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Compliance Programs Group

Symbol: EPC-DO: 24-045
LA-UR: 24-20868
Date: January 31, 2024

Meredith Zeigler, Assessment Coordinator
New Mexico Environment Department
Monitoring and Assessment Section
Surface Quality Bureau
P.O. box 5469
Santa Fe, New Mexico 87502

Subject: **Sandia Canyon Assessment Units Integrated Report Category 4b Demonstration – AU's AU NM-9000.A_047 and NM-128.A_11 REVISION 2**

Dear Ms. Zeigler:

Attached is a revised Upper Sandia Canyon AU dissolved copper 4b Demonstration (4b Demonstration). The 4b Demonstration provides the justification that regulatory controls, currently in place and planned, are stringent enough to implement applicable Water Quality Standards within a reasonable period of time. The AU addressed in this 4b Demonstration consists of the Sandia Canyon reach within Los Alamos National Laboratory property between National Pollutant Discharge Elimination System (NPDES) permitted outfall 001 and Sigma Canyon. This reach receives perennial flows generated primarily from an industrial outfall (NPDES Outfall 001).

Revisions requested by NMED and EPA Region 6 are addressed within the body of the document and include additional information in section 2.2 on reductions necessary to meet New Mexico's surface water quality criteria.

Thank you for your assistance in the development of this document. Please contact Bryan Dail (505) 487-3935 of the Environmental Compliance Programs (EPC-CP) if you have questions.

Sincerely,

TERRILL LEMKE
(Affiliate)

Digitally signed by TERRILL LEMKE
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Sarah S. Holcomb
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Attachment(s): Attachment 1 Sandia Canyon Assessment Unit NM-9000.A_47 Dissolved Copper 4B Demonstration

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Sandia Canyon Assessment Unit NM-9000.A_047 and NM-128.A_11 Dissolved Copper, Mercury, and Total Recoverable Aluminum 4B Demonstration – 2023 Progress Report. Revision 2

LA-UR-24-20868
January 31, 2024
EPC-DO: 24-045

Prepared by the Environmental Protection and Compliance Division.

EXECUTIVE SUMMARY

EPA regulations recognize that alternative pollution control requirements that are stringent enough, in place, and monitored may make developing a TMDL unnecessary because both mechanisms would essentially achieve the same surface water-quality goal. Specifically, TMDLs are not required if technology-based effluent limitations, more stringent effluent limitations, or other pollution control requirements (e.g., best management practices) required by local, state, or federal authority are stringent enough to implement an applicable WQS [see 40 Code of Federal Regulations 130.7(b)(1)] within a reasonable period of time. Impaired water with adequate alternatives to TMDLs in place are commonly referred to as "Category 4b waters".

A Category 4b progress report must be submitted by July 1 of every odd-number year demonstrating that the six elements are being addressed and that adequate progress is being made towards the goal of water quality standard attainment. This report is submitted pursuant to the guidelines contained in the Comprehensive Assessment and Listing Methodology (CALM) Appendix I. On June 4, 2020 the Department of Energy (DOE)/Triad National Security, LLC (Triad) submitted to NMED, the Sandia Canyon AU 4B Demonstration (4B Demonstration). The 4B Demonstration was approved by the WQCC on December 18, 2020, and by EPA on January 22, 2021. The report provides updated information on the six elements for the approximate timeframe through August 23, 2023.

In accordance with the EPA integrated listing guidance, the state of New Mexico's 2022-2024 Integrated Report listed the Sandia Canyon water quality Assessment Unit (AU) NM-9000.A_047 as not supporting coldwater aquatic life, and wildlife habitat designated uses and listed AU NM-128.A_11 as not supporting limited aquatic life, livestock watering and wildlife habitat. Further, the pollutants associated with the two AUs were assigned Categories 4B, 5B and 5C status. Assessment Units assigned Category 5 constitute New Mexico's CWA §303(d) List of Impaired Waters and may require either a TMDL (category 5A), a review of water quality standards (5B), or additional data (5C). Section 303(d) and supporting regulations require the state of New Mexico to develop a total maximum daily load (TMDL) for each impaired AU-pollutant combination. TMDLs establish pollution reduction goals and load allocations necessary for impaired water to attain applicable water-quality standards (WQS). The Sandia Canyon AU (NM-9000.A_047), in the most recent 2022-2024 IR Appendix A Integrated List, was assigned to Category 5B for temperature, 5C for PCBs and 4B for total recoverable aluminum and dissolved copper. The Sandia Canyon AU (NM-128.A_11) was assigned to Category 5C for adjusted gross alpha and PCBs and 4B for total recoverable aluminum, dissolved copper and total mercury.

The two Category 4B parameters determined to be associated with impairments in NM-9000.A_047 are dissolved copper and total recoverable aluminum. AU NM-9000.A_47 was first identified as impaired in 2002. Aluminum was added in 2006 and copper was added in 2010. The three Category 4B parameters determined to be associated with impairments in NM-128.A_11 are dissolved copper, total mercury, and total recoverable aluminum. AU NM-128.A_11 was first identified as impaired in 2006. Aluminum and mercury were added in 2006. This document presents information provided by the U.S. Department of Energy (DOE) and Los Alamos National Laboratory (LANL) to the New Mexico Environmental Department (NMED) to justify changing 303(d) listings to Category 4B status for NM-9000.A_047 (dissolved copper and total recoverable aluminum) and NM-128.A_11 (dissolved copper, total mercury, and total recoverable aluminum). A 4B status identifies an AU as impaired or threatened for one or more designated uses but does not require developing a TMDL because other pollution control requirements are reasonably expected to result in the attainment of the WQS in the near future.

The Sandia Canyon AU 4B Demonstration provides the justification that regulatory controls, currently in place and planned, are protective enough to implement applicable WQS. Water quality data has been

collected pursuant to the sampling plan contained in this document and will be used to support this 4B Demonstration going forward.

The 4B Demonstration encompasses the entire reach of Sandia Canyon within lands managed by the USDOE. The upper AU - NM-9000.A_047 is located between National Pollutant Discharge Elimination System– (NPDES) permitted Outfall 001 and Sigma Canyon and the lower - AU NM-128.A_11 is located between Sigma Canyon and the LANL boundary near State Road 4. The upper Sandia AU is classified under water quality Segment 20.6.4.126 as perennial and the lower Sandia AU is classified under water quality Segment 20.6.4.128 as intermittent-ephemeral. A number of NPDES permits including Industrial Outfall, Multi-Sector General, Construction General and the Individual Permit provide a regulatory framework for water quality standards (WQS) attainment. The Sandia Wetland Stabilization, Supplemental Environmental Projects (SEPs) and implementation of LANL's Storm Water Management Plan are expected to reduce potential migration of contaminated sediments and provide the necessary controls for eventual attainment WQS within the Sandia Canyon AUs.

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Appendices

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1. IDENTIFICATION OF ASSESSMENT UNITS AND STATEMENT OF PROBLEM CAUSING THE IMPAIRMENT

Appendix 1 contains a series of maps of the Sandia Canyon watershed, located within Los Alamos National Laboratory (the Laboratory). The maps show the two assessment units (AUs) as defined by the New Mexico Environment Department (NMED). The AUs range from National Pollutant Discharge Elimination System (NPDES) Outfall 001 east to the Laboratory boundary at New Mexico State Road 4 (SR-4). The 4b Demonstration covers the upper perennial reach from NPDES Outfall 001 to Sigma Canyon and the lower ephemeral reach from Sigma Canyon to the Laboratory boundary at SR-4. The AUs are described in the state of New Mexico 2020-2022 Clean Water Act (CWA) §303(d)/§305(b) Integrated Report (1).

1.1 Assessment Unit Description

The demonstration should identify the impaired assessment unit, including name, general location and State-specific location identifier.

1. AU Name: Upper Sandia Canyon AU (NPDES Outfall 001 to Sigma Canyon)
    - AU ID: NM-9000.A_047
    - 2.21-mi reach
2. AU Name: Lower Sandia Canyon AU (Sigma Canyon to LANL Boundary)
    - AU ID: NM-128.A_11
    - 3.4-mi reach

Sandia Canyon originates in the main Laboratory Technical Area 03 (TA-03) at an elevation of approximately 7,300 ft. The reach extends downstream for 5.5 mi to the Laboratory boundary at SR-4. Overall, the drainage area for the two AUs is approximately 2.52 mi^2, encompassing Laboratory property, private property, and the now-closed Los Alamos County landfill.

Three NPDES Permits provide coverage for current and historical activities within the upper and lower Sandia Canyon AUs:

1. The Industrial Point Source Permit (IPSP, NPDES Permit No. NM0028355) covers four outfalls,
2. The Storm Water Individual Permit (IP, NPDES Permit No. NM0030759) covers nineteen Resource Conservation and Recovery Act (RCRA) solid waste management units (SWMUs) and areas of concern (AOCs) associated with historical Laboratory activities, and
3. The Storm Water Multi-Sector General Permit (MSGP, NPDES Permit Tracking No. NMR050013) covers five ongoing operational industrial facilities subject to this EPA general permit.

