IPC-13-42057	Y	47.2	pCi/L	09/13/13	Baseline Monitoring
PJ-SMA-6	GROSSA	WT_IPC-14-56104	Y	81.6	pCi/L	07/08/14	Baseline Monitoring
S-SMA-3.95	GROSSA	WT_IPC-13-32088	Y	15.4	pCi/L	09/13/13	Baseline Monitoring
S-SMA-5.5	GROSSA	WT_IPC-14-56078	Y	91	pCi/L	07/31/14	Baseline Monitoring
W-SMA-14.1	GROSSA	WT_IPC-13-32037	Y	38.7	pCi/L	09/13/13	Corrective Action
W-SMA-14.1	GROSSA	WT_IPC-14-55972	Y	96.2	pCi/L	07/15/14	Corrective Action

Table 5.1-3
Summary of Landscape Conditions within SMAs

SMA	Watershed	SMA Drainage Area, ac	Developed Landscape Within SMA	Undeveloped Landscape Within SMA
3M-SMA-0.4	Pajarito	5.39	3%	97%
CDV-SMA-2	Water/Canon de Valle	3.27	0%	100%
CDV-SMA-2.51	Water/Canon de Valle	2.99	13%	87%
CHQ-SMA-4.1	Ancho/Chaquehui	0.26	0%	100%
CHQ-SMA-4.5	Ancho/Chaquehui	2.72	0%	100%
DP-SMA-2.35	Los Alamos/Pueblo	0.19	0%	100%
LA-SMA-5.91	Los Alamos/Pueblo	3.10	70%	30%
LA-SMA-6.395	Los Alamos/Pueblo	1.81	33%	67%
LA-SMA-9	Los Alamos/Pueblo	5.12	0%	100%
PJ-SMA-4.05	Pajarito	1.21	0%	100%
PJ-SMA-6	Pajarito	0.12	0%	100%
S-SMA-3.95	Sandia/Mortandad	0.08	0%	100%
S-SMA-5.5	Sandia/Mortandad	0.05	8%	92%
W-SMA-14.1	Water/Cañon de Valle	5.17	30%	70%

Appendix A

Data for 19 Site Monitoring Area/Site Combinations Exceeding Target Action Levels for Gross-Alpha Radioactivity

CONTENTS

Figures

A-1.0 INTRODUCTION

This appendix provides Site-specific information to support the alternative compliance request for 19 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 Permit (NPDES) 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 with the applicable TALs. The storm water monitoring results are plotted on graphs at the end of each SMA section.

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 value (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 plots for monitoring results 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.

A-2.0 3M-SMA-0.4

A-2.1 Site Description

3M-SMA-0.4, located in the Pajarito watershed, includes Solid Waste Management Unit (SWMU) 15-006(b), the Ector firing site. Located along the eastern side of Technical Area 15 (TA-15), the firing site was used for dynamic radiography of explosion-driven weapons components. It was originally established in 1973 and was used periodically until 1982. The Ector radiography machine was constructed at this Site, and the Site has operated with this machine from the mid-1980s to the present. Structures associated with the firing site are the firing point chamber (structure 15-276), the multidiagnostic hydrotest (building 15-306), and the blast-protection structure (15-319).

Investigation of SWMU 15-006(b) is deferred per Table IV-2 of Compliance Order on Consent (the Consent Order). The New Mexico Environment Department– (NMED-) approved investigation work plan proposed no sampling for this Site.

A-2.2 Storm Water Monitoring Results

SWMU 15-006(b) is monitored within 3M-SMA-0.4. Following the installation of baseline control measures, a baseline storm water sample was collected on July 12, 2013. Analytical results from this sample yielded one TAL exceedance (Figure A-2.2-1):

- Gross-alpha activity of 120 pCi/L (average TAL [ATAL] is 15 pCi/L).

This TAL exceedance is the subject of the alternative compliance request for this SMA/Site.

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

3M-SMA-0.4 is a 5.39-acre watershed that consists of 3% developed areas and 97% undeveloped areas. Developed areas consist of 0.17 acres of buildings and rip rap. Undeveloped areas consist of 1.71 acres of bare soil and 3.51 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:

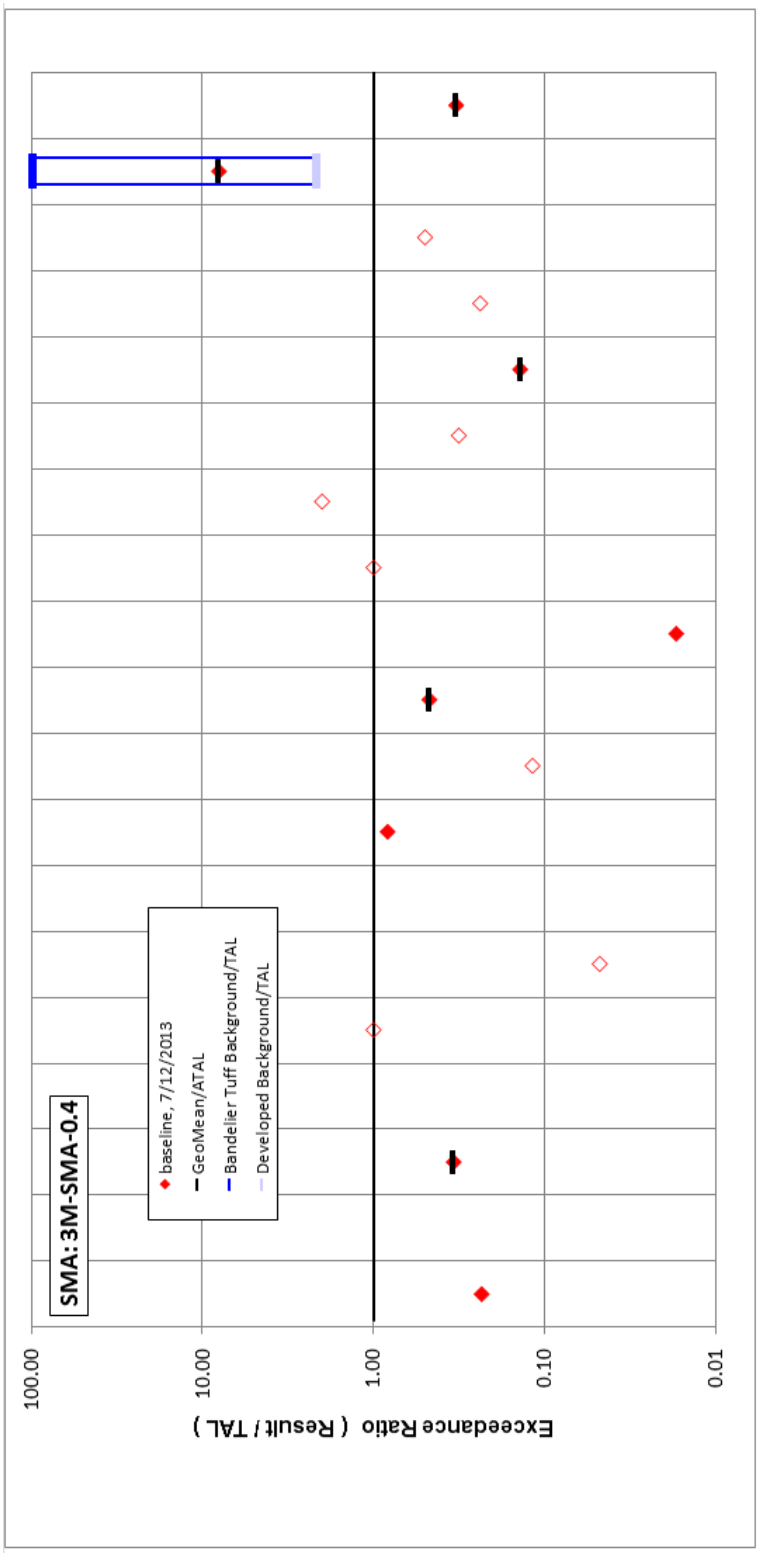
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is between these two values.

A-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 15-006(b):

- Alpha-emitting radionuclides are not known to be associated with industrial materials managed at this 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.



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	175	*3*	3.06	32.3	*1*	*10*	1.46	3.56	*2*	0.363	2.89	*5*	***1***	*2*	13.9	*10*	*0.005*	**120**	9.86
result / TAL	0.23	*0.005*	0.34	0.0065	*1*	*0.048*	0.0015	0.83	*0.12*	0.47	0.017	*1*	***2***	*0.32*	0.14	*0.24*	*0.5*	**8**	0.33

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 3M-SMA-0.4

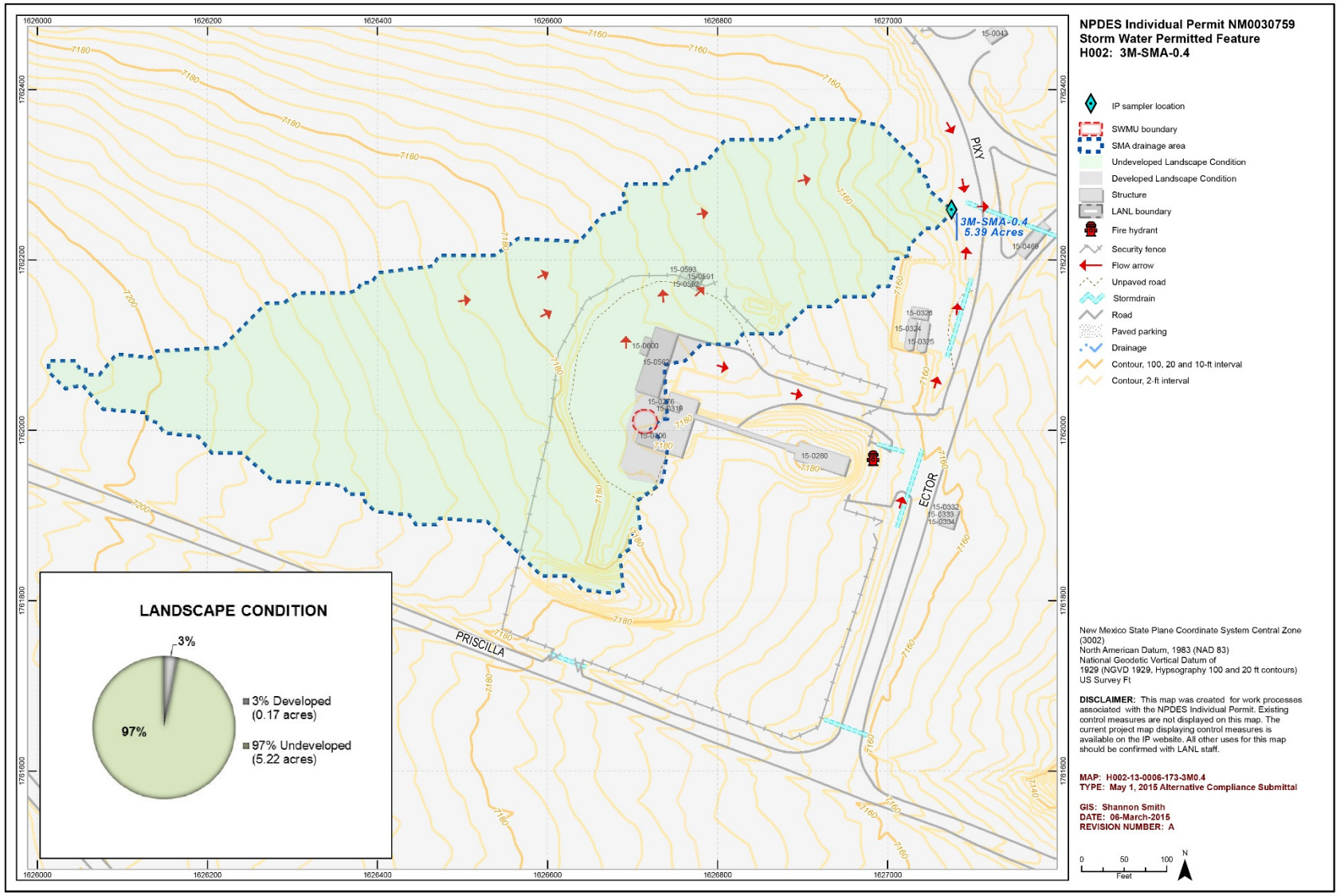


Figure A-2.3-1 SMA Map for 3M-SMA-0.4

A-3.0 CDV-SMA-2

A-3.1 Site Description

CDV-SMA-2, located in the Water/Cañon de Valle watershed, includes SWMU 16-021(c), a formerly NPDES-permitted outfall (the 260 Outfall) for 13 high explosives (HE) sumps [SWMU 16-003(k)] that served HE machining building 16-260 at TA-16. Wastewater from the sumps flowed through a concrete trough to the outfall, located approximately 200 ft east of the building. Discharge from the outfall flowed to a settling pond that was approximately 50 ft long and 20 ft wide and that was located approximately 45 ft below the outfall. The drainage channel continued approximately 600 ft northeast from the outfall to the bottom of Cañon de Valle. A 15-ft near-vertical cliff is located approximately 400 ft from the outfall and marks the break between the upper and lower drainage channels. Building 16-260 was constructed in 1951 to process and machine HE. Wastewater from machining operations contained dissolved HE and entrained HE cuttings. Wastewater treatment consisted of routing the water to 13 settling sumps to recover entrained HE cuttings. In 1994, outfall discharge volumes were measured at several million gallons per year. The discharge volumes were likely higher during the 1950s when HE production output from building 16-260 was substantially greater than it was in the 1990s. In the past, barium had been a constituent of certain HE formulations, and thus barium was also present in the outfall wastewater from building 16-260. Discharge to the outfall continued until 1996 when the sumps were plugged. The outfall was removed from the permit in January 1998.

During an interim measure (IM) conducted in 2000 and 2001, more than 1300 yd^3 of contaminated soil was removed from the former settling pond and drainage channel. A low-permeability cap consisting of a 20-in.-thick crushed tuff/bentonite mixture was installed on top of the former settling pond during the IM. A corrective measures implementation conducted in 2009 and 2010 included the removal of soil and tuff contaminated with HE and other constituents in the former 260 Outfall channel and in the alluvial systems of Cañon de Valle and Martin Spring Canyon, confirmation sampling, and installation of four HE treatment systems. Risk-assessment results for the 260 Outfall drainage channel indicate the Site meets residential risk levels. Groundwater contamination continues to be assessed, monitored, and treated.

Compliance Order on Consent (Consent Order) soil investigations for the SWMU 16-021(c) drainage channel are complete. SWMU 16-021(c) is now being addressed under the Consent Order as part of the corrective measures evaluation/corrective measures implementation for the 260 Outfall. Detailed sampling results can be found in the Summary Report for the Corrective Measures Implementation at Consolidated Unit 16-021(c)-99 (LANL 2010a).

A-3.2 Storm Water Monitoring Results

SWMU 16-021(c) is monitored within CDV-SMA-2. Following the installation of baseline control measures, a baseline storm water sample was collected on July 12, 2013. Analytical results from this sample yielded one TAL exceedance (Figure A-3.2-1):

- Gross-alpha activity of 18.2 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is 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

CDV-SMA-2 is a 3.27-acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.07 acres of riprap, 0.08 acres of gravel, 0.28 acres of bare soil, and 2.84 acres of ponderosa woodland (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:

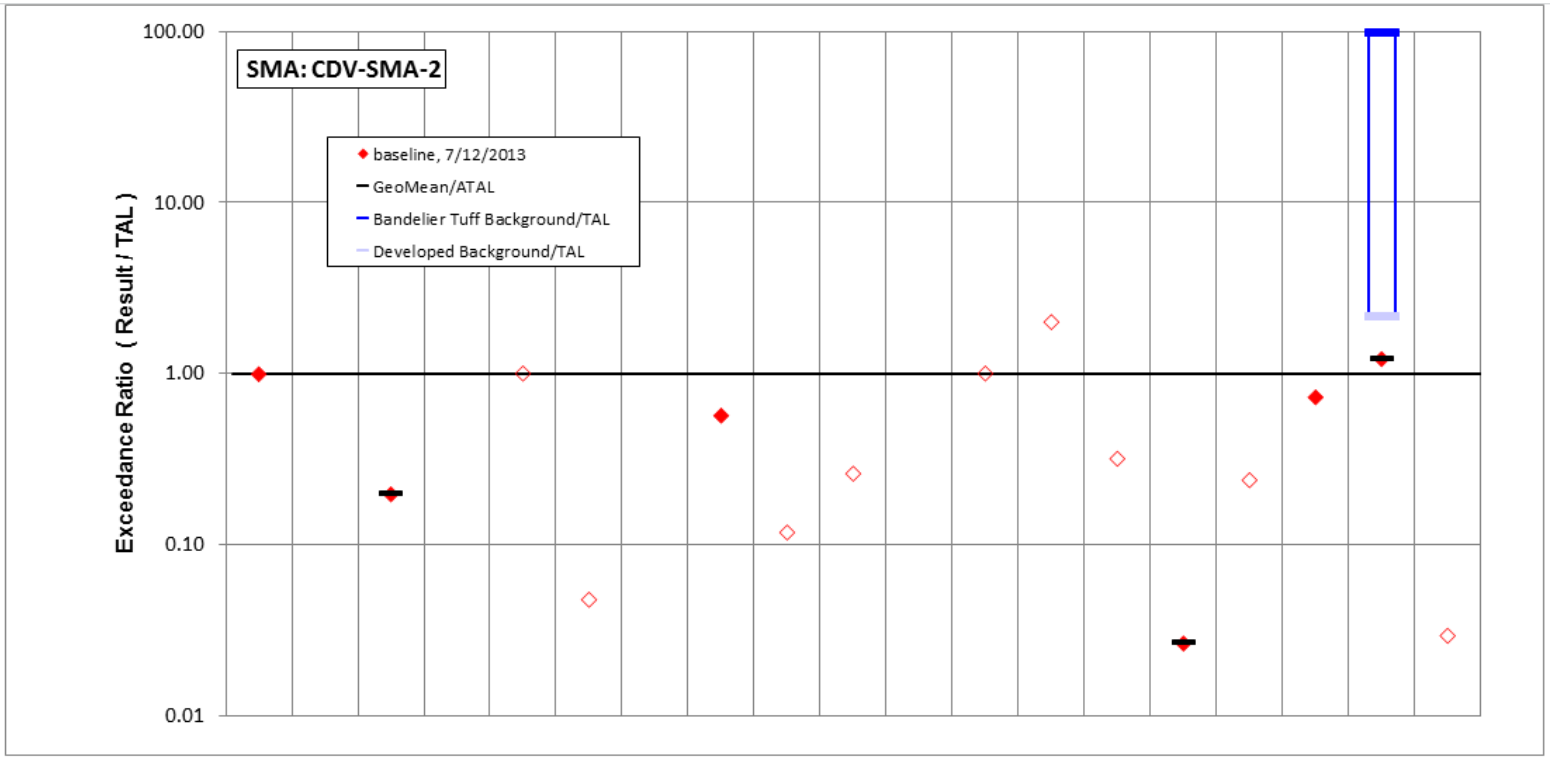
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L. The 2013 gross-alpha result is less than this value.