The upper AU is classified as perennial, in Water Quality Segment (Segment) 20.6.4.126 NMAC, with designated uses of coldwater aquatic life, livestock watering, wildlife habitat, and secondary contact (2). The lower AU is classified as ephemeral-intermittent, in Segment 20.6.4.128 NMAC, with designated uses of limited aquatic life, livestock watering, wildlife habitat and secondary contact (2).

1.2 Impairment and Pollutant Causing Impairment

The demonstration should identify the applicable water quality standards not supported and associated pollutant causing the impairment.

According to the 2022-2024 CWA §303(d)/§305(b) Integrated List, the following Water Quality Standards (WQS) are not supported (Table 1):

Table 1
Sandia Canyon AUs Water Quality Standards not Supported[1] (Category 4B)

Designated Use Not Supported	Parameter with Associated WQS	Sandia Canyon AU (LANL Boundary at SR-4 to NPDES outfall 001)
Coldwater Aquatic Life	Dissolved Copper	NM-9000.A_047
Coldwater Aquatic Life	Total Recoverable Aluminum	NM-9000.A_047
Limited Aquatic Life	Total Recoverable Aluminum	NM-128.A_11
Limited Aquatic Life	Dissolved Copper	NM-128.A_11
Livestock Watering	Total Recoverable Aluminum	NM-128.A_11
Wildlife Habitat	Total Mercury	NM-128.A_11

1.3 Sources of Pollutant Causing the Impairment

The demonstration should include a description of the known and likely point, nonpoint, and background (upstream inputs) sources of the pollutant causing the impairment, including the potential magnitude and locations of the sources. In cases where some portion of the impairment may result from naturally occurring sources (natural background), the demonstration should include a description of the naturally occurring sources of the pollutant to the impaired assessment unit.

1.3.1 Point Source Locations and Potential Magnitudes

1. The Industrial and Sanitary Point Source Permit (IPSP, NPDES Permit No. NM0028355)
2. The Storm Water Individual Permit (IP, NPDES Permit No. NM0030759)
3. The Storm Water Multi-Sector General Permit (MSGP, NPDES Permit Tracking No. NMR050013)

[1] Since chronic aquatic life criteria associated with Assessment Unit NM-90000.A_047 are more stringent than the Acute criteria reported throughout this document they would, by default, also be chronic impairments for this perennial AU. Acute criteria are reported throughout because the 4B demonstration addresses stormwater pollutants wherein exposures are brief, and are the reportable limits for the stormwater permits. For chronic exposures and impairments, the reader is referred to the Facility-Wide Groundwater Monitoring Plan (*IFGMP*) which includes baseflow monitoring of LANL surface waters. Since Appendix A to the 2022-2024 CWA §303(d)/§305(b) Integrated List does not denote whether the aquatic life impairments are acute or chronic, these are not listed in Table 1 above.

1.3.1.1 Industrial Point Source Permit (IPSP) Outfalls

Los Alamos National Laboratory (LANL or Laboratory) has been permitted under the requirements of the Clean Water Act Section 402 and Code of Federal Regulations Title 40, Section 122 NPDES Program requirements since 1978. On March 29, 2019, the Laboratory submitted a permit renewal application for 11 outfalls. The 2022 NPDES IPSP Permit (NM0028355) was subsequently issued by the United States Environmental Protection Agency (US EPA) on March 30, 2022 (EPA 2022a). The permit included effluent limits and conditions in Part I, Section A that are subject to a compliance schedule and the semi-annual reporting requirements defined in Part I, Section B.

On May 9, 2022, Concerned Citizens for Nuclear Safety, Honor Our Pueblo Existence, and Veterans for Peace filed a petition under 40 CFR 124.19(a) requesting that EPA's Environmental Appeals Board deny permit authorization for Outfalls 051, 13S, 03A027, 03A113, 03A160, and 05A055. On June 28, 2022, the EPA stayed the permit conditions for the six outfalls included in the appeal and delayed the implementation of the new permit for the remaining five outfalls until July 28, 2022 (EPA 2022b). This resulted in the implementation (on August 1, 2022) of a hybrid NPDES permit that continued 2014 NPDES Permit requirements (EPA 2015) and implemented the 2022 NPDES Permit requirements (EPA 2022a) as shown in Table 1. In addition, the EPA agreed to align the permit monitoring year to August 1 - July 31 regardless of coverage under the 2014 or 2022 NPDES permit. The stayed permit conditions were resolved after a second public comment period in 2023 and the EPA issued a a final revised NPDES permit on September 29, 2023, with an effective date of November 1, 2023.

Four of the outfalls permitted under the NPDES IPSP discharge to the upper and lower Sandia AUs, as presented in Table 2 below. The locations of the outfalls are indicated in the maps contained in Appendix 1. NPDES Outfall 001, which is the main effluent source of water to the AU, averages approximately 235,000 gal/d and consists of power plant once-through cooling water, treated sanitary wastewater, treated reclaimed sanitary wastewater, and blowdown from the Strategic Computing Center (SCC) Cooling towers. Outfall 03A027 is also associated with the SCC Cooling Towers with the effluent currently routed to Outfall 001 when not reclaimed. Outfall 03A199 and 03A113 also discharge cooling tower blowdown contributing an average 35,000 gal/d and 1,100 gal/day, respectively.

Table 2
Industrial Point Source Permit Outfalls Discharging to the Upper and Lower Sandia AU

Outfall ID No.	Facility	Watershed	Type of Discharge	Outfall Category	Permit Status
001	TA-3-22 Power Plant SWWS SERF SCC	Sandia (upper)	Continuous Once Through Cooling Water, Treated Sanitary Effluent, Treated Reclaimed Water, and Cooling Tower Blowdown	Power Plant (001)	2023 NPDES Permit
03A027	TA-3-2327	Sandia (upper)	Cooling Tower Blowdown Routed to Outfall 001	Treated Non-Contact	2023NPDES Permit

	SCC			Cooling Water (03A)	
03A113	TA-3-1837 LEDA	Sandia (lower)	Intermittent Cooling Tower Blowdown	Treated Non-Contact Cooling Water (03A)	2023 NPDES Permit
03A199	TA-53-952 LDCC	Sandia (upper)	Intermittent Cooling Tower Blowdown	Treated Non-Contact Cooling Water (03A)	2023 NPDES Permit
SCC = Strategic Computing Center; SERF = Sanitary Effluent Reclamation Facility; SWWS = Sanitary Wastewater System Treatment Facility; LDCC = Laboratory Data Communications Center; LEDA = Low Energy Demonstration Accelerator					

The NPDES IPSP Outfall Permit requires weekly, monthly, quarterly, yearly, and term sampling of the effluents released to the environment to demonstrate compliance with the permit's water quality limits. Monitoring for these four outfalls includes reporting and/or limits as shown in Table 3,

Table 3
Monitoring for Parameters Included as Impairments

Outfall ID No.	Monitoring Requirement 2014	Monitoring Requirement 2023
001	Total Recoverable Aluminum (limit) Dissolved Copper (limit)	Total Recoverable Aluminum (report only) Total Copper (limit)
03A027	Total Recoverable Aluminum (limit) Dissolved Copper (limit) Total PCB (limit)	Total Recoverable Aluminum (report only) Total Copper (limit) Total PCB (limit)
03A113	Total Recoverable Aluminum (limit) Dissolved Copper (limit)	Total Recoverable Aluminum (report only) Total Mercury (report only) Total PCB (limit)
03A199	Total Recoverable Aluminum (limit)	Total Recoverable Aluminum (report only)

	Dissolved Copper (limit) Total/Dissolved Mercury (limit)	Total Copper (report only) Total PCB (limit)

The sampling results are compared to the permit limits (if any) and are reported every month in a Discharge Monitoring Report to the U.S. Environmental Protection Agency and the New Mexico Environment Department. Additionally, any engineering changes or flow changes that would affect quality or quantity of the effluents are reported in a Notice of Planned Change to the U.S. Environmental Protection Agency and the New Mexico Environment Department.

1.3.1.2 Point Sources Covered Under the Storm Water Individual Permit (IP)

The IP (NPDES NM0030759) authorizes discharges of storm water associated with industrial activities from specified SWMUs and AOCs. A SWMU is a discernible unit at which solid wastes may have been "routinely and systematically released" and could result in a release of hazardous constituents. The Sites regulated under the IP are a subset of the SWMUs and AOCs that are being addressed under the March 2005 Compliance Order of Consent or the more recent update in 2016 (the Consent Order) (3).

For purposes of monitoring and management under the IP, Sites are grouped into small watersheds called site-monitoring areas (SMAs). An SMA is a single drainage area within a subwatershed and may include more than one Site. The IP treats the potential historical releases at a Site as an "industrial activity" that creates a "point source discharge" and directs the Permittees to monitor storm water discharges from Sites at specified SMAs. Storm water from a Site may drain to multiple subwatersheds and may be associated with multiple SMAs.

A Site that met the definition of a SWMU or AOC was evaluated for inclusion in the IP based on the following criteria:

1. The SWMU/AOC is exposed to storm water (e.g., not capped or subsurface);
2. The SWMU/AOC contains "significant industrial material" (e.g., not cleaned up or has contamination in place based on storm water, sediment, and soil data available at the time the permit application was submitted); and
3. Potentially impacts surface water. Based on an evaluation in the field for potential to discharge sediment to a Water of the U.S. or Water of the State.

SWMUs and AOCs are grouped for investigation under the Consent Order into watershed-based geographic areas known as aggregate areas. The upper Sandia Canyon Aggregate Area is located in TA-03, TA-60, and TA-61 with a boundary approximately equal to the upper Sandia Canyon AU. Nineteen Sites within Sandia Canyon area are permitted under the IP (Table 3). These nineteen Sites are grouped into nine SMAs.

Storm water monitoring for metals, including copper and total recoverable aluminum is required at all nineteen sites. The IP establishes target action levels (TALs) that are equivalent to New Mexico State water-quality criteria. These TALs are used as benchmarks to determine the effectiveness of control measures implemented under the IP. The maps in Appendix 1 show the locations of the SMAs in the AUs. The Laboratory has been collecting storm water samples under the IP since the spring of 2011.

The IP Program is required, at a minimum, to install and maintain baseline control measures at every SMA to minimize pollutants in storm water discharges. If SMA stormwater samples exceed any TAL, Corrective Actions must be taken to either meet the TAL, achieve total retention of storm water discharge, totally eliminate exposure of pollutants at the Site, or demonstrate that the Site has achieved "corrective action complete with/without controls" status or a Certificate of Completion under NMED's Consent Order.

The draft permit was issued by EPA on November 19, 2019. NMED provided the 401 Certification of draft permit on November 30, 2020, which included a condition that monitoring requirements at sites discharging into impaired waters monitor for those impairments if related to a material that was historically managed at the site.

1.3.1.3 Point Sources Covered Under the Storm Water Multi-Sector General Permit *(*MSGP)

The MSGP regulates storm water discharges from identified industrial activities and their associated facilities. Currently, there are five active MSGP-regulated facilities with the potential to discharge storm water to the AU. Four of the five are located immediately adjacent to upper Sandia Canyon. One MSGP facility conveys runoff to upper Sandia Canyon via the Laboratory's storm drain infrastructure. There are no active MSGP facilities located in lower Sandia Canyon.

Table 4 lists the five MSGP facilities, along with the monitored outfalls for each facility, and monitoring requirements for aluminum and copper in upper Sandia Canyon. A map in Appendix 1shows the location of the MSGP outfalls.

MSGP industrial activities within the AU include metal product fabrication, vehicle and equipment maintenance, recycling activities, and warehousing activities. For each type of industrial activity regulated by the MSGP, specific constituents (i.e., potential pollutant for that activity) are identified and required to be analyzed as part of permit-required storm water monitoring. The MSGP then stipulates a benchmark concentration for each potential pollutant. Section 9.6.2.2 of the MSGP contains conditions modifying some of these benchmark concentrations to reflect State of New Mexico water quality standards. Per the MSGP, aluminum is identified as a potential pollutant at two active MSGP facilities: the TA-3-38 Metals Fabrication Shop (Sector AA) and TA-60-1 Heavy Equipment Yard (Sector AA). Copper is not identified as a potential pollutant associated with MSGP industrial activities located in upper Sandia Canyon.

In addition to monitoring for the MSGP specified benchmark pollutants, if an industrial facility discharges to an impaired water body, the MSGP requires monitoring for all pollutants for which the water body is impaired. Therefore, storm water monitoring for dissolved copper and total recoverable aluminum is conducted at all the MSGP facilities discharging to upper Sandia Canyon.

20.6.4.900 NMAC requires hardness-based water quality standards for dissolved copper and total recoverable aluminum. Based on an average calculated hardness of 61 mg/L, the New Mexico hardness-based water quality standards for total recoverable aluminum and dissolved copper in upper Sandia Canyon are 1738 µg/L and 8 µg/L, respectively.

The MSGP permit period is from March 1, 2021 to February 28, 2026. Authorization to discharge was granted to Triad National Security, LLC, the Laboratory's current maintenance and operations contractor, under permit tracking number NMR050013 on June 25, 2021. For the period July 1, 2021 –June 30, 2023, 16 of 27 (59%) of dissolved copper and 12 of 43 (28%) of total recoverable aluminum values at MSGP facilities in upper Sandia Canyon exceeded the hardness-based water quality standard.

- Routine facility inspections are performed monthly. Part 3.1 of the MSGP requires qualified inspectors to examine the following areas exposed to storm water: industrial materials or

activities, potential pollutant sources, discharge points, storm water control measures and spills or leaks that have occurred in the past three years. The inspector is looking for the following: Industrial material, residue or trash that may have or could come into contact with storm water;

- Leaks or spills from industrial equipment, drums, tanks, and other containers;
- Offsite tracking of industrial or waste materials, or sediments where vehicles enter or exit the site;
- Tracking or blowing of raw, final or waste materials from areas of no exposure to exposed areas;
- Erosion of soils; and
- Control measures needing replacement, maintenance or repair.

Part 5.1.1.1-5.1.1.5 and 5.1.3.1 of the MSGP requires immediate corrective action be taken when any of the following conditions have occurred:

- An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by an NPDES permit);
- A discharge exceeds a numeric effluent limit;
- Control measures are not stringent enough for the storm water discharge to be controlled as necessary to such that receiving water of the United States will meet applicable water quality standards or the non-numeric effluent limits in the permit;
- A required control measure was never installed, was installed incorrectly, or is not being properly operated or maintained; or
- A visual assessment shows evidence of stormwater pollution.

During the current permit period through the end of monitoring year 2, approximately 189 corrective actions have been performed at active MSGP facilities in upper Sandia Canyon. Of those, approximately 4 were in response to the exceedance of a benchmark for total recoverable aluminum. Immediate actions are required until permanent solutions can be implemented. Additional implementation measures are required for benchmark threshold exceedances. These may include additional monitoring, implementation of additional (more robust) storm water control measures to prevent offsite migration of pollutants, good housekeeping measures and installation of permanent structural source and treatment controls.

Under the 2021 MSGP facilities discharging to impaired waters without a TMDL must monitor once during the first year of coverage for all pollutants causing impairment, then once the fourth year for only those associated with industrial activity and or benchmarks. If not detected, this monitoring can discontinue for the remainder of permit coverage. However, monitoring must continue if detected.

Table 3

Sandia Canyon Site Monitoring Areas Authorized to Discharge under Storm Water Individual Permit NM0030759

SMA	AU	Site Monitoring Requirements[1]
S-SMA-0.25	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-1.1	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-2	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-2.01	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-2.8	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.51	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum a, Total Mercury and, Copper
S-SMA-3.52	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.53	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.6	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.7	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.71	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.72	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.95	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-4.1	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-4.45	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-5	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-5.2	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-5.5	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-6	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper

1. Source: Appendix B, NPDES Permit No. NM030759, November 2010.

2. Source: 2012 Update to the Site Discharge Pollution Prevention Plan, Revision 1, Los Alamos National Laboratory NPDES Permit No. NM0030759, May 1, 2013, Sandia/Mortandad Watershed Receiving Waters: Sandia Canyon, Cañada del Buey, Mortandad Canyon, and Ten Site Canyon, Volume 2.

3. Upper Sandia Canyon Aggregate Supplemental Investigation Report, August 2013.

Table 4
Multi-Sector General Permit Sites in Sandia Canyon Assessment Unit NM-9000.A_47

Facility Name	Outfall / Location ID#	Sector	Total Recoverable Aluminum	Dissolved Copper
TA-3-38 Metals Fab Shop	076 / MSGP07601	AA	B[2], IW	IW
	077 / MSGP07701	AA	B, IW	IW
TA-60 Materials Recycling Facility	029 / MSGP02901	N	IW	IW
TA-60 Roads and Grounds	032 / MSGP03201	P	IW	IW
	042 / MSGP04201	P	IW	IW
	037 / MSGP03701	P	IW	IW
	039 / MSGP03901[3]	P	IW	IW
	084 / MSGP08401[3]	P	IW	IW
TA-60-1 Heavy Equipment Yard	022 / MSGP02201	AA, P	B, IW	IW
TA-60-2 Warehouse	026 / MSGP02601	P	IW	IW
	075 / MSGP07501	P	IW	IW

[1]Annual Impaired Waters monitoring requirement.
[2]Quarterly Benchmark monitoring requirement.
[3]Outfall 084 replaced 039 on August 5, 2022.

1.3.2 Non-point Source Locations and Potential Magnitudes

The watershed discharging to the Sandia Canyon AUs is approximately 2.52mi^2 and includes 29 acres of area under the control of Los Alamos County. Approximately 350 acres are comprised of impervious surfaces located within an urban environment. The majority of the upper watershed consist of impervious surfaces located within an urban environment consisting of buildings, parking lots, and light industrial facilities. Several terrestrial habitats exist within the Upper Sandia AU, including mixed conifer, semi-evergreen shrub-land, dense oak shrub-land and non-forested wetland riparian. Runoff in all urbanized areas is primarily managed through LANL's storm drain infrastructure system and discharged at specific locations near the head of the canyon. Remaining areas discharge to surface conveyances that flow directly to the canyon.

Within this 150-acre area are five NPDES MSGP active facilities with a combined total area of 39.25 acres. These facilities manage storm water runoff and potential pollutants in accordance with the MSGP requirements, as described in section 1.3.1.3. Also, within the 150 acres are nine SWMUs, which are authorized to discharge under the IP, and comprise less than an acre. However, the drainage to these SWMUs comprises discharge to the SMA from 100 acres of developed locations.