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 16-021(c):

- 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 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	743	*3*	1.77	33.7	*1*	*10*	*5.1*	2.44	*2*	*0.2*	1.52	*5*	***1***	*2*	2.64	*10*	0.0073	**18.2**	*0.879*
result / TAL	0.99	*0.005*	0.2	0.0067	*1*	*0.048*	*0.005*	0.57	*0.12*	*0.26*	0.0089	*1*	***2***	*0.32*	0.026	*0.24*	0.73	**1.2**	*0.029*

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 CDV-SMA-2

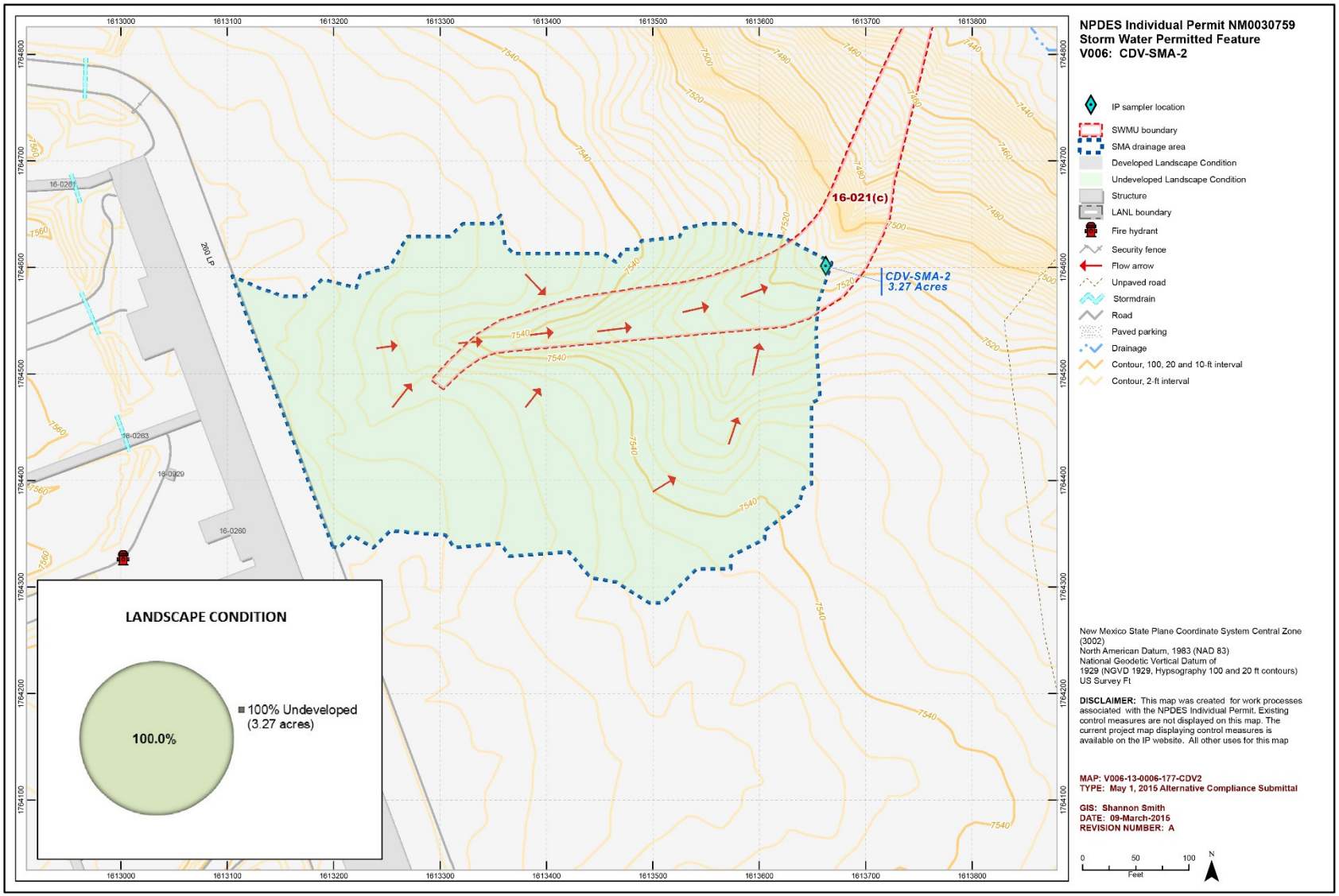


Figure A-3.3-1 SMA map for CDV-SMA-2

A-4.0 CDV-SMA-2.51

A-4.1 Site Description

CDV-SMA-2.51, located in the Water/Cañon de Valle watershed, includes SWMU 16-010(i), structure 16-392, an inactive burn pad that previously was a filter bed that received wash water from the basket-wash facility. The wash water was received through a trough (structure 16-1136). Filtered wash water from the basket-wash facility collected within perforated piping along the bottom of the filter bed and drained via gravity through a pipe to an adjacent outfall southeast of the filter bed. The filter bed was modified to a burn pad to burn suspected uranium-contaminated objects. The basket-wash facility and discharge trough were removed in 2003; the filter bed is still in place. SWMU 16-010(i), along with numerous other SWMUs and areas of concern (AOCs), is a component of Consolidated Unit 16-010(h)-99, the Burning Ground structures.

Consent Order sampling has not been conducted at SWMU 16-010(i); however, decision-level data are available from samples collected during the 1995 Resource Conservation and Recovery Act (RCRA) facility investigation (RFI). Detailed sampling results can be found in the Historical Investigation Report for Cañon de Valle Aggregate Area (LANL 2006).

A-4.2 Storm Water Monitoring Results

SWMU 16-010(i) is monitored within CDV-SMA-2.51. 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-4.2-1):

- Gross-alpha activity of 16.4 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is the subject of the alternative compliance request for this SMA/Site.

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

CDV-SMA-2.51 is a 2.99-acre watershed that consists of 13% developed areas and 87% undeveloped areas. Developed areas consist of 0.06 acres of pavement and building rooftops, and 0.34 acres of gravel road. Undeveloped areas consist of 0.03 acres of bare soil, 0.48 acres of grassland, and 2.08 acres of ponderosa woodland (Figure A-4.3-1 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:

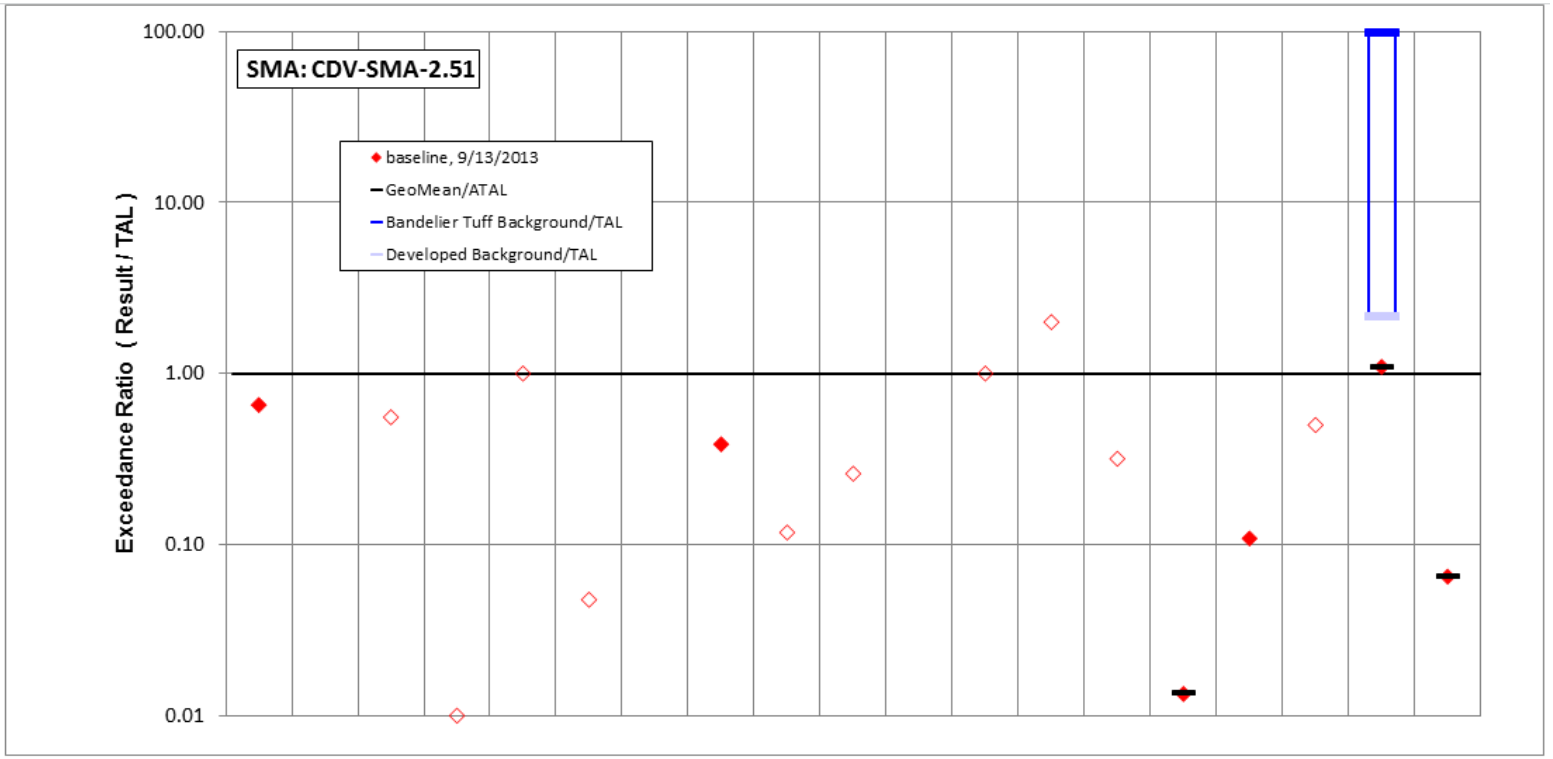
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is less than both these values.

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 16-010(i):

- Alpha-emitting radionuclides are 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
9/13/2013 result	491	*3*	*5*	*50*	*1*	*10*	*5*	1.66	*2*	*0.2*	0.736	*5*	***1***	*2*	1.34	4.56	*0.005*	**16.4**	1.95
result / TAL	0.65	*0.005*	*0.56*	*0.01*	*1*	*0.048*	*0.005*	0.39	*0.12*	*0.26*	0.0043	*1*	***2***	*0.32*	0.013	0.11	*0.5*	**1.1**	0.065

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 CDV-SMA-2.51

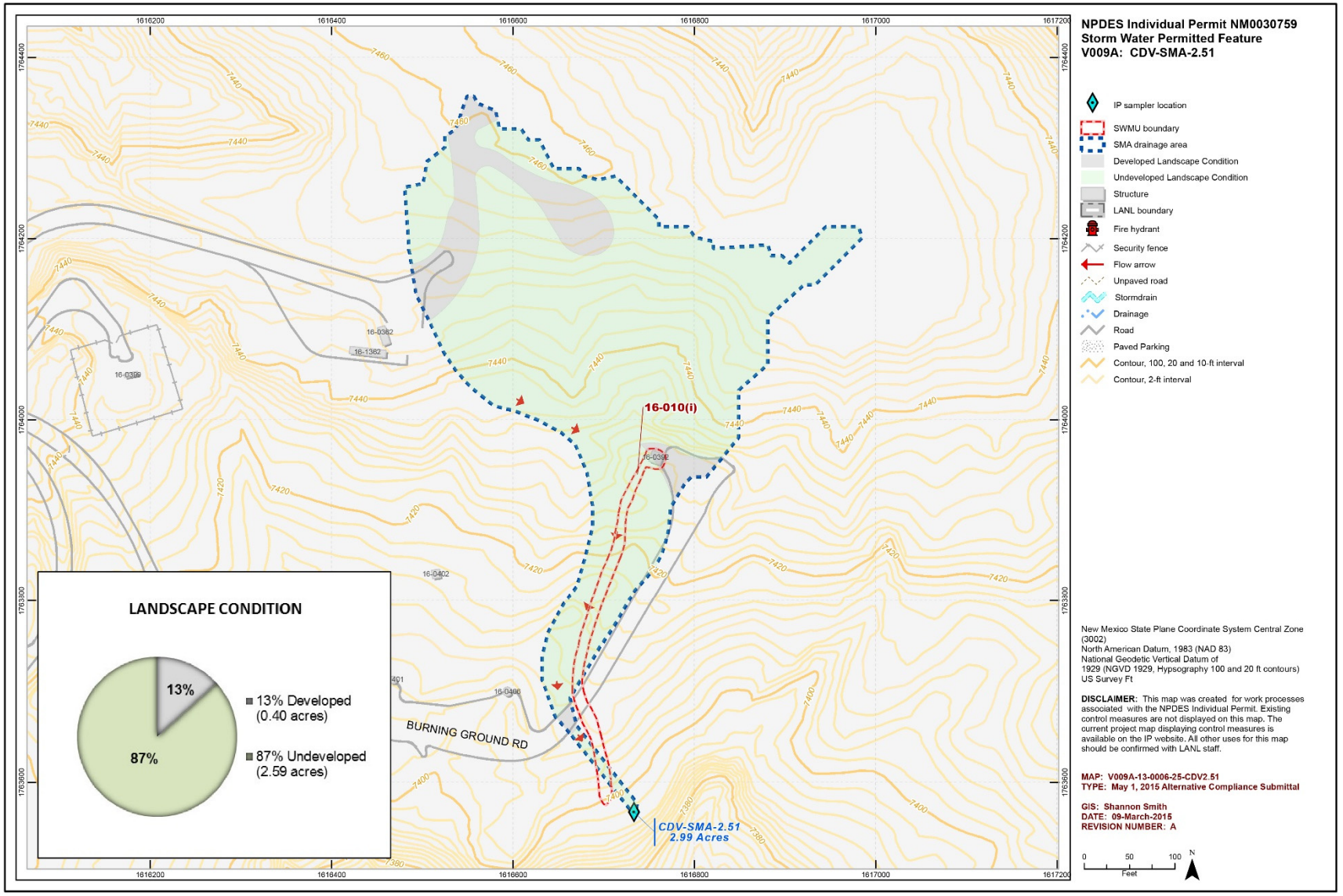


Figure A-4.3-1 SMA map for CDV-SMA-2.51

A-5.0 CHQ-SMA-4.1

A-5.1 Site Description

CHQ-SMA-4.1, located within the Ancho/Chaquehui watershed, includes SWMU 33-016, a formerly used sump and associated drainline and outfall at a process bunker (structure 33-0023) located in the southern portion of Main Site at TA-33. The concrete sump is 3 × 2 × 2 ft deep and is located next to the northwest corner of the bunker's exterior wall, near the door. A drainline leads from the sump to an outfall approximately 250 ft southwest of the building to a small side canyon to Chaquehui Canyon. The sump was connected to a sink and floor drain in the bunker, which was constructed in 1950. From 1950 to 1972, the bunker was used as a trim building to prepare propellant charges for gun tests at South Site. Structure 33-0023 was subsequently used until 1994 to store lithologic cores from the Hot Dry Rock Program. In addition to the sink and floor drain, the sump also may have received rainwater and snowmelt. The voluntary corrective action (VCA) implemented at SWMU 33-016 in 1995 involved removing the sump contents, filling the sump with approximately 3 yd^3 of sand and gravel and capping the sump with 1 ft of concrete. The sump contents were characterized and determined to be nonhazardous.

SWMU 33-016 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 33-016.Detailed sampling results can be found in the Historical Investigation Report for Chaquehui Canyon Aggregate Area (LANL 2009).