1.3.2.1 Non-point Source from Urban and Developed Areas within the Laboratory

Storm water samples from developed areas within TA-3 were collected in 2018 under the Sampling and Monitoring Supplemental Environmental Project (SEP). With the exception of monitoring completed under the SWMP, no other developed sites have been sampled since completion of the SEP project. The purpose of the SEP was to fill data gaps and characterize the sources of pollutants in storm water runoff and impacts on receiving waters in and around the Laboratory. A broad range of pollutants were targeted from Laboratory developed areas and natural landscapes. In the developed areas of the Laboratory, parking lots and associated buildings runoff were characterized. The data will be helpful as a reference when evaluating other monitoring locations down gradient of these sites where multiple sources contribute to water and sediment quality. Only those parameters identified as causing a 4B impairment are summarized in Table 6.

Table 5
SEP Urban Range of Findings (µg/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum ug/l
11.1 - 18.2	<0.067 – 0.11	23.3 - 411

1.3.2.2 Non-point Source from Natural Background

Naturally occurring sources of copper, aluminum and mercury are summarized in the Metals Background Report (4). Background Storm water samples were derived from two primary groups of locations: tributaries that enter the Laboratory's western (upstream) boundary and tributaries in a remote area north of the community of Los Alamos or Reference Area. The results from Reference Area stations reflect background runoff conditions from landscapes at Sandia Canyon with surficial geological materials derived from Bandelier Tuff, Puye Formation, and the Tschicoma Formation (4). The results from Western Boundary stations reflect background runoff conditions from landscapes with surficial geological materials derived from Bandelier Tuff and diorite-rich Tschicoma Formation (4). Copper, aluminum and mercury background values from undeveloped areas are presented in Table 6.

Table 6
Background Pajarito Plateau Storm Water Pollutant Concentrations (µg/L)

Parameter	Reference Area[a] Background Values	Western Boundary[b] Background Values
Copper	3.43	5.7
Mercury	c	c
Aluminum	2210	1780

Note: All the Reference and Western Boundary station locations were upstream of and distant from Laboratory liquid discharges.

[a] Reference Area—Ephemeral tributaries to the Rio Grande north of the Laboratory and urban Los Alamos County. The northernmost tributary sampling station is located in middle portion of the Pajarito Plateau. Surface water monitored at the Reference sites is mostly generated as storm water from local storms affecting the northern portion of the Pajarito Plateau.

[b] Western Boundary—Ephemeral, intermittent, and perennial tributaries to the Rio Grande to the west and upstream of the Laboratory and urban Los Alamos County.

c. Insufficient number of detections to calculate statistical distribution.

1.3.2.3 Non-point Source from SEP Undeveloped Reference Sites

On January 22, 2016 NMED and DOE reached a settlement agreement to resolve issues as they relate to an incident at the Waste Isolation Pilot Project (WIPP). The settlement agreement called for several corrective actions including increased sampling and monitoring capabilities for storm water runoff in and around the Laboratory. Water Quality Monitoring sampling under the SEP was carried out in 2017 and 2018. The purpose of the monitoring was to fill data gaps to characterize the sources of pollutants in storm water runoff and impacts on receiving waters in and around the Laboratory including the Sandia Canyon AUs. A broad range of pollutants (including dissolved copper, total recoverable aluminum and total mercury) are targeted from the following sources: Laboratory developed areas, Laboratory firing sites, natural landscapes, and atmospheric deposition. Additionally, storm water samples from undeveloped reference sites on the Pajarito Plateau were collected. Appendix 1 includes maps with the sampling locations. As indicated above past investigations of storm water quality from undeveloped reference sites have been previously conducted by the Laboratory. The SEP selected sampling and monitoring of storm water and related media in undeveloped watersheds to quantify concentrations of pollutants sourced from natural landscapes (primarily originating from natural geologic sources in sediments). The data from the four undeveloped reference are summarized in Tables 7-10:

Table 7
SEP Reference (Burnt Mesa 1) Range of Findings (µg/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
1.39 – 3.2	<0.067 – 0.164	1030 - 2860

d. Sample prepared with 10um filter.

Table 8
SEP Reference (Ponderosa 1) Range of Findings (ug/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
1.57 – 2.84	<0.067 – 0.079	1290 - 3580

d. Sample prepared with 10um filter.

Table 9
SEP Reference (San Juan Mesa 1) Range of Findings (ug/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
1.1 – 2.44	<0.067 – 0.482	766 - 22700

d. Sample prepared with 10um filter.

Table 10
SEP Reference (San Juan Mesa 4) Range of Findings (ug/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
0.601 – 22.2	<0.067 – 0.215	751 - 2210

d. Sample prepared with 10µm filter.

2. DESCRIPTION OF POLLUTION CONTROLS AND HOW THEY WILL ACHIEVE WATER-QUALITY STANDARDS

2.1 Water Quality Targets

The demonstration should identify a numeric water quality target(s). That is the chemical causing the impairment and the numeric criteria for that chemical in the water quality standard (i.e., the chemical causing the impairment and the water quality standard). Express the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target.

2.1.1 Numeric Targets

The acute and chronic numeric water quality hardness-dependent targets for dissolved copper and total recoverable aluminum are described in 20.6.4.900(I)(1) and (2) NMAC. The use specific numeric targets for total mercury are described in 20.6.4.900(J)(1) NMAC.

2.1.2 Current Conditions

Water quality data for 4B parameters were obtained from Intellus (https://www.intellusnm.com/) and the Laboratory's Environmental Informational Management (EIM) system. 4B parameter data was obtained for E123 (Sandia below Wetlands), E124 Sandia above Firing Site) and E125 and Sandia above State Road 4) for the period of March 2014 through August 23, 2023. A summary of results for this period are included in Tables 16-18 For the LANL-based samplers E124 and E125, flows were insufficient for sample collection in 2020 and early 2021 and results of samples that may have been collected in summer of 2023 are not yet posted in Intellus or EIM. NMED obtained a sample from E125 in February of 2020, While the sample included a result for aluminum it is not clear that the sample was prepared with a 10µm filter. E123 is located in the upper portion of NM-9000.A_047 below the Sandia Wetlands, E124 is located approximately 0.7 miles below the NM-9000.A_047 in NM-128.A_11and E125 is located at the end of NM-128.A_11 just above SR-4 (Appendix 1).

Time trend graphs for gages E123, E124 and E125 are provided in Appendix 3. The graphs show measured copper, total recoverable aluminum and total mercury levels in relation to water quality criteria for the period of March 2014 through June 2023.

2.1.3 Necessary Reduction to Meet Target

The 4B Demonstration was approved by the WQCC on December 18, 2020 and by EPA on January 22, 2021. Therefore the 4-year duration of the demonstration will span January 2021 through January 2025. The eventual achievement of water quality targets requires addressing impacts from storm water flows. To help address this issue the Laboratory developed the Sandia Storm Water Management Plan (SWMP), which is included in Appendix 2. The SWMP uses the principles established for the MS4 Phase II Storm Water Program. This requires the development of measurable goals to assess the effectiveness of storm water controls that address the six minimum control measures defined in the regulations. The SWMP was developed in anticipation of an anticipated MS4 permit for the Laboratory. Urban non-point source discharges are an important source of pollutants to Sandia Canyon. The highest values of filtered copper are most often observed in storm water originating from urban runoff from parking lots, roads, and buildings in TA-03. Aluminum and copper exceedances are attributed to urban runoff and naturally occurring sediments. Mercury is associated with SWMU and AOCs. Target Action Levels vary by discharge permit and are based on New Mexico standards criteria (20.6.4 NMAC) and the average hardness for Sandia canyon if the pollutant is a hardness-dependent metal (see footnote 1 to tables 12 through 14).

The sampling points identified in Table 11 serve as the locations for determining reductions in concentrations of parameters causing impairment (dissolved copper, total recoverable aluminum and total mercury) for attainment of water-quality targets under the 4b Demonstration. The locations of the sampling points are shown in the maps in Appendix 1. Tables 16 – 18 provide a summary of 2020 water quality data from these sites. Due to insufficient storm water flows, samples were not obtained from SWMP-S-06 a sampler located within Sandia Canyon below the lower grade control structure.

Table 11
Storm Water Monitoring Plan[a]

Assessment Unit	Sample Location	DOC (F)	Ca/Mg/ Hardness (F)	Copper (F)	Mercury (UF)	Total Recoverable Aluminum (F10µ)
(Upper) Sandia Canyon (Sigma Canyon to NPDES outfall 001) NM-9000.A_047	SWMP-S-01	**4**	**4**	**4**		**4**
	SWMP-S-02	**4**	**4**	**4**		**4**
(Upper) Sandia Canyon (Sigma Canyon to NPDES outfall 001) NM-9000.A_047	E123	**a**	**a**	**a**		**a**
Upper and Lower	E124	**4**	**4**	**4**	**4**	**4**
(Lower) Sandia Canyon (within	SWMP-S-03	**4**	**4**		**4**	**4**

LANL below Sigma Canyon) NM-128-A_11	SWMP-S-04	**4**	**4**		**4**	**4**
	SWMP-S-05	**4**	**4**		**4**	**4**
	SWMP-S-06	**4**	**4**		**4**	**4**
Lower) Sandia Canyon (within LANL below Sigma Canyon) NM-128-A_11	E125	**a**	**a**	**a**	**a**	**a**

F = Filtered with 0.45 µm filter

a. Based on environmental surveillance program monitoring schedule

Sampling points for SWMP samplers do not have run on sampling thus individual site reductions are not calculable. However, exceedances higher in the watershed (e.g., SWMP-S-01) appear to be more prevalent than lower in the watershed.

2.2 Point and Nonpoint Source Loading That When Implemented Will Achieve WQS

Describe the cause-and-effect relationship between the water quality standard (and numeric water quality targets as discussed above) and the identified pollutant sources and, based on this linkage, identify what loadings are acceptable to achieve the water quality standard.

Existing data indicate that the water quality targets are not currently achieved. This is particularly true under storm water flow conditions. Recent data obtain from the SEP monitoring project indicate that the urban/developed landscapes at the Laboratory are a major source of pollutants to the AUs. Effective management of storm water flows is key to achieving numeric water quality targets. LANL is looking to the International Stormwater Database (2020) to identify pollutant-specific efficacy among categories of BMPs for future consideration.

Loadings acceptable to achieve WQ standards:

In this revision we address the numeric standards for aluminum and copper and reported results obtained from EIM and Intellus New Mexico to understand what reductions would be necessary to meet New Mexico's water quality standards. LANL sought a worst-case scenario for the multi sector general permit because this permit covers industrial activities in an urbanized setting which contribute moderate amounts of aluminum and high amounts of copper but with typically low hardness which is an ameliorating water quality parameter to the toxicity of some metals. In the MSGP LANL is held to a receiving water hardness of 61.1 mg/L which was determined for SANDIA CANYON (SIGMA CANYON TO NPDES OUTFALL 001 Assessment Unit NM-9000.A_047). This hardness leads to limits specific to the permit of 1,742 µg/L for aluminum and 8 µg/L for copper. MSGP outfalls collect storm water samples before they reach the canyon bottoms and the receiving waters. The most stringent limit for total mercury is for the Wildlife Habitat use and is 0.77 µg/L. Sources for mercury include industrial uses and wet and dry deposition.

For the hardness dependent metals (aluminum and copper), LANL filtered the data to samples that had accompanying hardness data and used these individual determinations of sample-specific acute criteria using a hardness dependent calculator based on NMED's hardness dependent metals criteria at 20.6.4.900 NMAC. This had the result of limiting the dataset to samples taken between 2013 and 2018 and thus before LANL embarked on building many of its institutional controls to reduce erosion and

sediment mobilization. Over half of these controls (17 of 31) were built after the MSGP dataset for which LANL had sample specific hardness data.

From 2013 to 2018, LANL had 24 sample for aluminum and copper with sample specific hardness data. Half (50%) exceeded the acute aluminum criteria and fully 86% exceeded the acute copper criteria. LANL calculated a need to reduce copper by an average of 9% but notes that this average is skewed by three samples taken on one day with copper concentrations above 25 µg/L likely related to a release event. Aluminum would need to be reduced by 1.2% but LANL notes that aluminum from industrial activities is low when compared to receiving waters that have come into contact with parent geology (the Bandelier tuff) which is rich in aluminosilicates. Aluminum exceedances are generally many fold the associated criteria the further down canyon one goes. Efforts to control this source in Sandia canyon include the wetland, the Sandia grade control structure, and BMPs to capture sediment in TA-72.

Success of current controls

For the upper (perennial) portions of Sandia Canyon, those most influenced by urban stormwater runoff [Assessment Unit NM-9000.A_ Sandia Canyon (Sigma Canyon to NPDES outfall 001)], the current draft of New Mexico's 2024-2026 303(d) listing of impaired waters proposes a delisting for copper. Sandia's perennial waters cease very soon after this AU as it flows into deeper sediments. Copper is still listed as an impairment in the downstream ephemeral AU [Sandia Canyon (within LANL below Sigma Canyon)] but this may be an unidentified source in TA-53 which discharges stormwater from an unnamed side canyon reaching Sandia Canyon in TA-72. Waters in TA-72 rarely reach the eastern boundary- on average reaching the lower boundary gage system 2 times a year in a 2012 to 2021 gage record. It is unknown how often waters reach the Rio Grande due to the lack of gages beyond the LANL boundary.

Mercury

LANL's data retrieval of MSGP data for total mercury returned 153 results and none exceeded NMED's Wildlife Habitat criteria. The highest recorded was 0.66 µg/L.

General efficacy of types of controls used at LANL to reduce erosion and sediment mobilization.

LANL references the Water Research Foundation's International Stormwater BMP Database (2020) for a statistical inference about the efficacy of specific controls. This database addresses copper only but may be useful to glean removal effectiveness of other sediment-associated pollutants. Below, LANL reproduces the types of controls present in upper Sandia Canyon and the expected reduction of total copper.

1) Detention Basin: ~50%
2) Retention Pond: ~50%[2]
3) Wetland Basin: ~45%
4) Grass Swale: ~55%
5) Media Filter: ~55%

[2] LANL BMPs are designed to allow for pre-development flows, thus retaining waters is not a feature of LANL designs but there are infiltration galleries onsite.

These average BMP efficiencies are in excess of reductions needed to meet water quality standards for copper and aluminum, however there may be occult inputs to receiving waters that LANL has yet to identify.

2.3 Controls That Will Achieve Water-Quality Standards

The following serve as the primary controls for eventual attainment of the water quality targets:

1. Continued application of NPDES permits and regulatory controls.
2. Sandia Wetland Grade Control Structure

3. Storm Water Management Plan

2.3.1 Point Source Controls

Three major NPDES permits provide the point source controls for the AUs. The permits are specifically designed to monitor and prevent or reduce the amount of pollutants entering the AUs. These programs contain mandated provisions and limits, with specified implementation timelines, to address impaired water conditions.

2.3.1.1 Industrial and Sanitary Point Source Discharge Permit (IPSP) Point Source Controls

The NPDES IPSP Outfall Permit NM0028355 is currently the only active NPDES Industrial and Sanitary Outfall Discharge Permit at the Laboratory. The hybrid permit included 6 outfalls permitted under the NPDES Permit issued on October 2014 (modified in May 2015) and 5 Outfalls under the NPDES Permit issued March 2022. In the most current permit, 10 outfalls are operating under the 2022 version and one outfall may be stayed and fall under the prior permit conditions. Three of the 11 outfalls discharge to the upper AU. The locations of these outfalls are shown in the maps in Appendix 1.

The primary effluent source of water discharges to Sandia Canyon are from NPDES Outfall 001. This outfall has a continuous average discharge of 235,000 gal. per day consisting of once through cooling water from the power plant; SWWS treated effluent; SERF treated effluent; and blowdown from the SCC cooling towers. The NPDES permit provides monitoring and/or permit limits for Total Recoverable Aluminum and copper based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The 2014 NPDES Permit included permit limits for total recoverable aluminum and dissolved copper. The new 2022 permit revised these limits as shown in Table 12.

Table 12. 2014 and 2023 NPDES Permit Limits for Outfall 001

Outfall ID No.	Parameter	NPDES ISPS Permit Requirement Oct 2014	NPDES ISPS Permit Requirement November 2023

001	Total Recoverable Aluminum	Daily Max = 0.9889 mg/L	Report Only
	Copper	Dissolved Copper Daily Max = 0.0073 mg/L	Total Copper Monthly Average = 0.0087 mg/L Daily Max = 0.0087 mg/L

Monitoring data for total recoverable aluminum at Outfall 001 under the 2014 NPDES permit resulted in the determination there was no longer a reasonable potential for discharges of aluminum above the water quality standard. This resulted in the removal of the permit limit with a requirement to continued monitoring as report only in the 2022 NPDES Permit. Ongoing reasonable potential for copper in the outfall discharges resulted in stricter permit limits than those in the 2014 permit. Mercury was determined to have no reasonable potential in both the 2014 and 2022 NPDES permits.

The NPDES Outfall 03A027 is located <100-ft from Outfall 001 and has the capability of intermittent discharging but would only be used in an emergency or maintenance situations. Outfall 03A027 has not discharged since 2017 as a result of cooling tower blowdown waters being re-routed to Outfall 001. The NPDES permit provides monitoring and/or permit limits for Total Recoverable Aluminum and copper based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The 2014 NPDES Permit included permit limits for total recoverable aluminum and dissolved copper. The new 2022 permit revised these limits as shown in Table 13.