A-5.2 Storm Water Monitoring Results

SWMU 33-016 is monitored within CHQ-SMA-4.1. 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-5.2-1):

- Gross-alpha activity of 34.5 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is 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

CHQ-SMA-4.1 is a 0.26 acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.05 acres of bare rock, 0.08 acres of piñon-juniper woodland, and 0.13 acres of bare soil, (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:

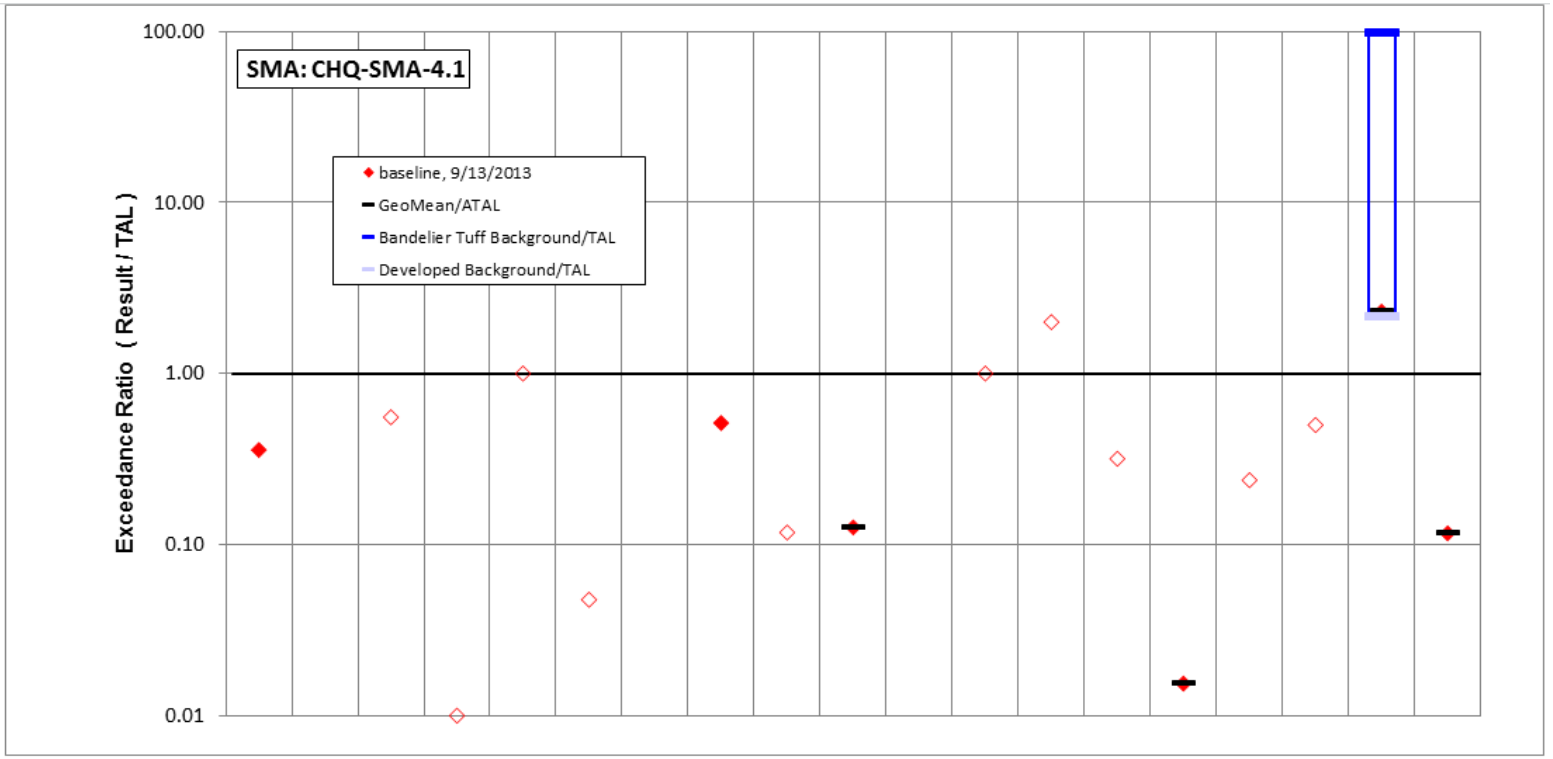
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L. The 2013 gross-alpha result is less than this value.

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 33-016:

- 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 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
9/13/2013 result	268	*3*	*5*	*50*	*1*	*10*	2.06	2.21	*2*	0.097	0.702	*5*	***1***	*2*	1.54	*10*	*0.005*	**34.5**	3.49
result / TAL	0.36	*0.005*	*0.56*	*0.01*	*1*	*0.048*	0.0021	0.51	*0.12*	0.13	0.0041	*1*	***2***	*0.32*	0.015	*0.24*	*0.5*	**2.3**	0.12

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 CHQ-SMA-4.1

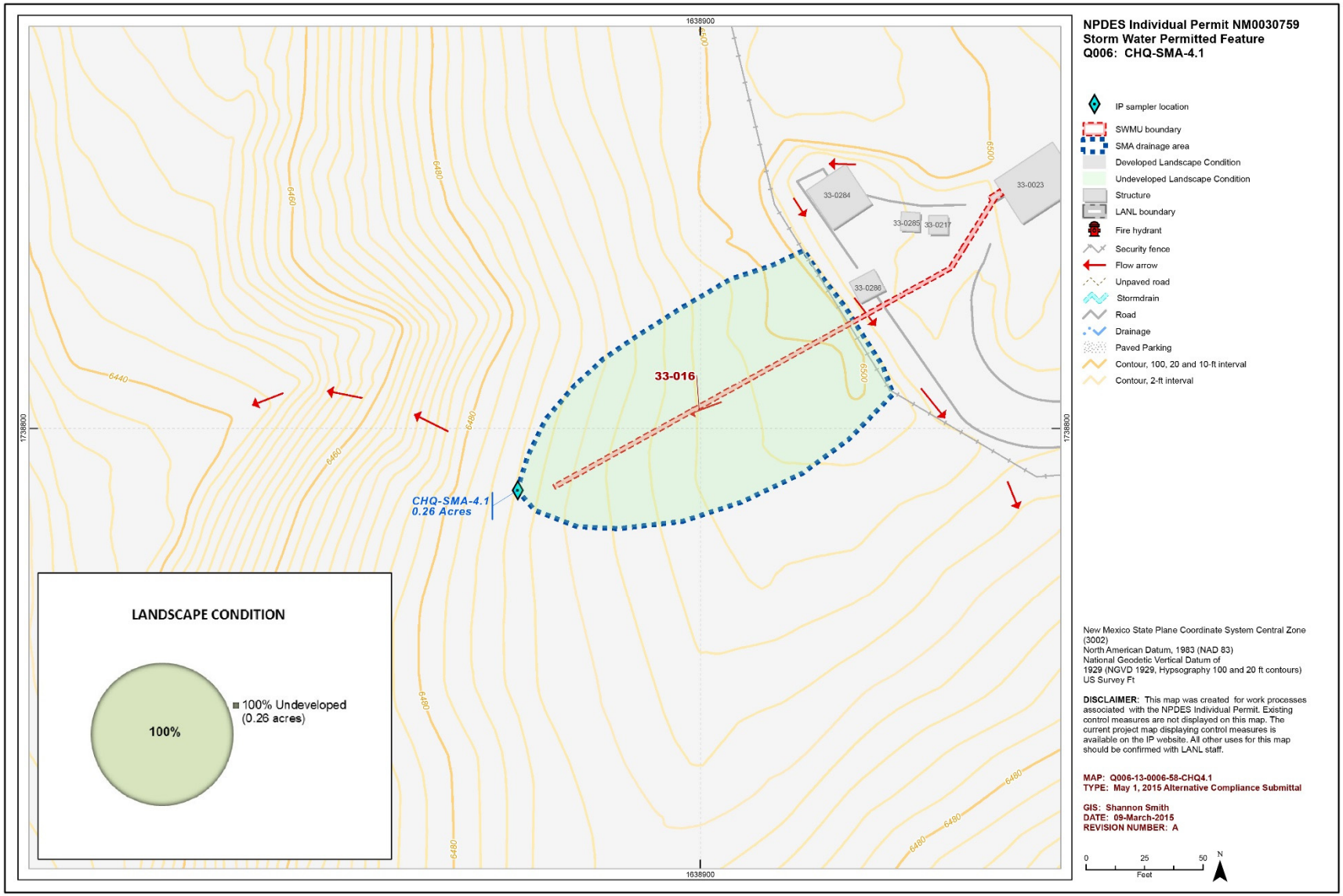


Figure A-5.3-1 SMA map for CHQ-SMA-4.1

A-6.0 CHQ-SMA-4.5

A-6.1 Site Description

CHQ-SMA-4.1, located within the Ancho/Chaquehui watershed, includes AOC 33-011(b), a former storage area located just outside the northwest corner of the National Radio Astronomy Observatory site at TA-33. This storage area was approximately 300 ft wide × 600 ft long. Beginning in the 1950s, the Site served as a storage area for equipment and materials such as tungsten, uranium, and beryllium. Equipment used at the TA-33 firing sites was also stored at the Site. The storage area was cleaned in 1984, and most materials and debris were removed at that time, although some debris remained. Approximately 75% of the area was scraped and leveled to or near the tuff bedrock. During the 1996 VCA, all remaining surface debris was removed from the Site. A total of 2 yd^3 of nonhazardous/ nonradioactive debris ad 0.5 ft^3 of radioactive debris were removed. No confirmation samples were collected during the VCA because no soil was removed.

SWMU 33-011(b) 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 33-011(b).Detailed sampling results can be found in the Historical Investigation Report for Chaquehui Canyon Aggregate Area (LANL 2009).

A-6.2 Storm Water Monitoring Results

AOC 33-011(b) is monitored within CHQ-SMA-4.5. Following the installation of baseline control measures, a baseline storm water sample was collected on July 25, 2013. Analytical results from this sample yielded one TAL exceedance (Figure A-6.2-1):

- Gross-alpha activity of 103 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is 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

CHQ-SMA-4.5 is a 2.72-acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.43 acres of grassland, and 2.29 acres of piñon-juniper woodland (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:

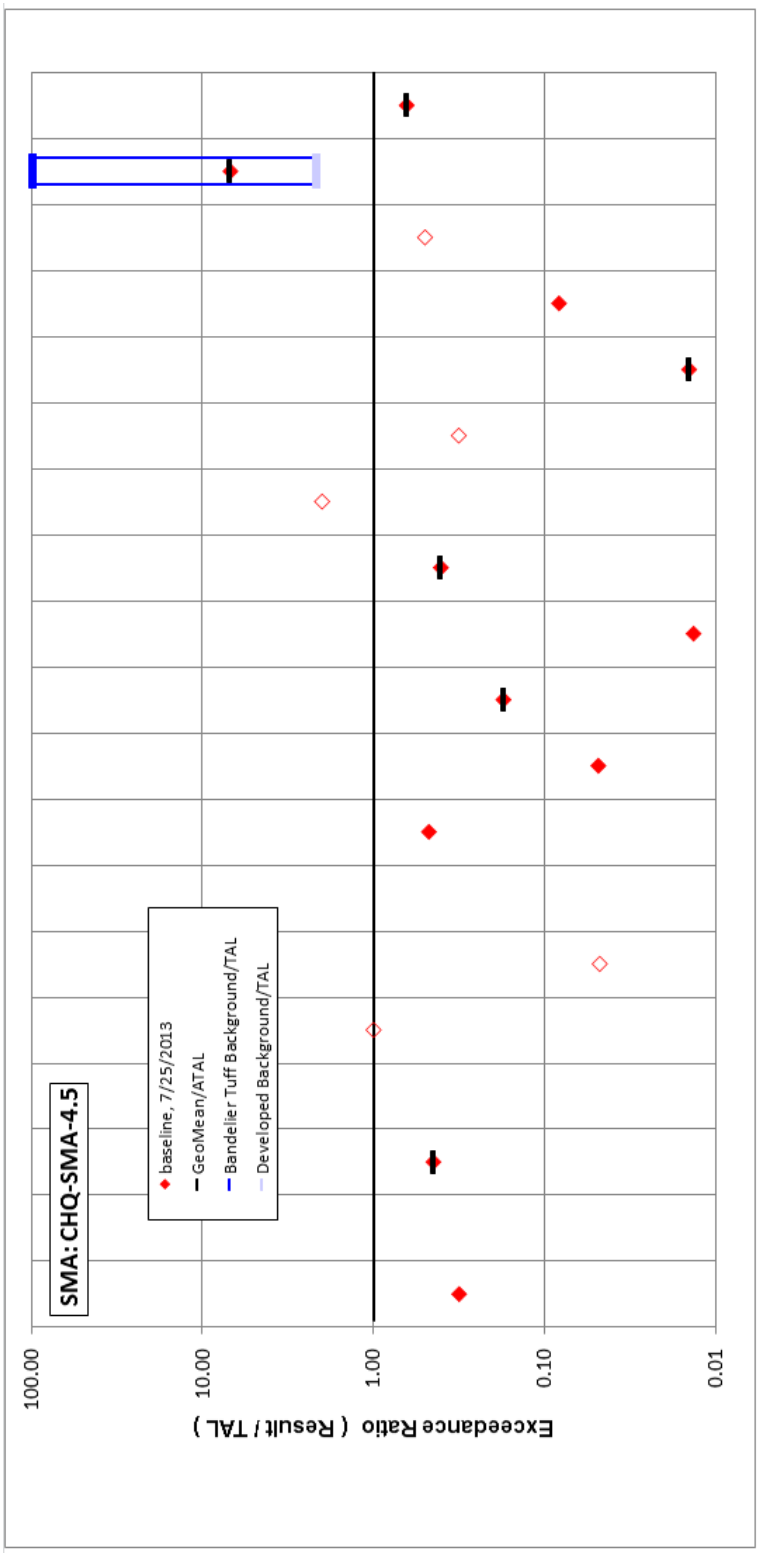
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is between these two values.

A-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.

AOC 33-011(b):

- Alpha-emitting radionuclides are 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.



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
7/25/2013 result	237	*3*	4.02	21.9	*1*	*10*	5.11	2.04	0.825	0.134	2.29	2.02	***1***	*2*	1.43	3.46	*0.005*	**103**	19.2
result / TAL	0.32	*0.005*	0.45	0.0044	*1*	*0.048*	0.0051	0.47	0.049	0.17	0.013	0.4	***2***	*0.32*	0.014	0.082	*0.5*	**6.9**	0.64

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 CHQ-SMA-4.5

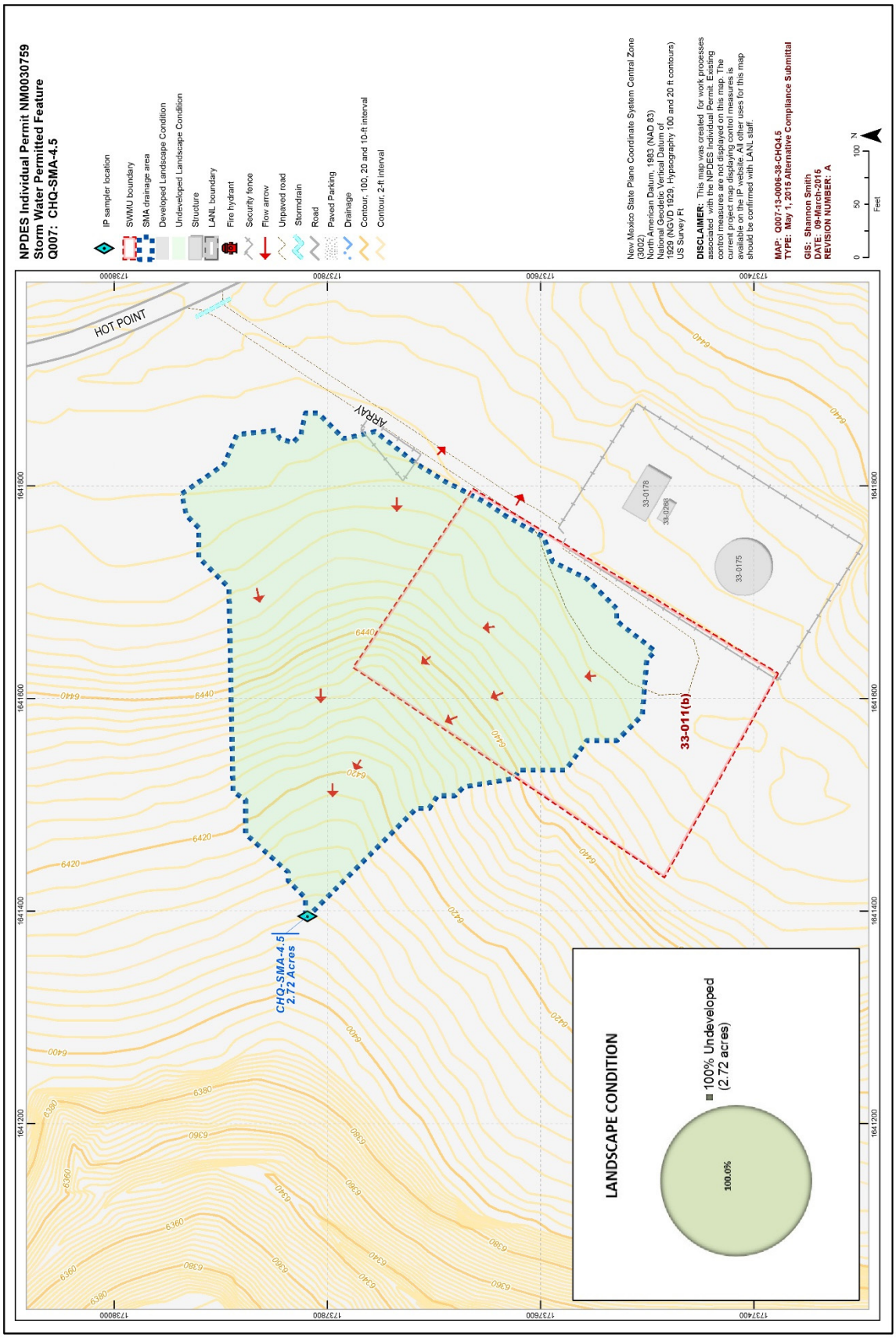


Figure A-6.3-1 SMA map for CHQ-SMA-4.5

A-7.0 DP-SMA-2.35

A-7.1 Site Description

DP-SMA-2.35, located within 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 certificate of completion (COC) is not expected to be made until investigation of all other TA-21 Sites is complete. Detailed sampling results can be found 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 1996).

SWMU 21-024(n) originally consisted of a corrrugated metal pipe that exited building 21-155 and an outfall on the north edge of DP Canyon. Building 21-155 was constructed in 1949 and housed a warehouse and laboratory. Three additional drainlines originating from building 21-155 (or next to building 21-155) that followed a parallel path to, and west of, the SWMU 21-024(n) drainline were found in engineering drawings and during site visits in the early 1990s. They were subsequently added to SWMU 21-024(n). Each of the parallel drainlines discharged to the same hillside as the SWMU 21-024(n) outfall. Discharges from each drainline flowed downslope to a ditch on the south side of the TA-21 perimeter road. From the ditch, the path of the effluent flowed to one of two culverts (one to the east and one to the west) that crossed under the perimeter road and emptied onto the ground surface that sloped toward DP Canyon. All four drainlines were removed in 2007.

Decision-level data for SWMU 21-024(n) determined the lateral and vertical extent of plutonium-239 and uranium-238 were not defined. Additional sampling and remediation will be conducted at SWMU 21-024(n) during the DP Aggregate Area Phase III investigation. SWMU 21-024(n) was recommended for corrective action complete without controls in the Phase III investigation report for DP Site Aggregate Area. Detailed reporting sampling results can be found in the Phase II Investigation Report for Delta Prime Site Aggregate Area (LANL 2010b).

A-7.2 Storm Water Monitoring Results

SWMUs 21-021 and 21-024(n) are monitored within DP-SMA-2.35. 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-7.2-1):

- Gross-alpha activities of 25 pCi/L (ATAL is 15 pCi/L).

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

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

DP-SMA-2.35 is a 0.19-acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.19 acres of grassland (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:

- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L. The 2013 gross-alpha result is less than this value.