Table 13. 2014 and 2023 NPDES Permit Limits for Outfall 03A027

Outfall ID No.	**Parameter**	**NPDES ISPS Permit Requirement Oct 2014**	**NPDES ISPS Permit Requirement November 2023**
001	Total Recoverable Aluminum	Daily Max = 0.9889 mg/L	Report Only
	Copper	Dissolved Copper Daily Max = 0.0073 mg/L	Total Copper Monthly Average = 0.0087 mg/L Daily Max = 0.0087 mg/L

Monitoring data for total recoverable aluminum at Outfall 03A027 under the 2014 NPDES permit resulted in the determination there was no longer a reasonable potential for discharges of aluminum above the water quality standard. This resulted in the removal of the permit limit with a requirement to continued monitoring as report only in the 2022 NPDES Permit. Ongoing reasonable potential for copper in the outfall discharges resulted in stricter permit limits than those in the 2014 permit. Mercury was determined to have no reasonable potential in both the 2014 and 2022 NPDES permits. Outfall 03A027 was routed to Outfall 001 in 2016 and is currently routed to the Reuse Tank at the Power Plant where it is combined with SWWS effluent and either discharged to Outfall 001 or to the Sanitary Effluent Reclamation Facility (SERF) for reuse. The SERF, located at the head of Sandia Canyon, provides tertiary treatment of the SWWS facility treated sanitary effluent and/or SCC Cooling Tower Blowdown so that it can be reused/recycled as makeup water in the cooling towers at the Laboratory The facility utilizes chemical precipitation, pH adjustment, filtration, and reverse osmosis to treat water to remove silica and other contaminants and improves water quality for discharges to Outfall 001 and/or 03A027.

A smaller volume of effluent is discharged to upper Sandia Canyon from NPDES Outfall 03A199. This outfall has an intermittent discharge of 35,000 gal./day that consists of LDCC Cooling Tower blowdown. The 2014 NPDES permit provides monitoring and/or permit limits for total recoverable aluminum, copper, mercury based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The new 2022 permit revised these limits as shown in Table 14.

Table 14. 2014 and 2023 NPDES Permit Limits for Outfall 03A199

Outfall ID No.	**Parameter**	**NPDES ISPS Permit Requirement Oct 2014**	**NPDES ISPS Permit Requirement November 2023**
03A199	Total Recoverable Aluminum	Daily Max = 0.9889 mg/L	Report Only
	Copper	Dissolved Copper Daily Max = 0.0073 mg/L	Report Only
	Total & Dissolved Mercury	Daily Max = 0.77 ug/L	NA

Monitoring data for total recoverable aluminum and copper at Outfall 03A199 resulted in the determination there was no longer a reasonable potential for discharges above the standard. This resulted in the removal of the respective permit limits with a requirement to continued monitoring as report only in the 2022 NPDES Permit. Monitoring data for total and dissolved mercury at the outfall resulted in a determination that there was no longer a reasonable potential for discharges above the standard. This resulted in the removal of the monitoring requirements in the 2022 NPDES permits.

Outfall 03A113 discharges to an intermittent discharge o lower Sandia canyon that consists of cooling tower blowdown from the LEDA cooling towers at TA-53. The 2014 NPDES permit provides monitoring and/or permit limits for total recoverable aluminum and copper based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The new 2022 permit revised these limits as shown in Table 15.

Table 15. 2014 and 2026 NPDES Permit limits for Outfall 03A113

Outfall ID No.	Parameter	NPDES ISPS Permit Requirement Oct 2014	NPDES ISPS Permit Requirement March 2022
03A113	Total Recoverable Aluminum	Daily Max = 6.904 mg/L	Report Only
	Dissolved Copper	Daily Max = 0.0218 mg/L	NA
	Total Mercury	NA	Report Only

Monitoring data for total recoverable aluminum, dissolved copper, and total mercury at Outfall 03A113 resulted in the determination there was no longer a reasonable potential for discharges above the standard. This resulted in the removal of the permit limits for aluminum and copper and an ongoing requirement to monitor as report only in the 2022 NPDES Permit.

2.3.1.2 Individual Permit (IP) Point Source Controls Related to Certain RCRA SWMUs and AOCs

Section 1.3.1.2 provides an overview of the key provisions of the IP and the relationship to the Consent Order requirements. The IP categorizes a Site as having had an “industrial activity” that creates a “point source discharge” and directs the Permittees to monitor representative storm water discharges from Sites at specified sampling points known as SMAs.

The selection of analytical monitoring suites and Site priority designations is based on historical information and any storm water, sediment, and soil data available at the time the Permit application was submitted. The investigation and remediation of SWMUs and AOCs began during the 1990s before the effective date of the Individual Permit (November 1, 2010) and continue concurrently with implementation of the Individual Permit.

The Permit establishes Target Action Levels (TALs) that are equivalent to New Mexico water-quality criteria. These TALs are used as benchmarks to determine the effectiveness of control measures implemented under the Permit. That is, confirmation monitoring sample results for an SMA are compared with applicable TALs. If one or more confirmation monitoring results exceed a TAL, the Permittees must take corrective action through the installation of measures reasonably expected to (1) meet applicable TALs at the Site, (2) achieve total retention of storm water discharges from the Site, or (3) totally eliminate exposure of pollutants to storm water; otherwise, the Permittees must demonstrate the Site has a Certificate of Completion (COC) under the Consent Order.

The Individual Permit requires that the Permittees certify to EPA completion of corrective action at each Site by a specific deadline based upon the Site's status as either a High Priority or Moderate Priority Site.

Table 3 lists the 13 permitted sites in the IP for the AUs. The maps in Appendix 1 show the locations of the SMAs.

Tables 16 through 18 indicate stormwater sampling events and exceedance ratios.

2.3.1.3 Storm Water Multi-Sector General Permit Controls

The NPDES MSGP regulates storm water discharges from identified industrial activities and their associated facilities. Table 4 lists the MSGP facilities and monitored outfalls discharging storm water to the AU and a map in Appendix 1 shows the location of these outfalls. MSGP regulated activities within the AU include metal fabrication, vehicle and equipment maintenance, recycling activities, and warehousing activities. Triad is permitted under the EPA 2021 NPDES Storm Water MSGP for Industrial Activities (2021 MSGP). The MSGP requirements include the implementation of control measures, development of facility-specific Storm Water Pollution Prevention Plans (SWPPPs), Corrective Action requirements for identified issues, and monitoring storm water discharges from permitted outfalls. Compliance with these requirements is achieved primarily by:

- Identifying potential pollutant sources and activities that could adversely impact water quality,
- Identifying and providing structural and nonstructural controls to limit the impact of potential pollutants,
- Developing and implementing facility-specific SWPPPs,
- Implementing permit-specified Corrective Actions for any identified issues,
- Monitoring storm water runoff for industrial sector-specific benchmark parameters, impaired water constituents, indicator parameters, and effluent limitations, and
- Visually inspecting storm water runoff to assess color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of storm water pollution.

Minimizing the exposure of potential pollutant sources and activities to storm water is primarily achieved through administrative controls associated with work processes and engineering controls such as covering, secondary containment, berms to direct runoff flow, and storm drain inlet protection. Erosion and sediment transport at facilities is also monitored and addressed through the implementation of structural controls or stabilization of areas with asphalt, concrete, or perennial vegetation.

Evaluation of storm water monitoring results is performed to identify the need to modify existing controls or implement new controls. Storm water monitoring under the 2021 MSGP is ongoing.

2.3.2 Non-Point Source Controls

A number of non-point source controls and initiatives have been established in the upper and lower Sandia Canyon AUs. Of particular importance to non-point source mitigation was the installation of the Sandia Grade Control Structure (GCS) and two grade control structures completed in the lower AU under the Supplemental Environmental Projects (SEPs). On January 22, 2016 NMED and DOE reached a

settlement agreement to resolve issues as they related to the incident at WIPP. The settlement agreement called for a number of corrective actions and SEPs. Execution of the SEPs provided the Laboratory the opportunity to address storm water management issues including design and installation of engineering structures to slow storm water flow and decrease sediment load to improve water quality. The SEP also called for increase sampling and monitoring capabilities for storm water runoff in and around the Laboratory as indicted in section 1.3.2.3.

2.3.2.1 Sandia Wetland Stabilization Project

The Sandia Canyon wetland is located within the AU below the primary developed Laboratory area in the upper watershed and approximately 100 yards above monitoring station E-123. A large head cut formed in the lower section of the wetland, resulting in increased sediment migration down canyon. The wetland is an important historical sediment deposition area. The head cut in the lower section of the wetland was stabilized by constructing a three stepped grade-control structure that allow a grade transition from the current elevation of the wetland to the stream bank near stream gage E-123. The area behind the grade-control structure was backfilled and wetland vegetation to allow expansion of the wetland area. These measures have physically stabilize the wetland by reducing sediment and associated contaminant transport into the lower sections of the canyon.

The grade-control structure was designed to meet the following objectives:

- Provide and even grade to allow wetland expansion and further stabilization
- Be sufficiently impervious to prevent the draining of alluvial soils
- Facilitate non-channelized flow
- Minimize erosion during large flow events
- Support wetland function under reduced effluent conditions

A 25-year, 2-hour storm event with a peak design flow of 500 cubic feet per second was used for the design of the grade-control structure as required by the Laboratory's design guidance. The primary goal was to reduce the stream velocity in the area of the grade control structure to less than 6 feet per second. Construction of the grade-control structures was completed in November 2013.

Construction of the grade-control structure was required based on the results of investigations conducted under the Order on Consent (Consent Order), which provides the time table and requirements for environmental cleanup of hazardous constituents for the Laboratory. Monitoring pursuant to Consent Order requirement will be conducted as follows:

- Surface water monitoring of base flows at gages upstream and downstream of wetland
- Storm water samples will be collected from gages upstream and downstream of wetland
- Vegetation monitoring will be conducted via semi-annual photo surveys
- A series of repeat cross sections will be established to document geomorphic changes

Suspended sediment concentrations have decreased significantly compared with pre- and post-GCS data immediately downgradient of the wetland at gaging station E123, presumably from eliminating headcutting at the terminus of the wetland and from trapping efficiency because of the dense vegetation within the wetland. The monitoring conducted during the performance period indicates the Sandia wetland remains stable following the installation of the GCS, even with generally lower, but variable, effluent volumes entering the wetland. The GCS continues to be effective in arresting headcutting at the terminus of the wetland. Groundwater within the shallow alluvium remains in a reducing condition, with no obvious detrimental temporal trends in chemistry observed (6).

Monitoring requirement includes:

- Photo documentation
- Vegetative species and cover qualification
- Extent of wetland vegetation
- Water level monitoring

2.3.2.2 Storm water Controls/Management from Developed Laboratory Areas

Controls within the LANL area primarily consist of several small detention ponds, riprap structures at various discharge locations, and a grade control structures within Sandia Canyon. The detention ponds capture runoff from adjacent buildings and surrounding impervious areas, and discharge flow through controlled outlet structures. These ponds are designed to manage runoff velocity to pre-development levels and also facilitate the settling and capture of sediment transported in storm water runoff. As an example, a bio detention pond is currently being constructed within LANL's primary administration area to address runoff from a large parking structure and an adjacent parking lot. The pond will minimize runoff velocity and is designed with a forebay to capture "first flush" sediments and manage site snow removal. This system will provide a first flush treatment before site runoff enters the existing storm drain infrastructure system.

Riprap is placed at various discharge locations to reduce runoff and minimize the potential for erosion within and adjacent to Sandia Canyon. For example, both surface runoff and flow collected in the storm drain infrastructure system from a significant portion of the LANL area discharge directly at the head of Sandia Canyon. A riprap structure and a small riprap basin have been installed at this discharge location to manage these flows. The riprap reduces runoff velocity in the flows prior to discharge into Sandia Canyon.

Approximately 0.7 miles downstream from the head of Sandia Canyon, a grade control structure has been installed within an existing wetland. This wetland is an important historical sediment deposition area, as the highest concentrations of copper in the AU are located within the wetland reach of the canyon. A large head cut formed in the lower section of the wetland, resulting in increased sediment migration down canyon. The grade control structure, consisting of a series of sheetpile structures designed to reduce flow velocity and increase the width of flow within the watercourse, will stabilize the head cut by facilitating a grade transition from the current elevation of the wetland to the downstream channel. The area behind the sheetpile structures was backfilled and wetland vegetation is being established in these areas. A cascading drop pool constructed with rock at the downstream end of the grade control structures serves as a final energy dissipater for the water flow. By reducing flow velocity and enhancing the sustainability of the wetland, this grade control structure will stabilize existing soils and enhance future sediment deposition, thereby maintaining hydrologic and geochemical conditions that will minimize the migration of pollutants of concern including copper.

A Low Impact Development (LID) Master Plan has been developed and finalized. The LID Master Plan will guide and prioritize future development of LID projects at LANL. The LID Master Plan applies to developed areas across the Laboratory and focuses on identifying opportunities for storm water quality and hydrological improvements in the heavily urbanized areas of Technical Areas 03, 35 and 53. TA-03 primarily drains to Sandia, Mortandad, Two Mile and Los Alamos Canyons. The LID Master Plan is organized to allow the addition of LID projects for other technical areas as time and funds allow in the future.

The LID Master Plan identifies a number of LID projects within the Sandia AU. Under the SEP, 5 projects were designed and 3 were completed in 2019. These projects are designed and constructed with the specific goal of improved storm water management.

2.3.2.3 Sandia Canyon Storm Water Management Plan (SWMP)

LANL has completed development of a Storm Water Management Plan (SWMP). The complete SWMP is included in Appendix 2. The SWMP will be managed through the Environmental Protection and Compliance Division (EPC-CP) with collaboration with personnel from Planning, Utilities and Project Management. The Plan is based on the municipal separate storm water sewer system (MS4) Phase II Storm Water Program that requires permittees develop measurable goals to assess the effectiveness of storm water controls that address the six minimum control measures defined in the regulations.

LANL completed a number of activities under the SWMP:

1. LANL Workforce Education and Outreach

   A link to the Sandia Storm Water Management Plan (SWMP) was added to the Los Alamos National Laboratory (LANL) Water Quality Support webpage which includes environmental tools and applications, water quality plans, procedures, NPDES permits and reports. The webpage serves as a resource for LANL staff to access information related to the stormwater management and other environmental programs.

   Informational signs were installed at two Low Impact Development (LID) projects to showcase sustainable (low water, low maintenance) landscaping and the use of natural processes to manage urban stormwater runoff and pollutant concentrations. These signs inform and remind LANL staff about the importance of stormwater management and how it can be applied at LANL.

   The LANL Stormwater Permitting & Compliance Team has participated in multiple community outreach events within and around Los Alamos during CY 2022 and 2023. At these events team members teach and expose community members to concepts of watersheds, erosion, stormwater management, and water quality utilizing a stream table for a hands-on demonstration.

2. Pollution Prevention/Good Housekeeping

The LANL Stormwater Permitting & Compliance team has developed a Long Term Stewardship Program that includes the assessment and inventory of institutional stormwater controls or BMPs located on the mesa tops and canyon systems within the Sandia Canyon drainage basin. Assessment and documentation has facilitated the establishment of an actively maintained database that tracks site specific attributes for each stormwater BMP (i.e., coordinates, BMP type, drainage area, date built, last inspection date, and inspection results). Annual or biannual inspections are conducted to assess the effectiveness and condition of each BMP. Frequency of inspection is dependent on the type of BMP and risk for exposure to damage caused by stormwater runoff or maintenance activities on co-located infrastructure. Controls are registered with LANL infrastructure management systems (Archibus/FIMS) and given a facility ID for tracking in DOE systems.

Additional developments include revisions to the LANL Snow and Ice Control Plan. In effort to reduce erosion and minimize the discharge of pollutants from snow melt (i.e., ice-melting chloride salts, asphalt, floatable debris, heavy metals, etc.), the LANL Stormwater Team is assessing snow pile storage locations

within the Sandia drainage basin to determine which areas need to be relocated or retrofitted with permanent BMPs for sediment management. Dedicated locations will be signed and added to an actively maintained database, registered with LANL infrastructure management systems (Archibus/FIMS), and given a facility ID for tracking in DOE systems. Biannual inspections are planned for each snow storage location to evaluate damage from snow clearing equipment, BMP effectiveness, and sediment accumulation.

3. Post-Construction Runoff Control

   The LANL Engineering Standards Manual was revised to streamline and clarify NPDES Construction General Permit and Energy Independence & Security Act, Section 438 requirements for designing and implementing stormwater management features. The revision includes the addition of LANL site specific data (i.e., rainfall data, hydrologic curve numbers, design storm precipitation totals) to ensure projects equal to or greater than 5,000 square feet implement the appropriate stormwater controls necessary to restore the pre-development hydrology of the site. Additional requirements were added for sizing LID water quality treatment BMPs such as extended detention stormwater controls.

   Subject matter experts from the LANL Storm Water Permitting & Compliance team provided technical input associated with development of the LANL Campus Master Plan. The plan projects near-term, mid-term, and long-term development of new buildings and infrastructure located in all areas at LANL, including areas covered under the SWMP. As part of this effort to ensure that all regulatory stormwater requirements are acknowledged and included in the plan, the team provided guidance on stormwater regulatory compliance requirements and Low Impact Development (LID) Standards. Through continued planning and integration, the team will incorporate LID concepts and other stormwater regulatory requirements into the final designs for all projects included in Campus Master Plan.

Following the completion of construction projects, permanent stormwater controls designed to manage post construction stormwater runoff are required to be maintained to ensure long term operation. NPDES Construction General Permit (CGP) and EISA 438 SMEs are working closely with GIS SMEs to register and track each post construction stormwater control in the LANL infrastructure management systems database (Archibus/FIMS). Similar to other institutional stormwater controls, post construction stormwater controls are inspected annually or biannually to assess the effectiveness and condition of the control. To promote dedicated routine maintenance support, EPC-CP is working with LANL Utilities and Infrastructure to prioritize O&M for all post construction and institutional storm water controls at the Laboratory.

On March 6, 2015 EPA issued their preliminary determination that discharges of storm water from MS4s on Laboratory property and urban portions of Los Alamos County result in or have the potential to result in exceedances of state water quality standards including impairment of designated uses, or other significant water quality impacts such as habitat and biological impacts. In December 2019, LANL received final designation from EPA as a MS4 regulated entity. Draft permits were then issued by EPA in December 2020 and March 2021 and permit negotiation continued between EPA and stakeholders through the remainder of 2021. In January 2022, due to a lawsuit between Los Alamos County and EPA, the Tenth Circuit Court of Appeals remanded the MS4 designation back to EPA for reevaluation and the MS4 permitting process is paused during reevaluation.

Until the MS4 permit is developed and finalized, the SWMP will serve as a bridge and key to management of stormwater flow in Sandia Canyon. The Sandia SWMP for the 4b designation was based

on EPA guidance for MS4 permit required SWMPs in anticipation of the future issuance of the MS4 permit to LANL, and to facilitate transition of 4b activities to implementation of MS4 permit requirements as stormwater discharges to Sandia Canyon are anticipated to be MS4 regulated discharges. It is expected that implementation of MS4 permit requirements, upon issuance of a permit by EPA, will further meet Sandia SWMP objectives and satisfy 4b designation requirements.