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

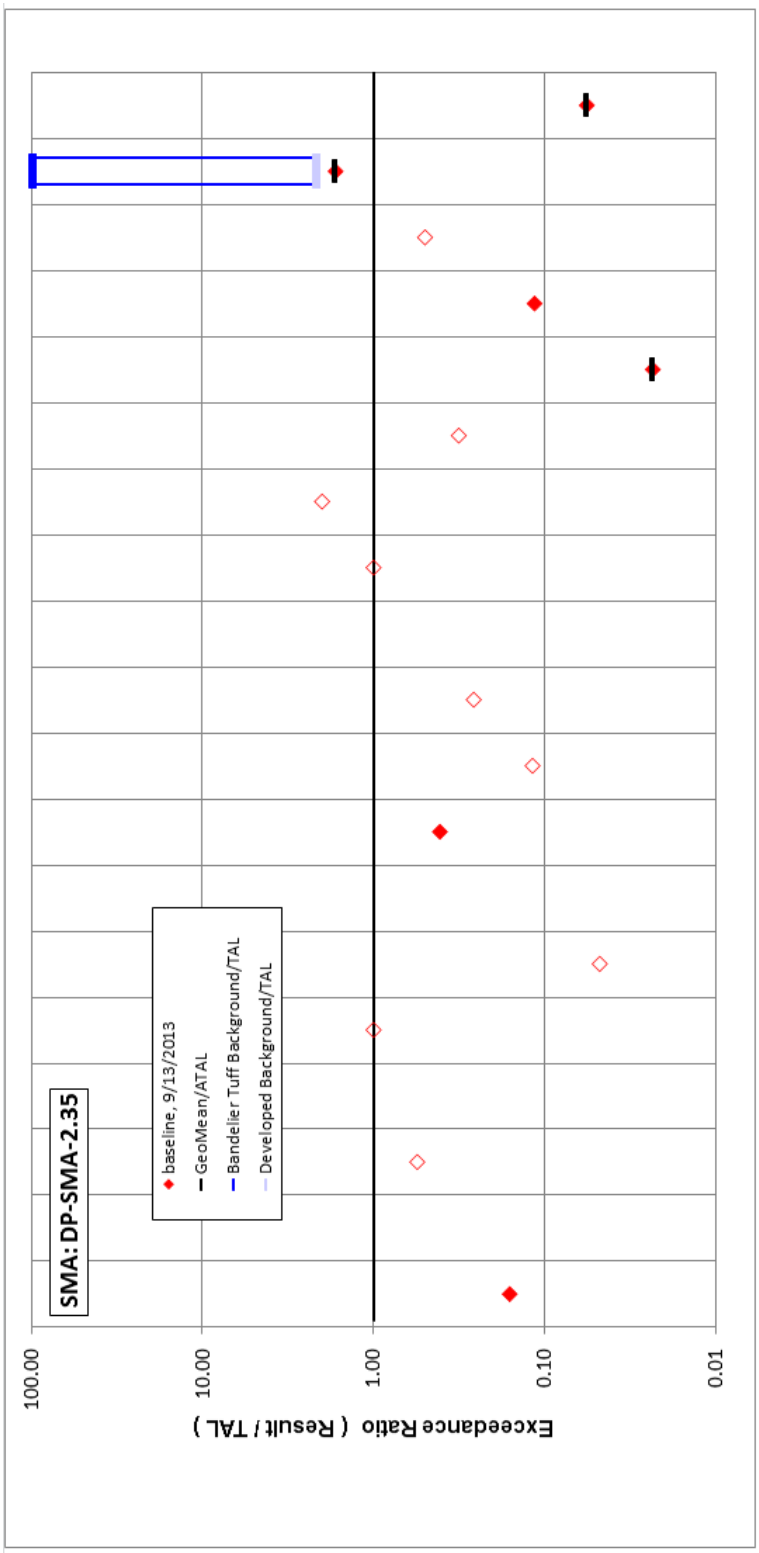
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 21-021:

- 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.

SWMU 21-024(n):

- Alpha-emitting radionuclides are 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.



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	120	*3*	*5*	15.7	*1*	*10*	*5*	1.76	*2*	*0.2*	0.791	*5*	***1***	*2*	2.33	4.81	*0.005*	**25**	1.7
result / TAL	0.16	*0.005*	*0.56*	0.0031	*1*	*0.048*	*0.005*	0.41	*0.12*	*0.26*	0.0047	*1*	***2***	*0.32*	0.023	0.11	*0.5*	**1.7**	0.057

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 DP-SMA-2.35

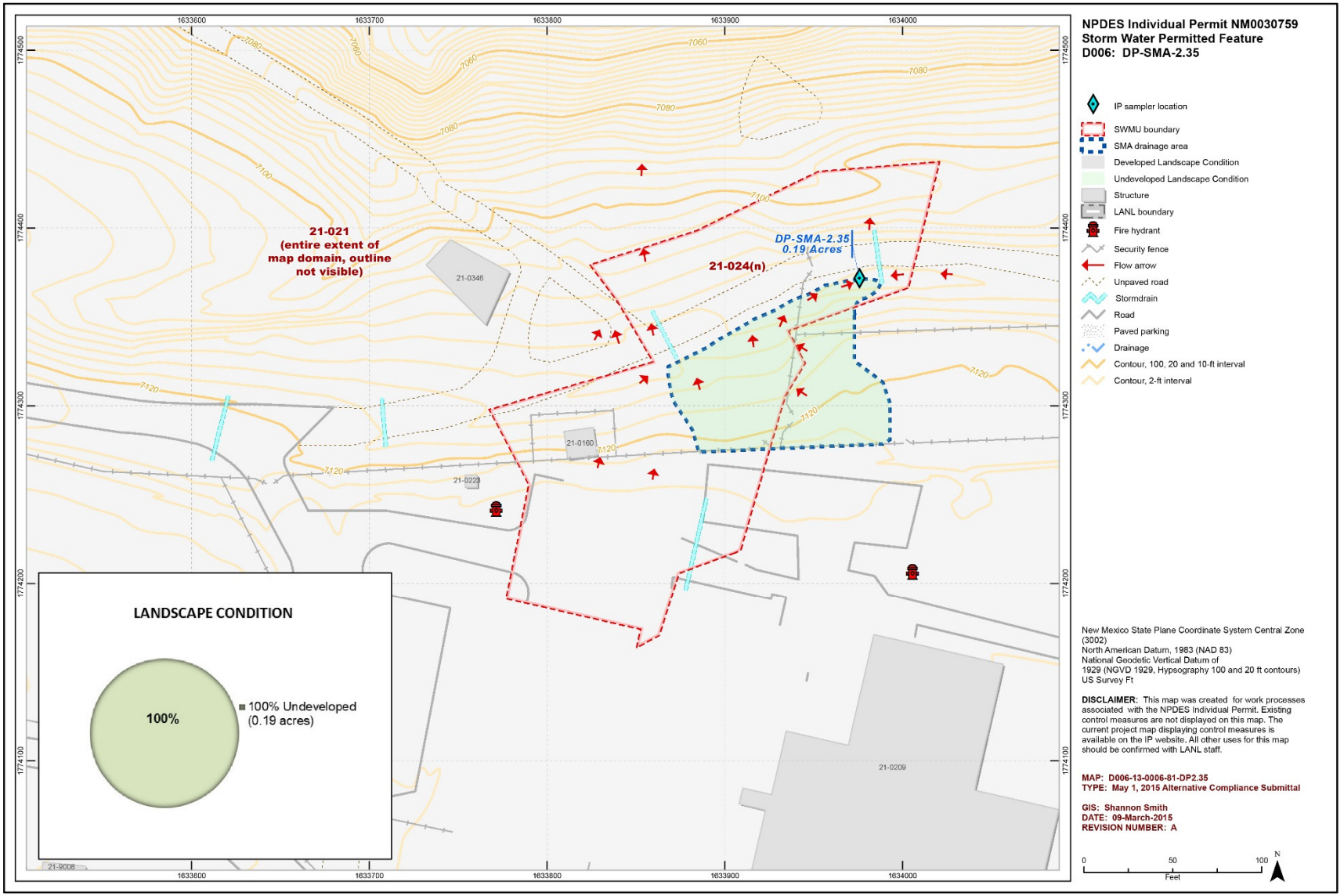


Figure A-7.3-1 SMA map for DP-SMA-2.35

A-8.0 LA-SMA-5.91

A-8.1 Site Description

LA-SMA-5.91, located within 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 can be found 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 1996).

A-8.2 Storm Water Monitoring Results

Following the installation of enhanced control measures at LA-SMA-5.91, corrective action storm water samples were collected on September 12, 2013, and July 15, 2014. Analytical results from this corrective action monitoring sample yielded two TAL exceedances (Figure A-8.2-1):

- Gross-alpha activities of 15.7 pCi/L and 169 pCi/L (ATAL is 15 pCi/L).

The 2013 and 2014 TAL exceedances are 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 is not evaluated in the following discussion.

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

LA-SMA-5.91 is a 3.10-acre watershed that consists of 70% developed areas and 30% undeveloped areas. Developed areas consist of 0.21 acres of pavement and 1.96 acres of gravel. Undeveloped areas consist of 0.10 acres of bare soil and 0.83 acres of ponderosa 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:

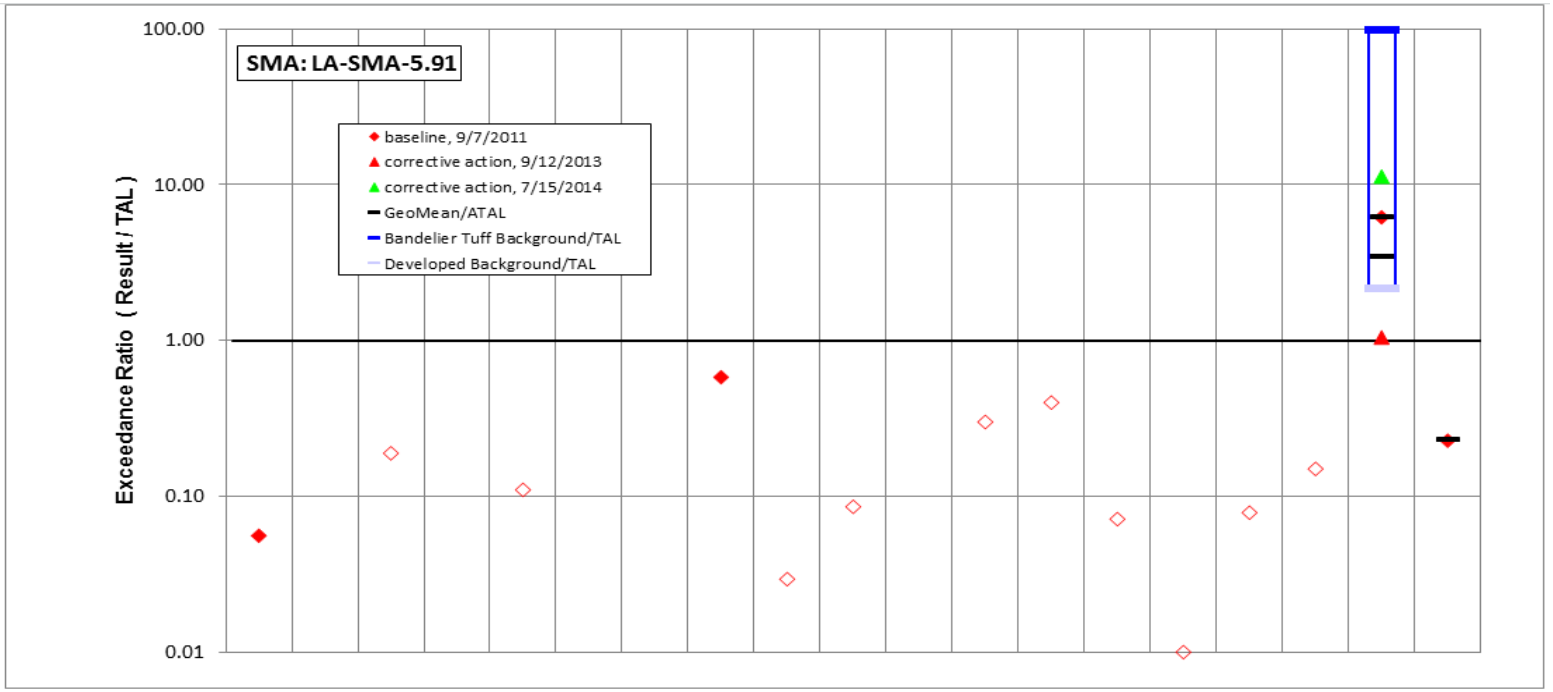
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2014 gross-alpha result is between these two values, while the 2013 result is below both 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 21-021:

- 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.



	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
7/15/2014 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**169**	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**11**	-
9/12/2013 result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**15.7**	-
result / TAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1**	-
9/7/2011 result	41.9	*1*	*1.7*	27.1	*0.11*	*2*	2.9	2.5	*0.5*	*0.066*	1.3	*1.5*	*0.2*	*0.45*	*1*	*3.3*	*0.002*	**92.6**	6.83
result / TAL	0.056	*0.002*	*0.19*	0.0054	*0.11*	*0.01*	0.0029	0.58	*0.029*	*0.086*	0.0076	*0.3*	*0.4*	*0.071*	*0.01*	*0.079*	*0.15*	**6.2**	0.23

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 LA-SMA-5.91

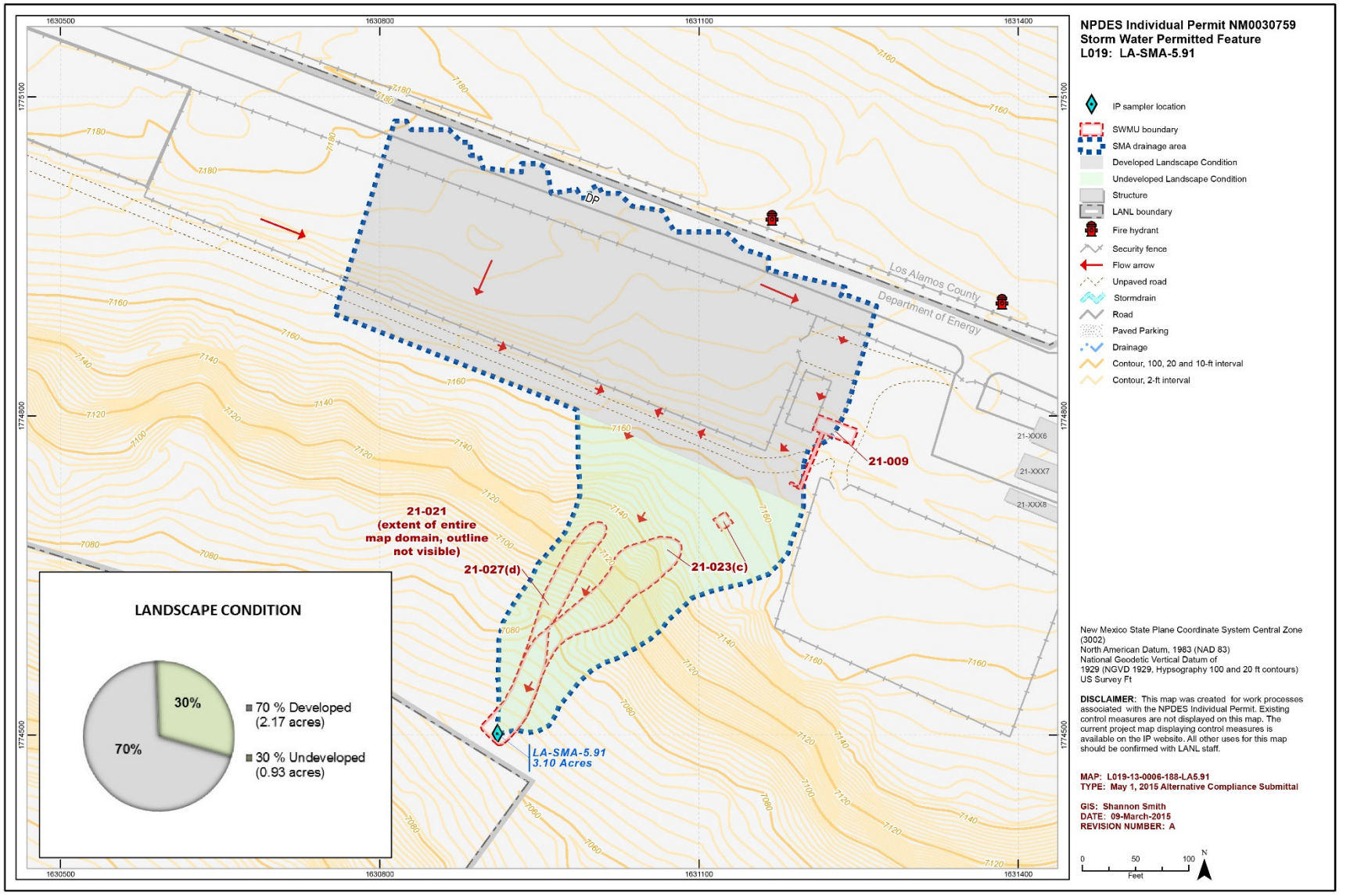


Figure A-8.3-1 SMA map for LA-SMA-5.91

A-9.0 LA-SMA-6.395

A-9.1 Site Description

LA-SMA-6.395, located within 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 prior to the Consent Order and 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 can be found 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 1996).

A-9.2 Storm Water Monitoring Results

SWMU 21-021 is monitored within LA-SMA-6.395. 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-9.2-1):

- Gross-alpha activities of 300 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is the subject of the alternative compliance request for this SMA/Site.

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

LA-SMA-6.395 is a 1.81-acre watershed that consists of 33% developed areas and 67% undeveloped areas. Developed areas consist of 0.15 acres of pavement and 0.44 acres of gravel. Undeveloped areas consist of 0.32 acres of bare soil and 0.90 acres of grassland (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:

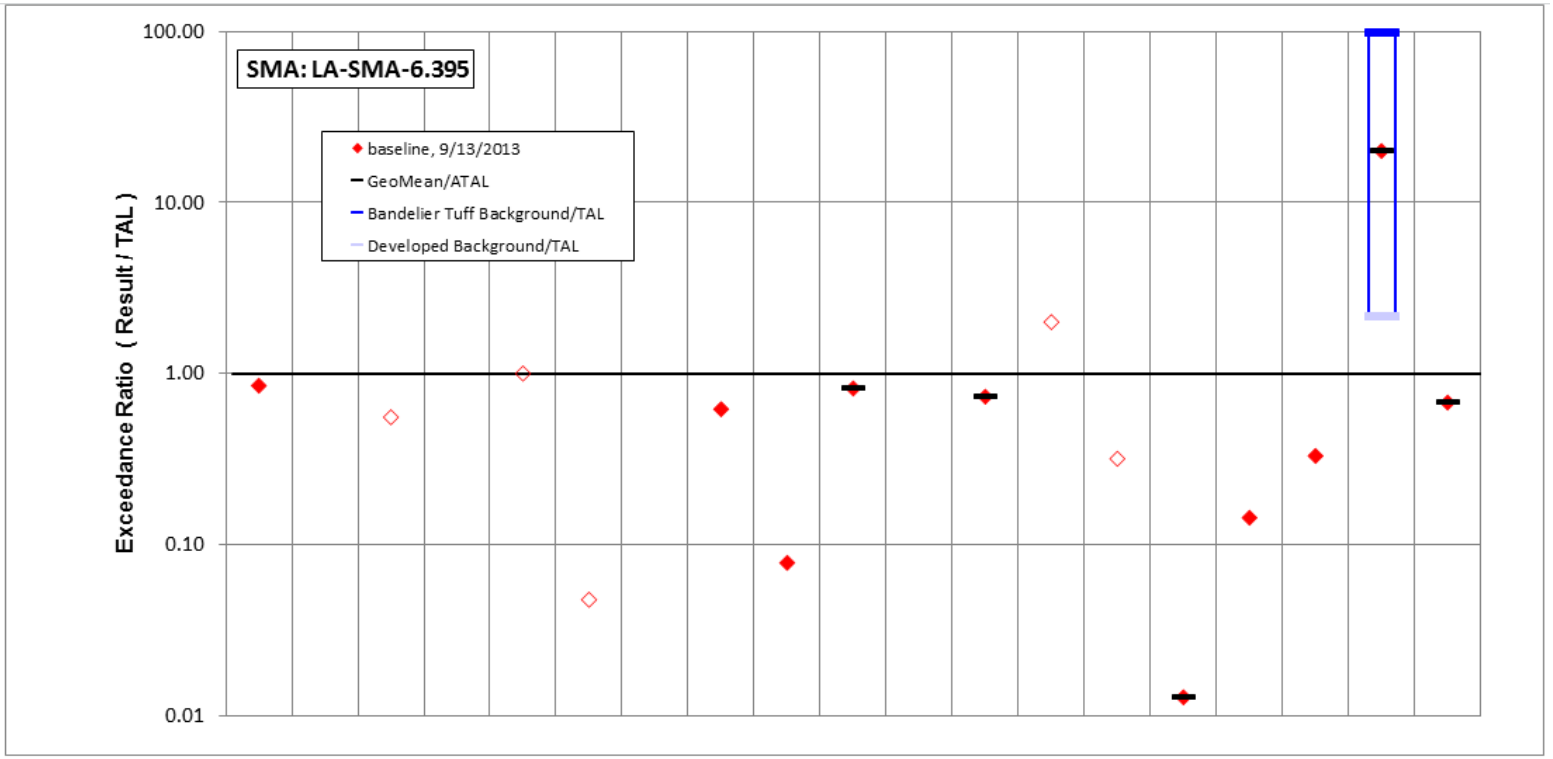
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2013 gross-alpha result is between these two values.

A-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 21-021:

- 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.



	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	637	*3*	*5*	22.7	*1*	*10*	3.4	2.66	1.33	0.63	1.52	3.66	***1***	*2*	1.28	6.03	0.0033	**300**	20.3
result / TAL	0.85	*0.005*	*0.56*	0.0045	*1*	*0.048*	0.0034	0.62	0.078	0.82	0.0089	0.73	***2***	*0.32*	0.013	0.14	0.33	**20**	0.68

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 LA-SMA-6.395

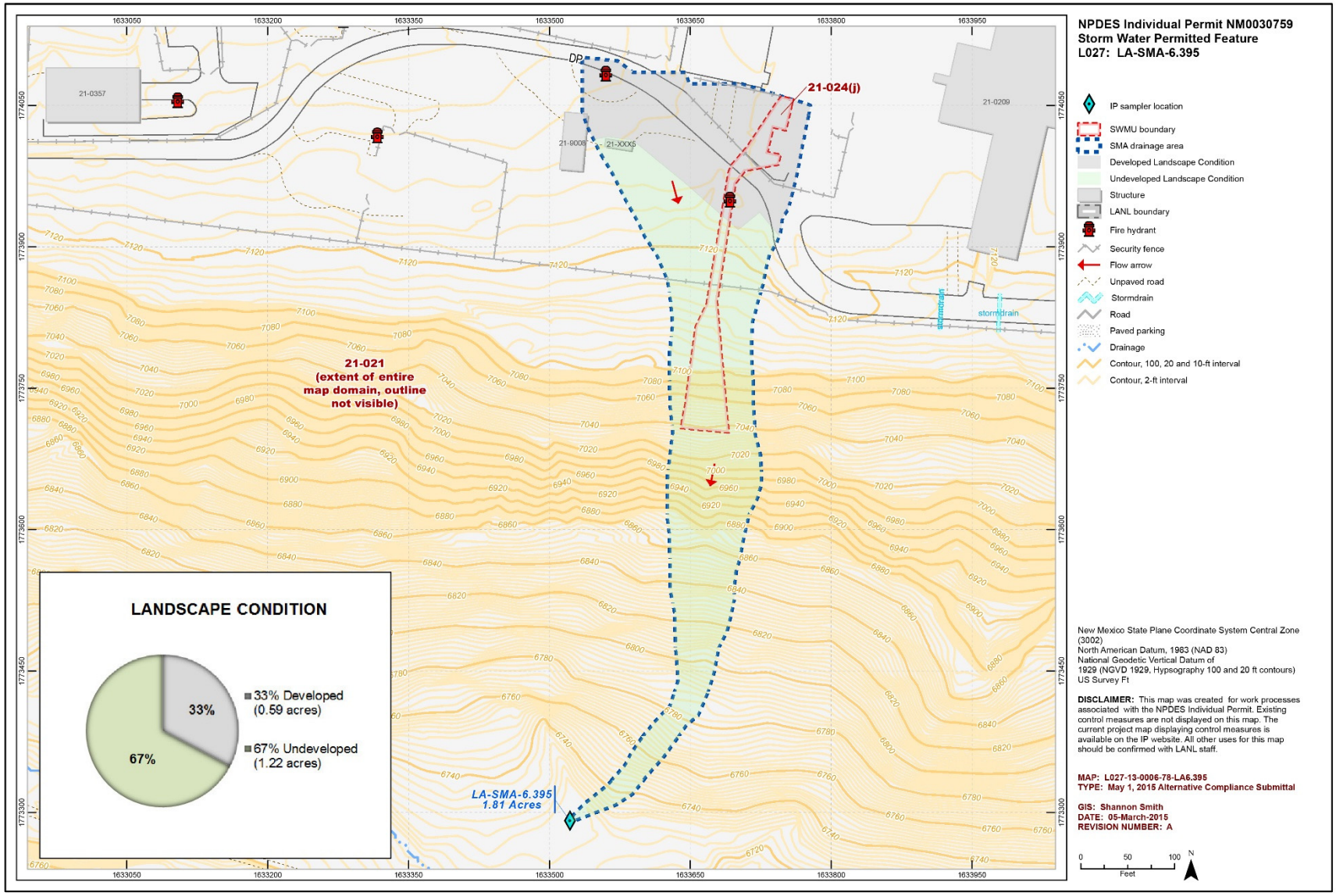


Figure A-9.3-1 SMA map for LA-SMA-6.395

A-10.0 LA-SMA-9

A-10.1 Site Description

LA-SMA-9, located within the Los Alamos/Pueblo watershed, includes SWMU 26-001, a surface disposal area that contains debris from a five-room concrete storage vault (structure 26-1) and located within TA-73 on the south-facing slope of Los Alamos Canyon. The vault was constructed in 1946 for storing radioactive materials; however, the type and quantity of radioactive materials is not known. The vault was later used for storing HE. The vault was decommissioned and dismantled in 1966. Before it was decommissioned, some components of the vault, including shelving, drainlines, the sump, and ductwork, were removed and disposed of at Material Disposal Area C. The remaining structure was bulldozed onto the south-facing slope of Los Alamos Canyon. In the 1970s, most of the vault debris rested on the bench below the mesa top; however, some debris may have fallen as far as the canyon floor. The debris on the ledge was covered with approximately 3 ft of soil.

SWMU 26-002(a) is a former acid sump system located within TA-73 and situated on the south rim of Los Alamos Canyon. Installed in 1948, the sump system consisted of a 6-in. vitrified clay pipe (VCP) floor drain that discharged to a collection sump located outside the concrete storage vault (structure 26-1). The sump discharged to an outfall [SWMU 26-002(b)] that drained to Los Alamos Canyon. The sump was decommissioned and removed in 1966.

SWMU 26-002(b) is a former drainline located within TA-73 and situated on the south rim of Los Alamos Canyon. The 4-in. VCP drainline served the equipment room of the former concrete storage vault (structure 26-1) and discharged directly to Los Alamos Canyon. The drainline was removed in 1966.

SWMU 26-003 is a sanitary septic system that served a restroom in the former concrete storage vault (structure 26-1) at former TA-26. Installed in 1948, the septic system consisted of 4-in. VCP drainline connected to a 250-gal. steel septic tank. The septic tank may have been removed at the same time as the sump [SWMU 26-002(a)]; however, there is no documentation verifying removal of the septic tank.

Consent Order investigations were conducted at all four Sites; additional sampling to determine the lateral and vertical extent of contamination is proposed. Detailed sampling results for each Site can be found in the Phase II Investigation Report for Middle Los Alamos Canyon Aggregate Area (LANL 2011b).

A-10.2 Storm Water Monitoring Results

SWMUs 26-001, 26-002(a), 26-002(b), and 26-003 are monitored within LA-SMA-9. Following the installation of baseline control measures, a baseline storm water sample was collected on August 10, 2014. Analytical results from this sample yielded one TAL exceedance (Figure A-10.2-1):

- Gross-alpha activities of 208 pCi/L (ATAL is 15 pCi/L).

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

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

LA-SMA-9 is a 5.12-acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.08 acres of bare soil, 0.87 acres of grassland, 1.03 acres of piñon-juniper woodland, and 3.14 acres of bare rock (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:

- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L. The 2014 gross-alpha result is less than this value.

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 26-001:

- Alpha-emitting radionuclides may 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 26-002(a):

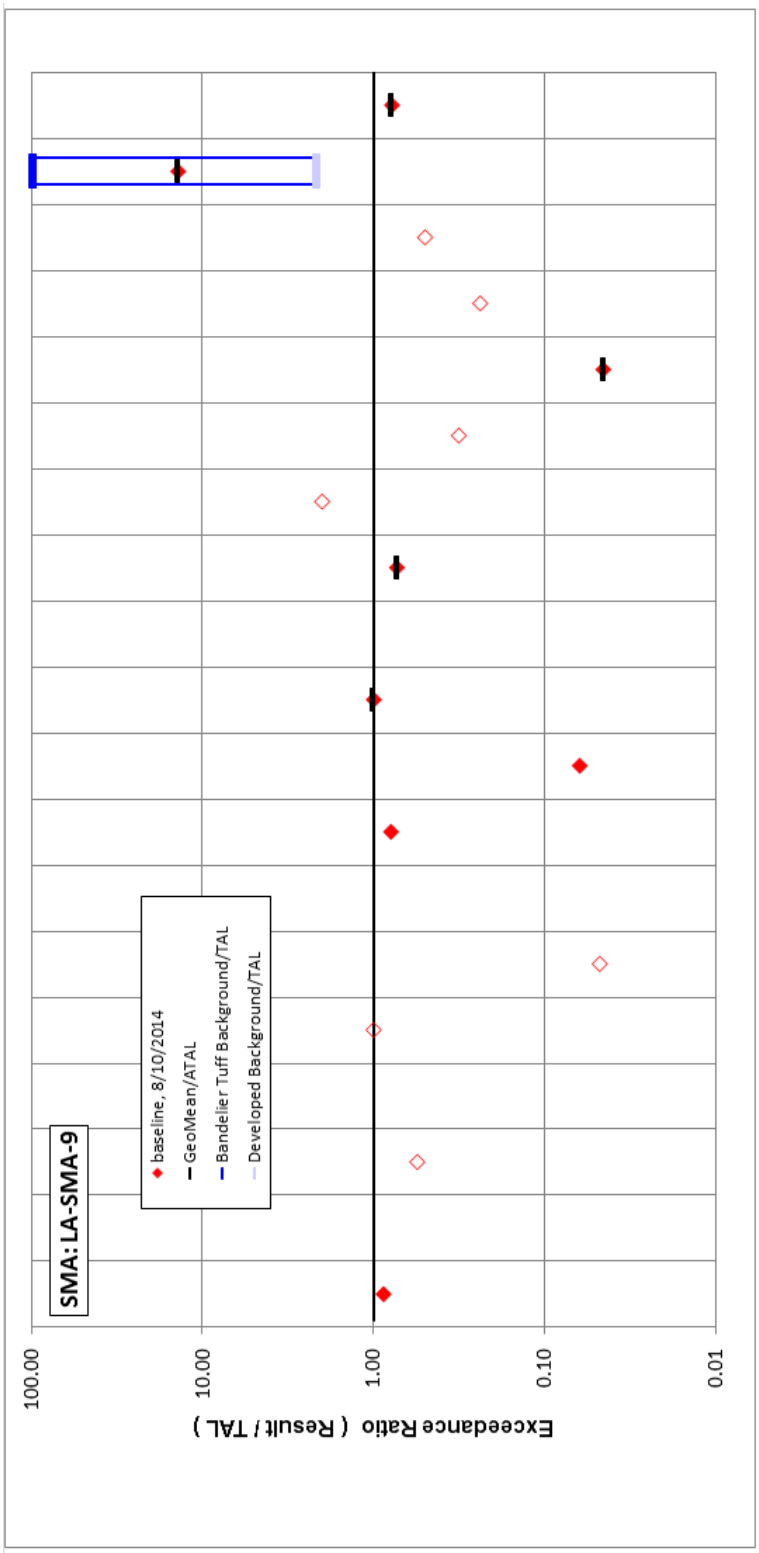
- Alpha-emitting radionuclides are not known to be associated with industrial materials historically managed at the Site. Alpha-emitting radionuclides managed by the Permittees are exempt from regulation under the CWA and are excluded from the definition of adjusted gross-alpha radioactivity.

SWMU 26-002(b):

- 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 CWA and are excluded from the definition of adjusted gross-alpha radioactivity.

SWMU 26-003:

- 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 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
8/10/2014 result	656	1.32	5	20.5	*1*	*10*	5	3.4	1.06	0.767	1.69	3.65	***1***	2	4.54	*10*	*0.005*	**208**	23.4
result / TAL	0.87	0.0021	*0.56*	0.0041	*1*	*0.048*	*0.005*	0.79	0.062	1	0.0099	0.73	***2***	*0.32*	0.045	*0.24*	*0.5*	**14**	0.78

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 LA-SMA-9

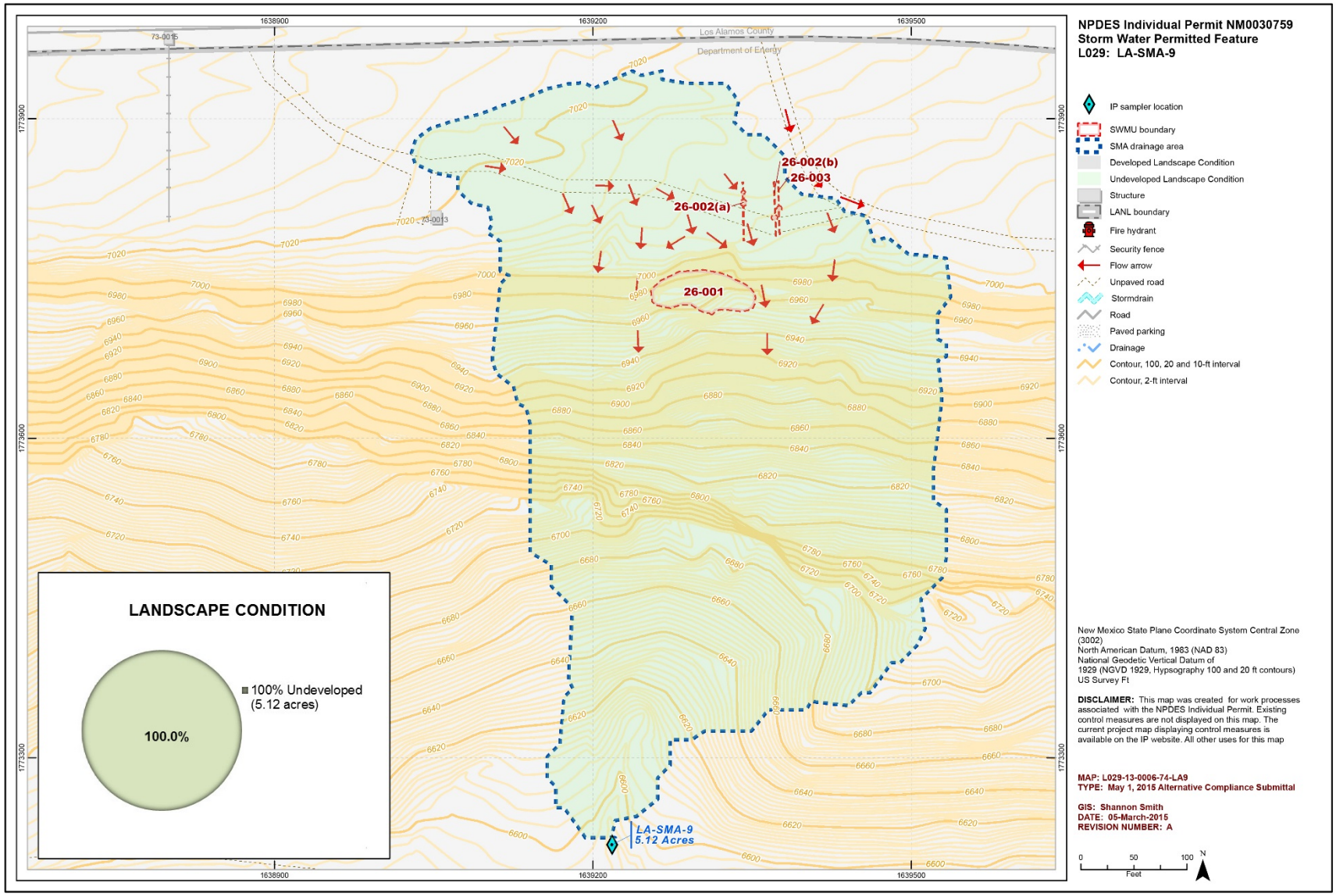


Figure A-10.3-1 SMA map for LA-SMA-9

A-11.0 PJ-SMA-4.05

A-11.1 Site Description

PJ-SMA-4.05, located within the Pajarito watershed, includes SWMU 09-004(g), the decommissioned sump (structure 09-190) located at TA-09 on the east side of building 09-50 (a shipping and receiving building). The original Site narrative in the Permit described the SWMU as a settling tank, but the structure is a sump. The sump, installed between 1950 and 1952, is made of reinforced concrete and formerly received industrial waste from building 09-50. Activities in the building involved shipping, receiving, short-term storage of HE, and small-scale laser experiments. Since 1993, building 09-50 has been used for storage only. The sump collected settling HE particles that were not filtered out by the building's waste system and discharged effluent to a former NPDES-permitted outfall (EPA 04A155), which is part of SWMU 09-005(g), a septic system that formerly received sanitary wastewater from building 09-50. Periodically, the sump was inspected, debris was removed using specially equipped trucks, and the sump was cleaned. In October 2006, the sump was removed.

No Consent Order investigation, RFI, or other investigations have been conducted at SWMU 09-004(g).

There is no evidence that SWMU 09-004(g) managed or released significant industrial materials to cause exposure to storm water because it was a subsurface sump that has been removed. However, SWMU 09-004(g) discharged through as subsurface pipe to an outfall regulated by SWMU 09-005(g). SWMU 09-005(g) is an inactive septic system at TA-09 consisting of a septic tank (structure 09-109), drain field, and formerly NPDES-permitted outfall (EPA 04A155) located at TA-09, approximately 100 ft southeast of building 09-50 (a shipping and receiving building). Building 09-50 is an active facility. Installed between 1950 and 1952, the tank is approximately 5 ft wide × 8 ft long × 4 ft deep, with a capacity of 750-gal. The tank receives sanitary waste from building 09-50 and originally discharged into the same industrial waste line as the SWMU 09-004(g) sump. In 1989, septic tank 09-109 was rerouted to bypass the industrial waste line and discharge to an absorption trench (i.e., drain field). The precise location of the drain field is not known. The outfall has been removed from the NPDES permit. There is no documentation to show the inlet drainline from the building to the septic tank has been either plugged or disconnected, although the outlet drainline was plugged in 1989. The septic tank is currently listed as abandoned in the Laboratory's Archibus facility information database, indicating it is not in use.

The SMA sampler is located downgradient of the outfall from SWMU 09-005(g). Therefore, the SMA adequately represents storm water discharges from SWMU 09-005(g) site-affected soils. The Permittees believe that SWMU 09-004(g) was incorrectly identified during the Individual Permit establishment and should have contained SWMU 09-005(g). The TAL exceedance comparison described below, therefore, applies to SWMU 09-005(g). However, the evaluation and discussion of SWMU 09-005(g) are for discussion purposes only because SWMU 09-005(g) is currently not regulated by the Individual Permit.

A-11.2 Storm Water Monitoring Results

SWMUs 09-004(g) and 09-005(g) (not currently regulated under the Individual Permit) are monitored within PJ-SMA-4.05. 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-11.2-1):

- Gross-alpha activity of 47.2 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is the subject of the alternative compliance request.

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

PJ-SMA-4.05 is a 1.21-acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.11 acres of grassland and 1.10 acres of ponderosa woodland (Figure A-11.3-1 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. The 2013 gross-alpha result is less than this value.

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

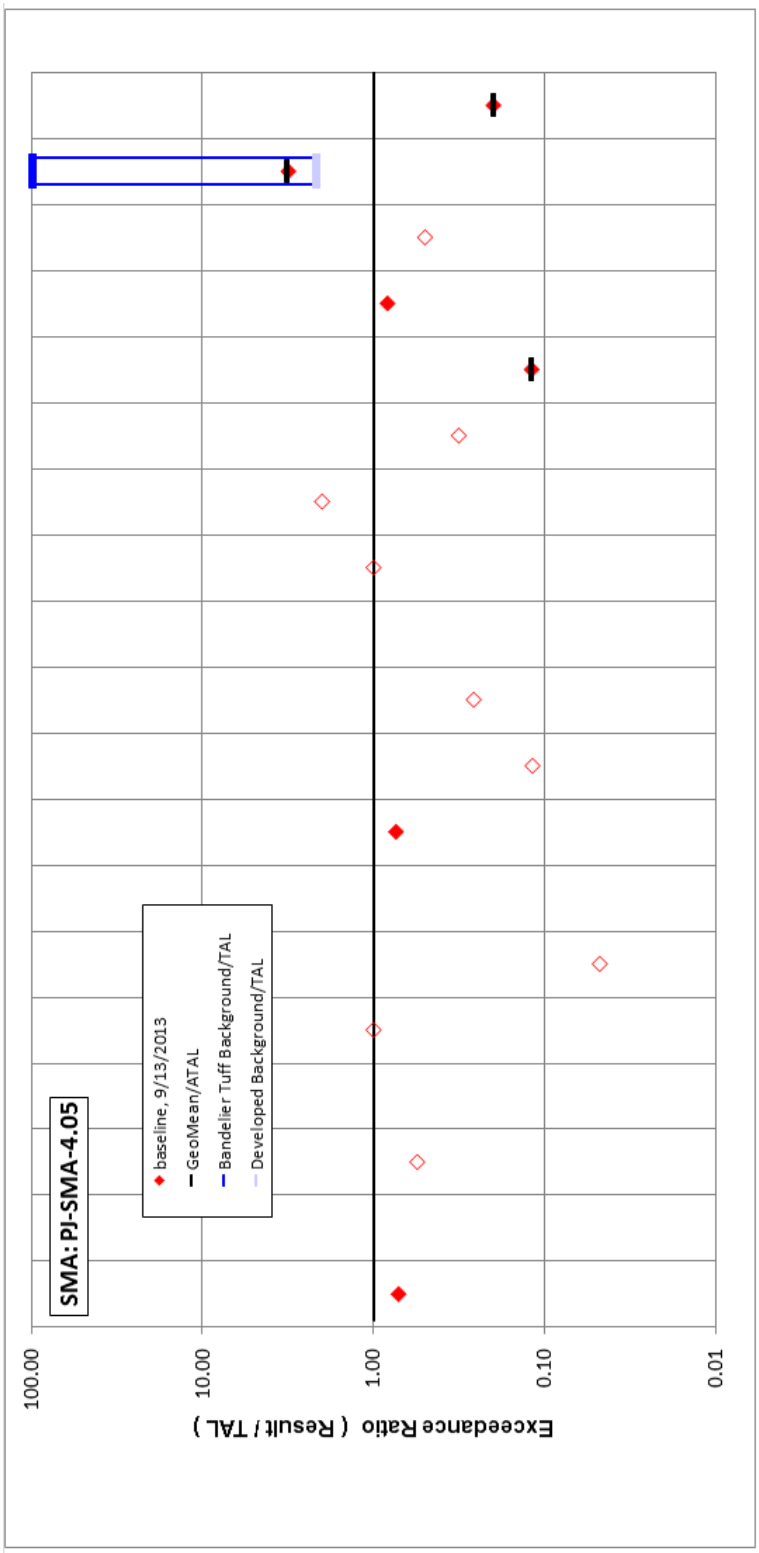
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 09-004(g):

- 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 09-005(g):

- 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
9/13/2013 result	536	3	5	38.2	*1*	*10*	1.26	3.18	2	*0.2*	1.27	5	***1***	2	11.9	34.8	*0.005*	**47.2**	5.98
result / TAL	0.71	*0.005*	*0.56*	0.0076	*1*	*0.048*	0.0013	0.74	*0.12*	*0.26*	0.0075	*1*	***2***	*0.32*	0.12	0.83	*0.5*	**3.1**	0.2

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 PJ-SMA-4.05

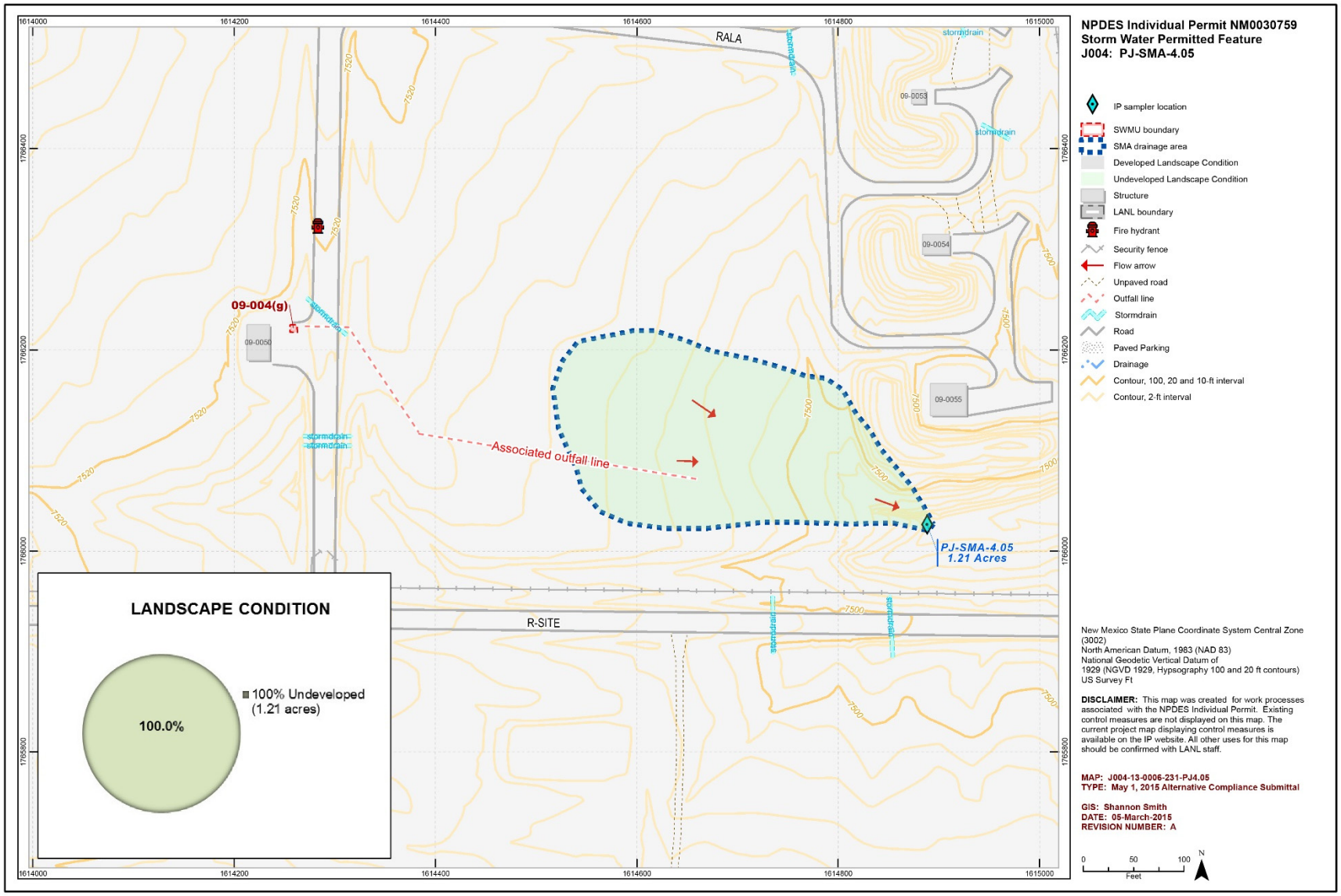


Figure A-11.3-1 SMA map for PJ-SMA-4.05

A-12.1 PJ-SMA-6

A-12.1 Site Description

PJ-SMA-6, located within the Pajarito watershed, includes SWMU 40-010, a surface disposal area located at TA-40 on the edge of Pajarito Canyon, approximately 200 ft south of former building 40-72. The surface disposal area extends about 150 ft along the canyon edge and 140 ft down the canyon side. The area contained various types of debris, including twenty 30-gal. drums. This area also contains debris from farm and home implements that predate Manhattan Project activities. Post–Cerro Grande fire activities removed all the drums and exposed debris, with the exception of the pre–Manhattan Project debris, which is considered to be of archaeological importance and therefore cannot be removed. Best management practices were installed at SWMU 40-010 in 2000 as part of the post–Cerro Grande fire recovery. The fire damage exposed the surface disposal area. Straw wattles were installed upgradient of the surface disposal area to provide run-on diversion. The area was raked, reseeded, and mulched. Surface debris near the edge was removed and disposed of as solid wastes.

Consent Order sampling has not been conducted at SWMU 40-010; decision-level data are not available for the Site. However, screening-level data are available from samples collected during the 1995 RFI. Detailed sampling results can be found in the Historical Investigation Report for Starmer/Upper Pajarito Canyon Aggregate Area (LANL 2010c).

A-12.2 Storm Water Monitoring Results

SWMU 40-010 is monitored within PJ-SMA-6. Following the installation of baseline control measures, a baseline storm water sample was collected on July 8, 2014. Analytical results from this sample yielded one TAL exceedance (Figure A-12.2-1):

- Gross-alpha activity of 81.6 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is 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

PJ-SMA-6 is a 0.12-acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.06 acres of grassland and 0.06 acres of ponderosa woodland (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:

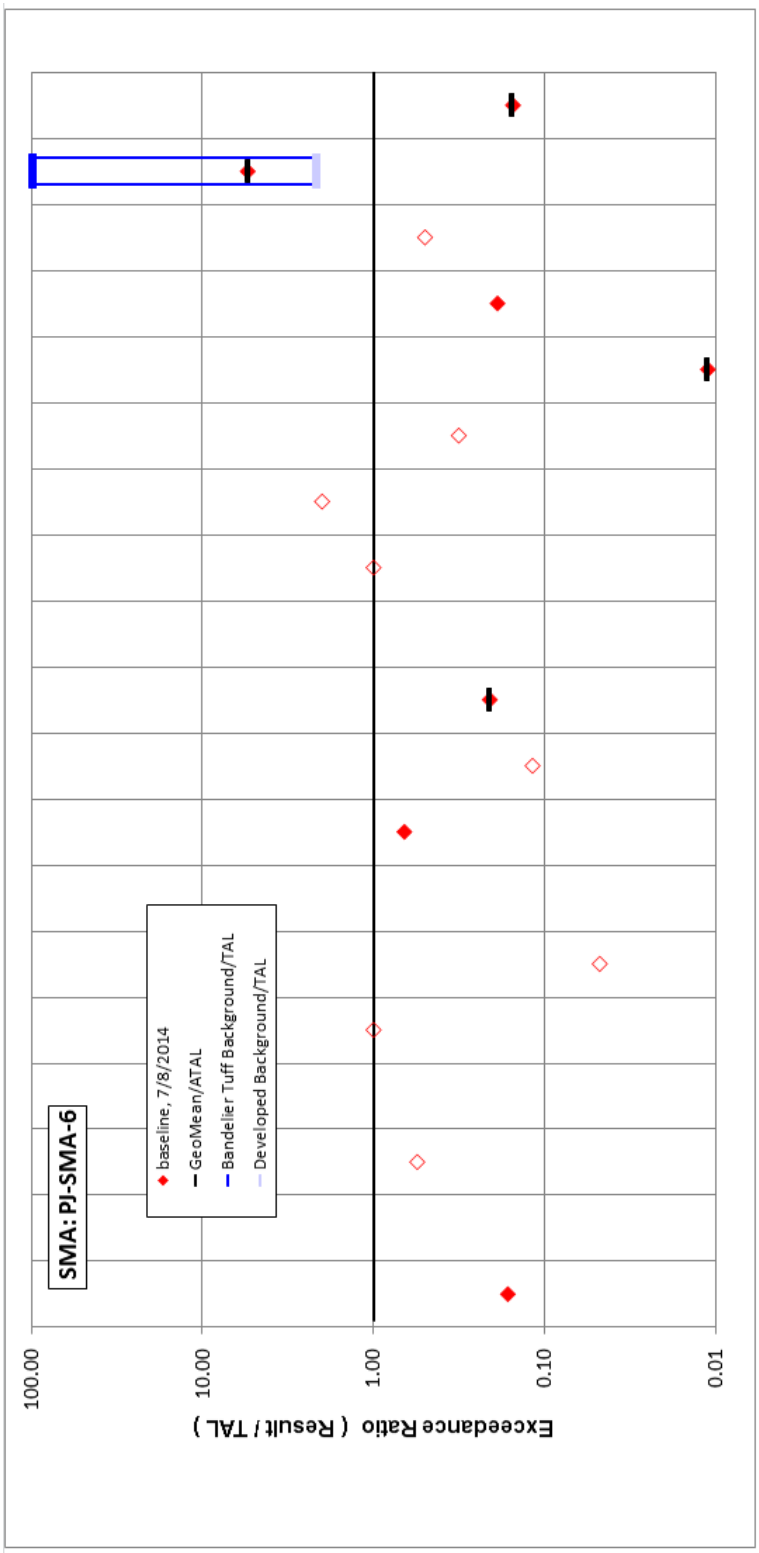
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L. The 2014 gross-alpha result is less than this value.

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 40-010:

- 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
7/8/2014 result	123	3	5	18.9	*1*	*10*	5	2.84	2	0.161	0.842	5	***1***	2	1.11	7.92	*0.005*	**81.6**	4.59
result / TAL	0.16	*0.005*	*0.56*	0.0038	*1*	*0.048*	*0.005*	0.66	*0.12*	0.21	0.005	*1*	***2***	*0.32*	0.011	0.19	*0.5*	**5.4**	0.15

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 PJ-SMA-6

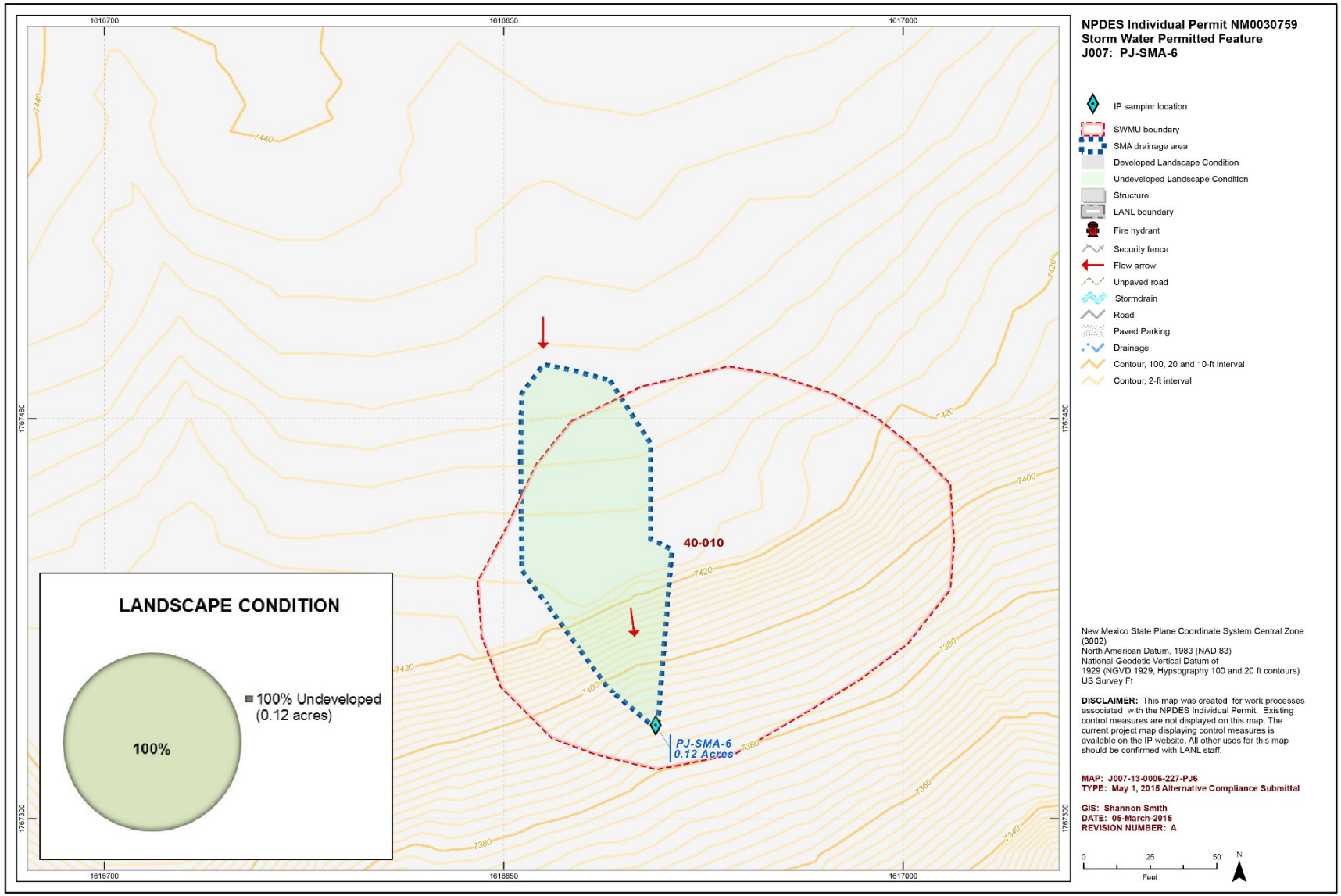


Figure A-12.3-1 SMA map for PJ-SMA-6

A-13.0 S-SMA-3.95

A-13.1 Site Description

S-SMA-3.95, located within the Sandia/Mortandad watershed, includes SWMU 20-002(a), the location of a former firing pit (former structure 20-6) used from 1945 to 1948 to conduct initiator tests. The firing pit was located on the far west end of former TA-20, south of East Jemez Road. The steel-lined pit was constructed following the failure of the Dumbo, a steel vessel designed to contain the firing test shot debris. The firing pit had interior dimensions of 14 ft 8 in. × 14 ft 8 in. × 12 ft deep. The walls and floor of the pit consisted of 0.75-in.-thick steel plate backed by 12- × 12-in. timbers. The pit was covered by a steel framework overlain by a mat of 0.25-in.-diameter steel rods spaced 1 in. apart. According to a 1947 report, the framework and mat, presumably installed to contain shot debris, failed after the first few shots. The Laboratory facility engineering records indicate the pit was removed in April 1948. A memorandum dated April 20, 1948, describing cleanup efforts in Sandia Canyon notes one “cage” was excavated and the “interior checked negative after clearing.” The SWMU 20-002(a) firing pit is presumed to be the “cage” referred to in the memorandum.

Phase I Consent Order sampling is complete for SWMU 20-002(a). All detected inorganic and organic chemical concentrations from Consent Order samples were below residential SSLs. SWMU 20-002(a) will be recommended for corrective action complete in the supplemental investigation report for Lower Sandia Canyon Aggregate Area, to be submitted to NMED in 2015. SWMU 20-002(a) will be eligible for a COC upon approval of the report by NMED. Consent Order investigations have been conducted at the Site and detailed reporting on soil sample results can be found in the Investigation Report for Lower Sandia Canyon Aggregate Area, Revision 1 (LANL 2011a).

A-13.2 Storm Water Monitoring Results

SWMU 20-002(a) is monitored within S-SMA-3.95. 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-13.2-1):

- Gross-alpha activities of 15.4 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is the subject of the alternative compliance request for this SMA/Site.

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

S-SMA-3.95 is a 0.08-acre watershed that consists of 100% undeveloped areas. Undeveloped areas consist of 0.08 acres of grassland (Figure A-13.3-1 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:

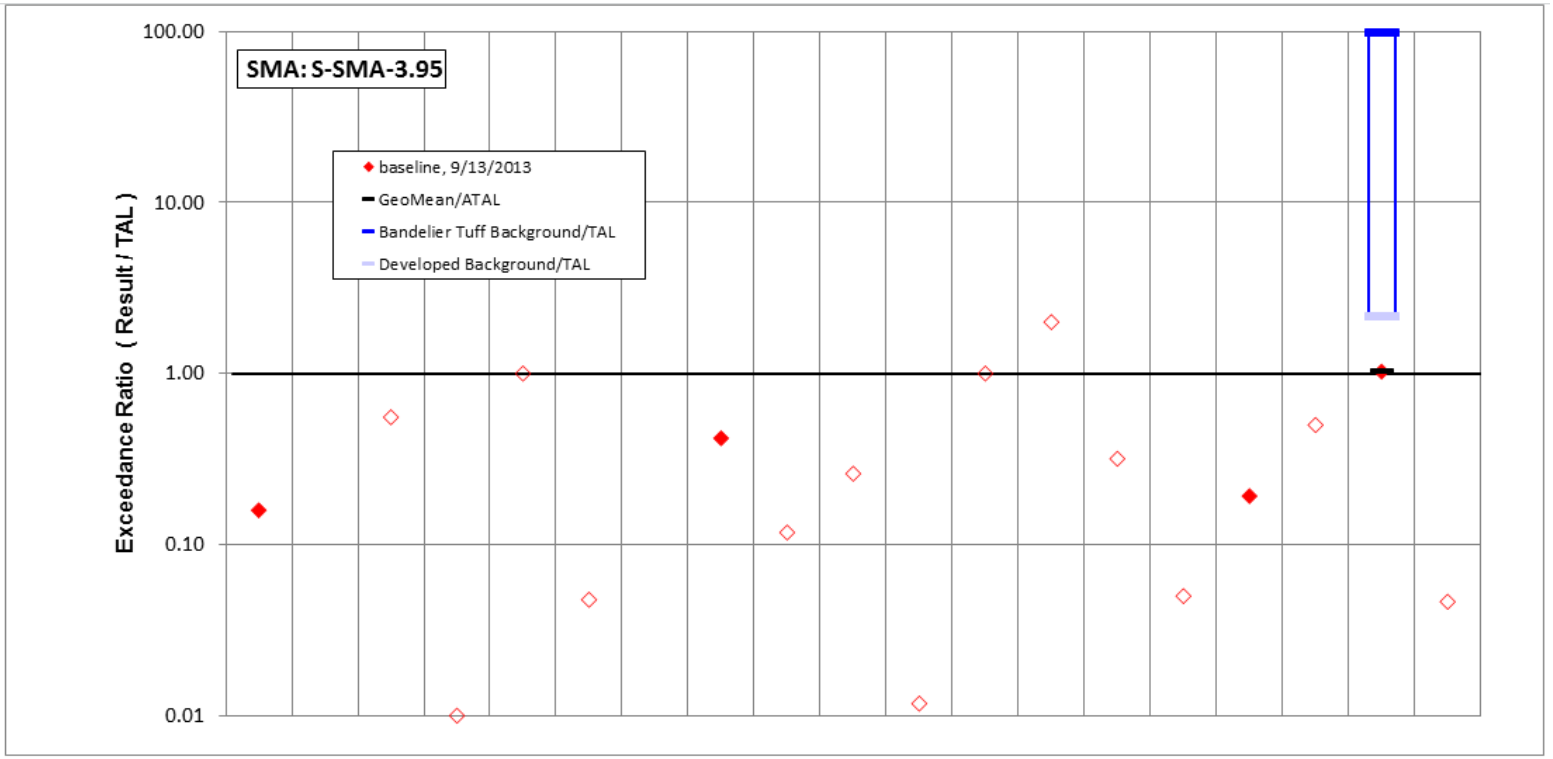
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L. The 2013 gross-alpha result is less than this value.

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 20-002(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.



	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	119	*3*	*5*	*50*	*1*	*10*	1.37	1.8	*2*	*0.2*	*2*	*5*	***1***	*2*	*5*	8.07	*0.005*	**15.4**	*1.39*
result / TAL	0.16	*0.005*	*0.56*	*0.01*	*1*	*0.048*	0.0014	0.42	*0.12*	*0.26*	*0.012*	*1*	***2***	*0.32*	*0.05*	0.19	*0.5*	**1**	*0.046*

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 S-SMA-3.95

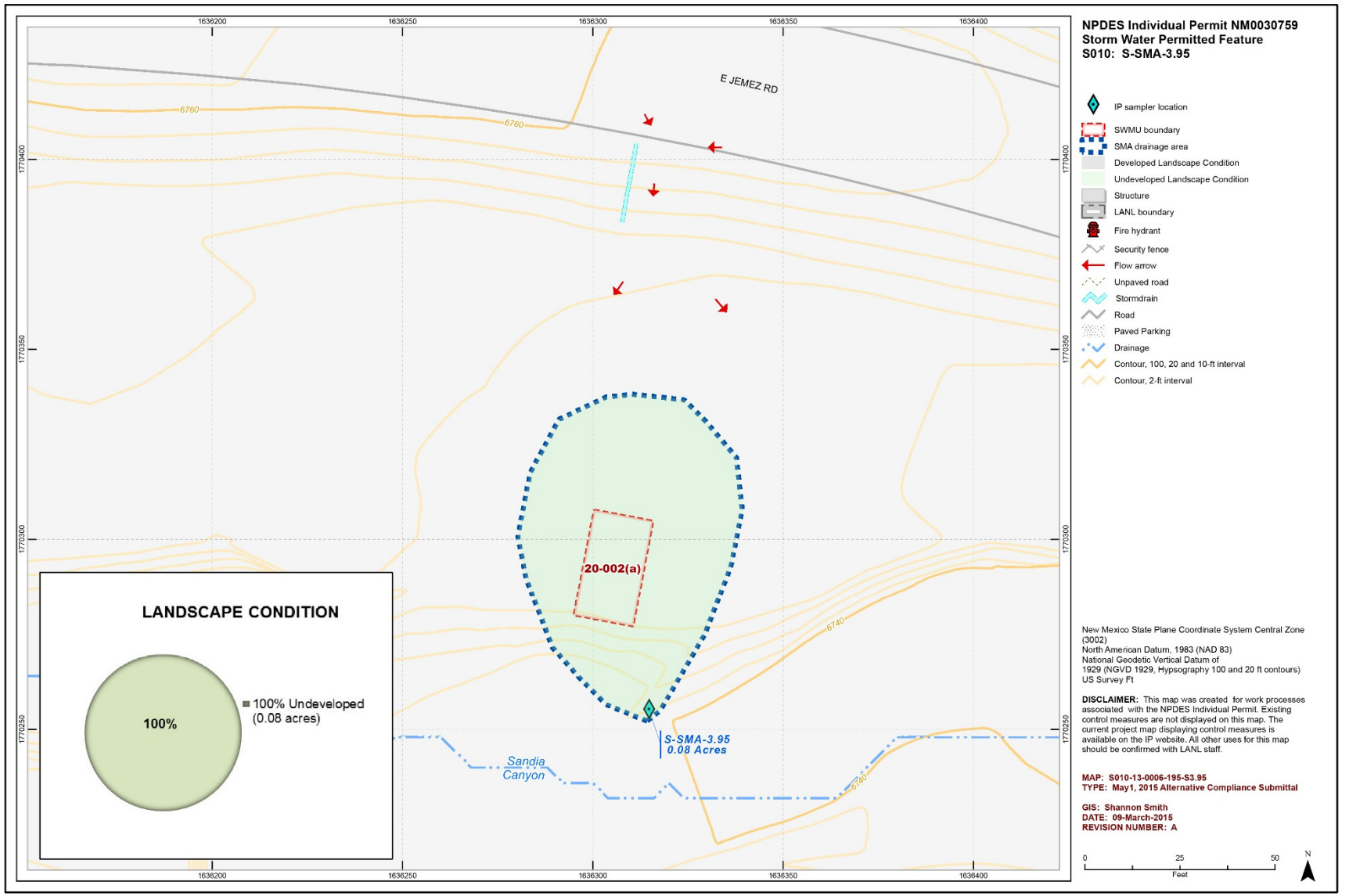


Figure A-13.3-1 SMA map for S-SMA-3.95

A-14.0 S-SMA-5.5

A-14.1 Site Description

S-SMA-5.5, located within the Sandia/Mortandad watershed, includes SWMU 20-005, a former septic system (septic tank and drainlines) located south of East Jemez Road in the central portion of the aggregate area. The system served a toilet, restroom sink, and darkroom sink in former building 20-1. The system was constructed in 1945 and it operated until 1948. Engineering drawings show the tank (structure 20-27) as having 6-in.-thick concrete walls with interior dimensions of 3 × 6 × 5 ft high and a capacity of 540 gal. The discharge point of the tank is not known. The septic system could not be located during a 1985 program the Laboratory conducted to remove existing structures from Sandia Canyon. A pit-like depression was noted in the tuff in the area where the tank was believed to have been located. According to the 1985 report, excavation surrounding the area of the "pit" identified no evidence of the tank or associated drainlines. During the 1995 Phase I RFI conducted at SWMU 20-005, a geophysical survey was conducted to locate the tank. Survey data indicated no subsurface anomalies, confirming the septic tank had been removed.

Phase I Consent Order sampling is complete for SWMU 20-005. All detected inorganic and organic chemical concentrations from Consent Order samples were below residential soil screening levels. Detailed reporting sampling results can be found in the Investigation Report for Lower Sandia Canyon Aggregate Area, Revision 1 (LANL 2011a).

A-14.2 Storm Water Monitoring Results

SWMU 20-005 is monitored within S-SMA-5.5. Following the installation of baseline control measures, a baseline storm water sample was collected on July 31, 2014. Analytical results from this sample yielded one TAL exceedance (Figure A-14.2-1):

- Gross-alpha activities of 91 pCi/L (ATAL is 15 pCi/L).

This TAL exceedance is 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

S-SMA-5.5 is a 0.05-acre watershed that consists of 8% developed areas and 92% undeveloped areas. Developed areas consist of 0.004 acres of gravel. The area of gravel is from a highly compacted access road running along the south edge of the SMA. Undeveloped areas consist of 0.046 acres of grassland (Figure A-14.3-1 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:

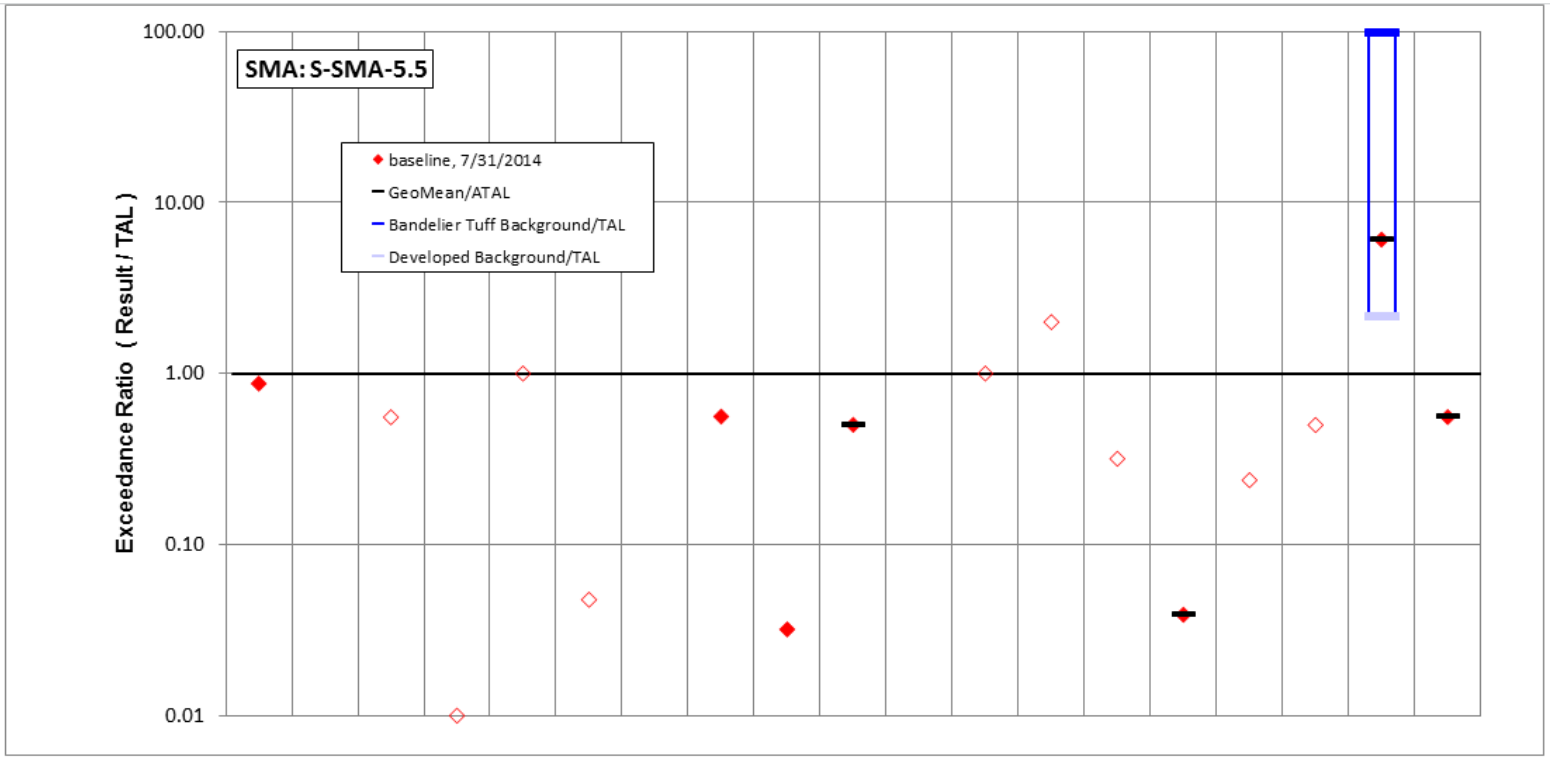
- Gross alpha—The gross-alpha UTL for background storm water containing sediment derived from Bandelier Tuff is 1490 pCi/L, and the gross-alpha background storm water UTL for storm water run-on from a developed urban landscape is 32.5 pCi/L. The 2014 gross-alpha result is between these two values.

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 20-005:

- 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
7/31/2014 result	655	*3*	*5*	*50*	*1*	*10*	*5*	2.41	0.543	0.386	1.27	*5*	***1***	*2*	3.89	*10*	*0.005*	**91**	16.7
result / TAL	0.87	*0.005*	*0.56*	*0.01*	*1*	*0.048*	*0.005*	0.56	0.032	0.5	0.0075	*1*	***2***	*0.32*	0.039	*0.24*	*0.5*	**6.1**	0.56

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 S-SMA-5.5

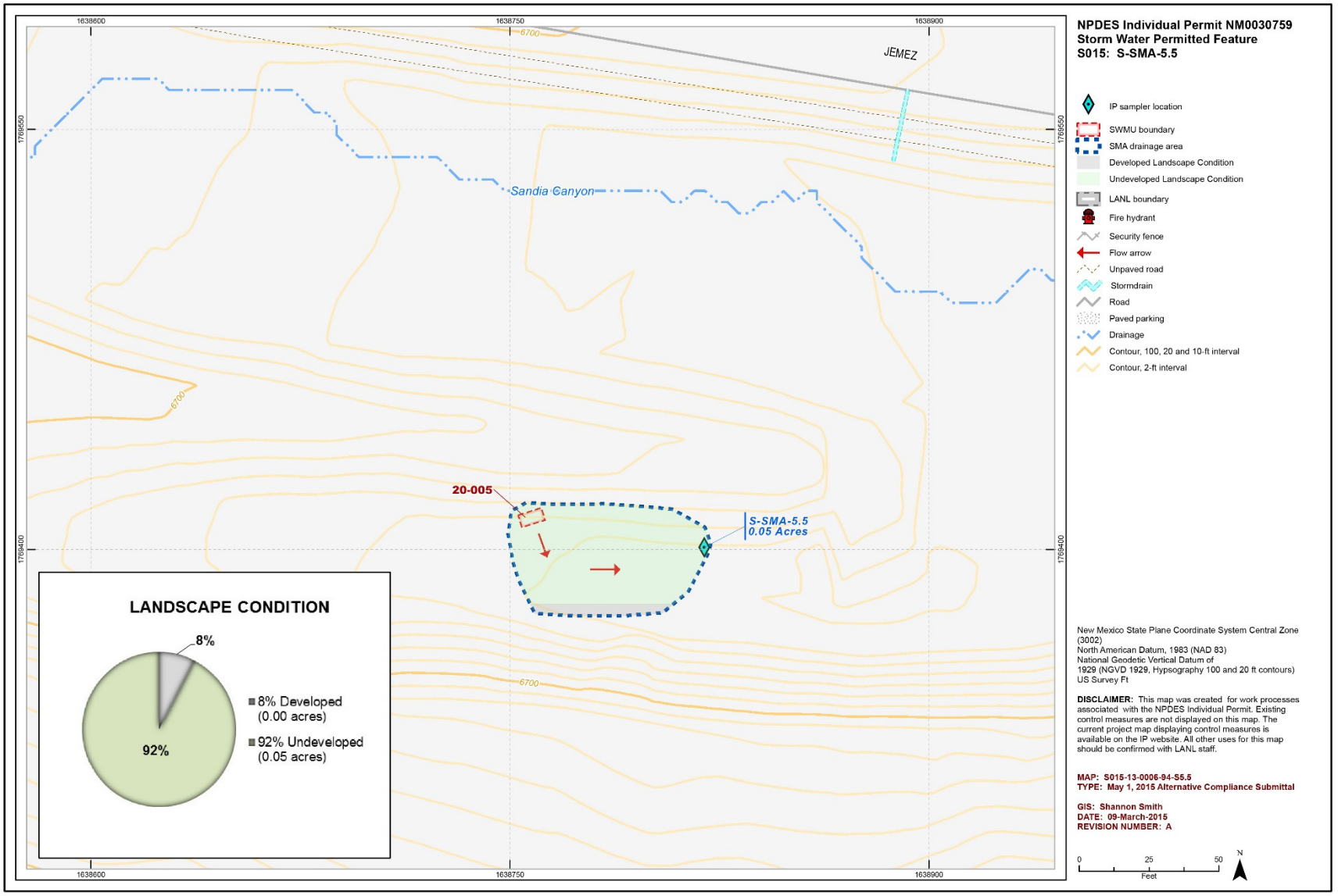


Figure A-14.3-1 SMA map for S-SMA-5.5

A-15.0 W-SMA-14.1

A-15.1 Site Description

W-SMA-14.1, located within the Water/Cañon de Valle watershed, includes SWMU 15-014(l) and AOC 15-004(h).

SWMU 15-014(l) is a drainline and formerly permitted outfall (EPA 03A028) for a cooling tower (structure 15-202) located within the PHERMEX facility in TA-15. This drainline and outfall received blowdown discharge from the cooling tower that was built in 1961. It is not known if the outfall is still active.

Consent Order investigations have not been performed at SWMU 15-014(l). SWMU 15-014(l) will be included in the future Consent Order Lower Water/Indio Canyons Aggregate Area investigation. No investigations were conducted at SWMU 15-014(l) before the Consent Order went into effect in 2005.

AOC 15-004(h) is inactive Firing Site H located west of the PHERMEX facility at TA-15. Firing Site H is located approximately 100 ft north of the power control building for PHERMEX (structure 15-185). This firing site was built in 1948 and included an instrument chamber (structure 15-17) and a camera chamber (structure 15-92) and was used for explosives testing. The exact nature of the materials used during tests is not known but is believed to include DU, beryllium, lead, and HE. Firing site operations were discontinued in 1953. The surface of the Site was reportedly regraded in 1992. The camera chamber (structure 15-92) remains on-site.

Consent Order investigations have not been performed at SWMU 15-004(h). AOC 15-004(h) will be included in the future Consent Order Lower Water/Indio Canyons Aggregate Area investigation. No investigations were conducted at AOC 15-004(h) before the Consent Order went into effect in 2005.

A-15.2 Storm Water Monitoring Results

SWMU 15-014(l) and AOC 15-004(h) are monitored within W-SMA-14.1. Following the installation of baseline control measures, two baseline storm water samples were collected on July 25, 2011, and August 18, 2011. Analytical results from these samples yielded three TAL exceedances (Figure A-15.2-1):

- Copper concentrations of 20 µg/L and 42.6 µg/L (maximum TAL [MTAL] is 4.3 µg/L) and
- Zinc concentration of 55.9 µg/L (MTAL is 42 µg/L).

Following the installation of enhanced control measures at W-SMA-14.1, corrective action storm water samples were collected on September 13, 2013, and July 15, 2014. Analytical results from this corrective action monitoring sample yielded two TAL exceedances (Figure A-15.2-1):

- Gross-alpha activity of 38.7 pCi/L and 96.2 pCi/L (ATAL is 15 pCi/L).

The 2013 and 2014 TAL exceedances are the subject of the alternative compliance request for this SMA/Sites. TAL exceedances from the baseline compliance stage is 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

W-SMA-14.1 is a 5.17-acre watershed that consists of 30% developed areas and 70% undeveloped areas. Developed areas consist of 1.57 acres of pavement and building rooftops. Undeveloped areas consist of 3.60 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:

- 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 and 2014 gross-alpha results are between these two values.

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

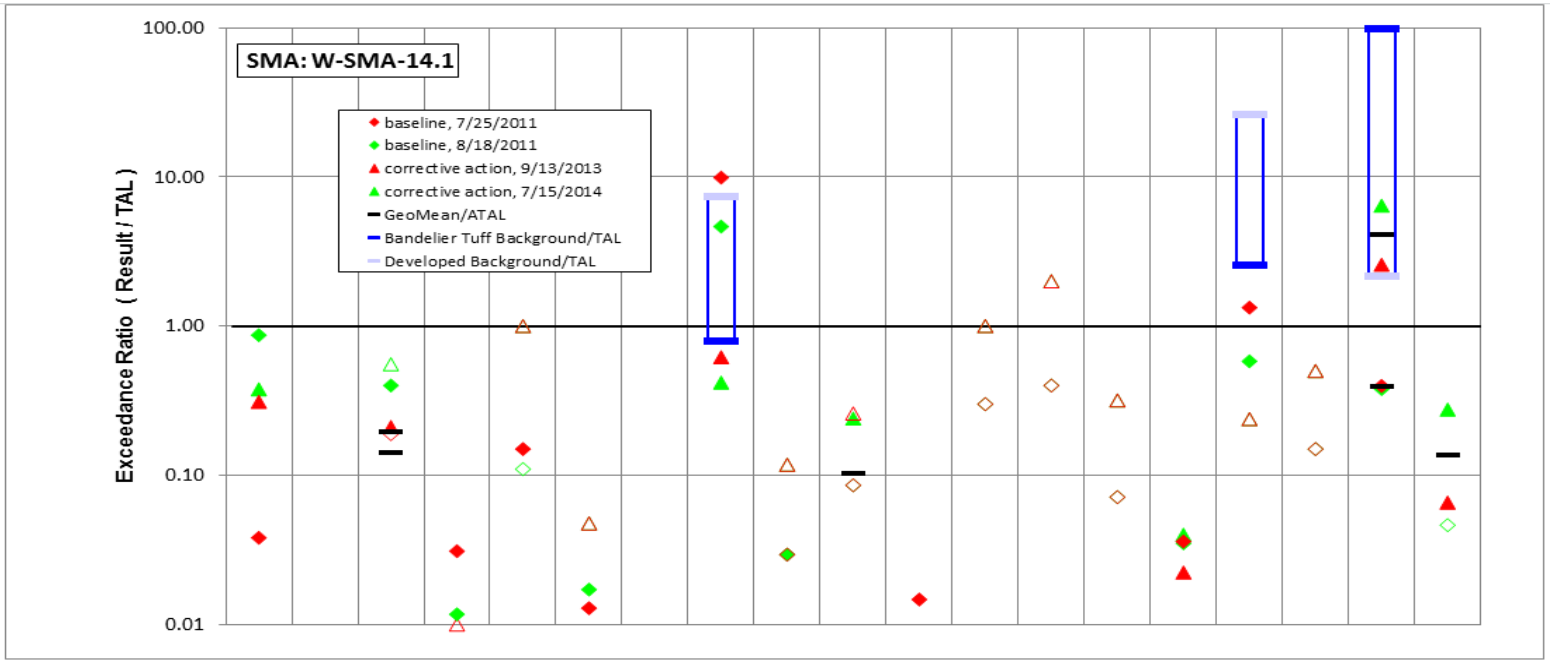
Site history and shallow (i.e., less than 3 ft bgs) soil sampling data (where available) are used to determine whether the TAL exceedance constituent(s) may be related to historical industrial activities. The discussion is organized by Site and TAL exceedance constituent.

SWMU 15-014(l):

- Alpha-emitting radionuclides are 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.

AOC 15-004(h):

- 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.



	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
7/15/2014 result	283	*3*	*5*	*25*	*1*	*10*	1.45	1.8	*2*	0.185	0.833	*5*	***1***	*2*	4	*10*	*0.005*	**96.2**	8.28
result / TAL	0.38	*0.005*	*0.56*	*0.005*	*1*	*0.048*	0.0014	0.42	*0.12*	0.24	0.0049	*1*	***2***	*0.32*	0.04	*0.24*	*0.5*	**6.4**	0.28
9/13/2013 result	233	*3*	1.9	*50*	*1*	*10*	*5*	2.66	*2*	*0.2*	0.569	*5*	***1***	*2*	2.23	*10*	*0.005*	**38.7**	1.97
result / TAL	0.31	*0.005*	0.21	*0.01*	*1*	*0.048*	*0.005*	0.62	*0.12*	*0.26*	0.0033	*1*	***2***	*0.32*	0.022	*0.24*	*0.5*	**2.6**	0.066
8/18/2011 result	652	1.1	3.6	58.5	*0.11*	3.6	*1*	**20**	0.5	*0.066*	1.5	*1.5*	*0.2*	*0.45*	3.5	24.4	*0.002*	5.68	*1.39*
result / TAL	0.87	0.0017	0.4	0.012	*0.11*	0.017	*0.001*	**4.7**	0.029	*0.086*	0.0088	*0.3*	*0.4*	*0.071*	0.035	0.58	*0.15*	0.38	*0.046*
7/25/2011 result	28.6	*1*	*1.7*	155	0.15	2.7	1.8	**42.6**	*0.5*	*0.066*	2.5	*1.5*	*0.2*	*0.45*	3.6	**55.9**	*0.002*	5.96	*0.258*
result / TAL	0.038	*0.002*	*0.19*	0.031	0.15	0.013	0.0018	**9.9**	*0.029*	*0.086*	0.015	*0.3*	*0.4*	*0.071*	0.036	**1.3**	*0.15*	0.4	*0.009*

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 W-SMA-14.1

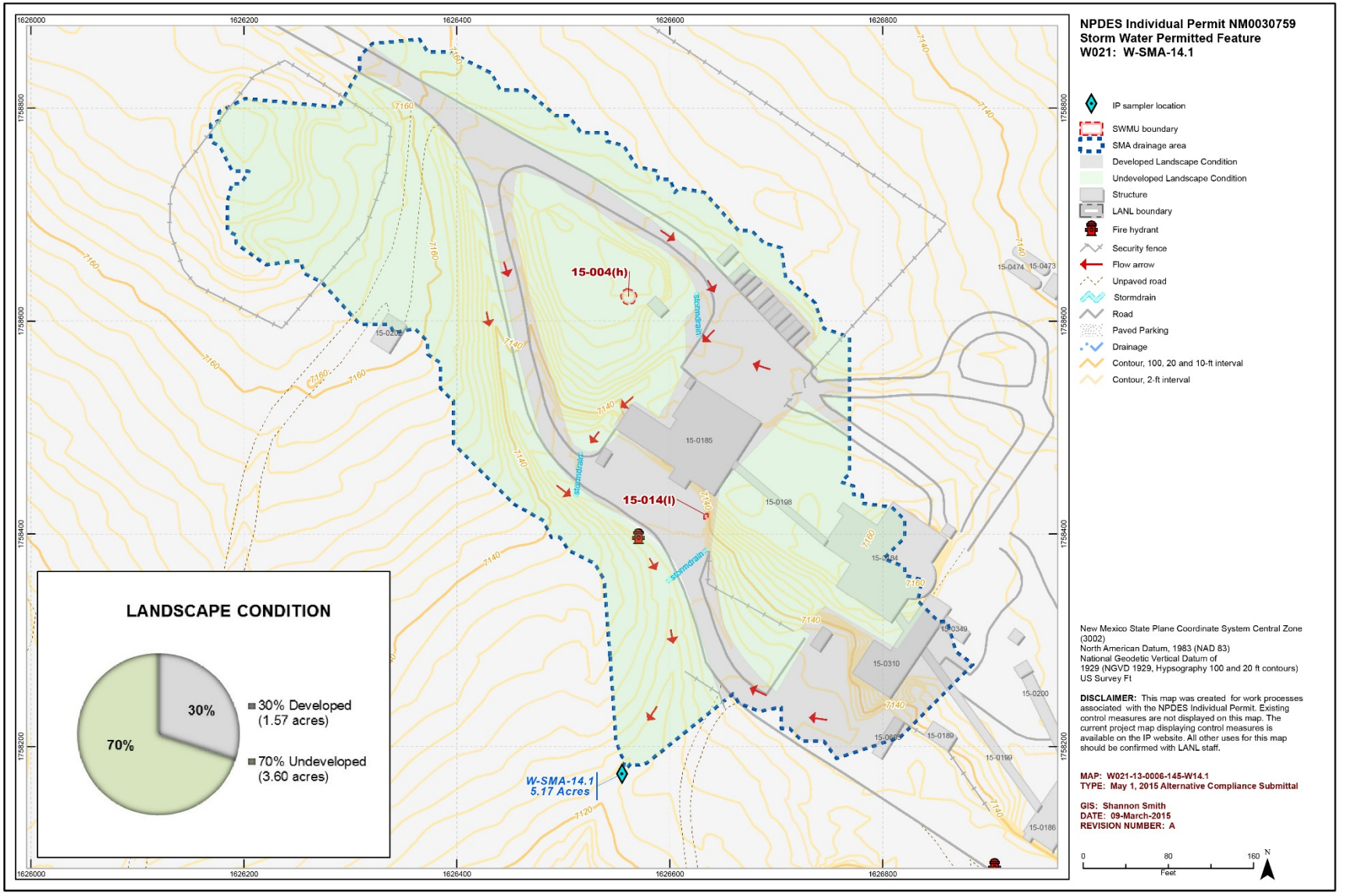


Figure A-15.3-1 SMA map for W-SMA-14.1

A-16.0 REFERENCES

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