The initial scope of the SWMP will focus on stormwater discharges into Sandia Canyon. The maps in Appendix 1 show the Sandia Canyon watershed within LANL, the upper and lower assessment units (AUs) and proposed monitoring locations. S-01 and S-02 are the primary storm drain outfalls from TA-03 and will be used as run-on sampling locations for the upper AU. Gage station location E-124 will be used as the runoff sampling location for the upper AU and one of the run-on sampling locations for the lower AU. Sampling locations S-03, S-04 and S-05 will be used as TA-53 run-on sampling locations for the lower AU. Sampling location S-06 is located just upstream from the Lower Sandia Grade Control Structure and will be used as the runoff sampling location for the lower AU.

In addition, a Sampling and Analysis Plan (SAP) has been prepared that identifies analytical suites and sampling frequencies for each monitoring location. Table 1 is a summary of the SAP. We plan to collect four samples a year at each location. All sample analytical results will be posted on Intellus New Mexico.

In 2020 storm water flow were sufficient for samples to be collected at SWMP-S-01, 02, 03, 04 and 05. Storm water flows were insufficient for sampling collection at E124 and 06.

2.3.2.4 Storm water Controls/Management from Urban Townsite in Upper Watershed

Los Alamos County property discharging to Sandia Canyon is comprised of approximately 23 acres at the former municipal landfill site and 6 acres within the Royal Crest housing area. The landfill site has a soil cap and operates under a closure plan. At the east end of the site, the ground cover consists of sparse native perennial vegetation and approximately 3.5 acres of compacted basecourse housing a solar array. The west side of the site is primarily a flat area of compacted soil with light industrial activity. With the exception of a small area at the east end of the landfill site, the slopes along Sandia Canyon are stabilized with native perennial vegetation.

Within the Los Alamos County landfill site four rock lined open channel structures collect and convey runoff to Sandia Canyon. Three of the four structures discharge at locations upstream of the grade control structure. Runoff in remaining areas is conveyed to the canyon in multiple locations via sheetflow or minor concentrated flow. The six-acre site within the Royal Crest housing area has a system of storm drains that collect runoff from streets and surrounding structures and discharges runoff through a single culvert.

Controls within the Los Alamos County area consist primarily of maintenance of the landfill cap, compliance with the landfill closure plan, and erosion control structures on the east end of the landfill site. Previously, a significant portion of the runoff from the eastern half of the landfill site, from a single drainage area, was conveyed in rock rundowns to a single discharge location due north of the grade control structure. Significant erosion of the canyon slope at this discharge location was occurring, resulting in discharges of sediment into Sandia Canyon. Los Alamos County has initiated work to subdivide the current single drainage area on the east end into two basins, resulting in two new discharge locations. New riprap channels will convey runoff to small basins at these discharge points, facilitating additional reduction of runoff velocity prior to discharge. Creating new discharge locations also bypasses the existing eroded slope, minimizing sediment transport into Sandia Canyon.

In addition to the drainage modification on the landfill site, a large retention structure has been constructed within Sandia Canyon, on the north side of the grade control structure, to capture runoff from

approximately five acres of the landfill.. This structure is located within the area of the eroded slope and will retain runoff from the eroded area as well as the concentrated flow from one of the new discharge points. The structure has a controlled outlet and is designed to retain runoff from a 100-year storm event. For events of smaller magnitude this structure will prevent runoff from the landfill from reaching the water course within Sandia Canyon.

2.4 Description of Requirements under Which Pollution Controls Will Be Implemented

The demonstration should describe the basis for concluding that the pollution controls are requirements or why other types of controls already in place may be sufficient.

The programs and permits described above are based on specific requirements contained in the federal CWA or New Mexico State law. NPDES pollution controls and regulatory requirements described are specifically designed with the objective of meeting WQS at the point of compliance. Permit conditions and requirements are tailored specifically for discharges to impaired waters. The Consent Order (3) is the principal regulatory driver for the Laboratory's environmental restoration programs and requires the investigation and, if necessary, remediation of SWMUs and AOCs located on Laboratory property.

3. ESTIMATE OR PROJECTION OF TIME WHEN WQS WILL BE MET

The demonstration should provide a time estimate by which the controls will result in WQS attainment, including an explanation of the basis for the conclusion.

The 4B Demonstration was approved by the WQCC on December 18, 2020 and by EPA on January 22, 2021. Therefore the 4-year duration of the demonstration will span January 2021 through January 2025. For the pollutants identified, the controls in place are projected to provide measurable decreases in concentrations within 4 years of adoption of the Category 4B. The time-frame will allow implementation of control measures and confirmation monitoring against water-quality criteria targets. The time frame also facilitates coordination with listing cycles. Where the pollutant has no known anthropogenic source or where significant contributions originate from natural background sources, site-specific water quality criteria may be warranted, as provided for in 20.6.4.10 NMAC (2).

4. SCHEDULE FOR IMPLEMENTING POLLUTION CONTROLS

The demonstration should describe, as appropriate, the schedule by which the pollution controls will be implemented and/or which controls are already in place.

The Permits, projects and controls listed below are in effect. The NPDES permits or regulatory requirements set the schedule for implementation of pollution controls. Each permit or regulatory requirement imposes some combination of effluent limits, compliance schedules, monitoring requirements, enforcement provisions and compliance periods. The Sandia Wetland Stabilization Project is subject to requirements, including monitoring and reporting, under the Consent Order. The SEP and LID projects are completed and subject to maintenance, monitoring and inspection by NMED. LANL's SWMP will remain in effect until the MS4 is established and in effect.

- LANL Storm Water Monitoring Plan (SWMP)
- NPDES Industrial Outfall Permit (IPSP)
- NPDES Storm Water Individual Permit (IP)

- NPDES Storm Water MSGP
- Sandia Wetland Stabilization Project
- SEP Grade Controls and LID Projects
- NPDES – Construction General Permit

LANL continues to make progress on implementation of storm water controls. All NPDES permit monitoring requirements and permit limitations remain in effect. As indicated above LANL received the final designation from EPA as a MS4 regulated entity. The draft MS4 permit will be issued soon for public comment.

5. MONITORING PLAN TO TRACK EFFECTIVENESS OF POLLUTION CONTROLS

The demonstration should include a description of, and schedule for, monitoring milestones to track effectiveness of the pollution controls. The demonstration should describe water quality monitoring that will be performed to determine the combined effectiveness of the pollution controls on ambient water quality.

To track the effectiveness of the 4b Demonstration, the watershed-based gage stations E123, E124 SWMP-S-06 and E125 will be monitored as described in section 2.1.3 and Table 14.

Additionally, E123 is located within NM-9000.A_047 below the Sandia Canyon Wetland and E125 is located at the end of near the head of AU NM-128.A_11. Both gages are part of the Laboratory's Environmental Surveillance Program (ESP). E124, located above the TA-72 Firing Site, is also part of the ESP. The ESP has sampled and analyzed sediments and surface water in Sandia Canyon since approximately 1970. This work, reported in annual Environmental Reports, supports the evaluation of long-term trends in contamination in different media and understanding of the role of storm water transport.

Tables 16 – 18 provide a summary of sampling that occurred in calendar year 2020 through August 2023 water quality data from these sites. Due to insufficient storm water flows, limited samples were obtained from E124, SWMP-S-06 and E125. These samplers are located within the main stem of the Sandia Canyon water course and identified in Appendix 1.

Table 16
Dissolved Copper 2020 – August 2023

Monitoring Location	Min (µg/L)	Max (µg/L)	Mean (µg/L)	No. of Samples	Ratio of Storm water Samples	No. of Acute/Chronic WQC Exceedances[1]
SWMP-S-06		6.46	NA	1	1/1	1
E123	3.0	10.8	4.5	36	13/36	5/13
E124	2.78	5.46	3.7	7	7/7	0/1
E125	No Data[2]					

1. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2)

2. Insufficient flow for sample collection

Table 17
Total Mercury 2020 – June 2023

Monitoring Location	Min (µg/L)	Max (µg/L)	Mean (µg/L)	No. of Samples	Ratio of Storm water Samples	No of Wildlife Habitat WQC Exceedances
SWMP-S-06	<0.067	0.244	0.129	5	5/5	0
E123[3]	≤0.067	0.544		46	13/46	0
E124	0.07	0.619	0.295	5	4/5	0
E125	0.06	0.06		1	1	0

1. Not part of 4b in lower Sandia Canyon AU
2. Samples were not collected due to extended dry conditions and insufficient storm water.
3. Mercury is not a 4B parameter in the AU NM-9000,A_047

Table 18
Total Recoverable[2] Aluminum 2020 – June 2023

Monitoring Location	Min (ug/L)	Max (ug/L)	Mean (ug/L)	No. of Samples	Ratio of Storm water Samples	No. of Acute/Chronic WQC Exceedances[2]
SWMP-S-06	1830	13200	7023	4	4/4	4/4
E123	≤19.3	2600	868.7	34	29/34	11/26
E124	68	13800	5415	10	10/10	7/9
E125	No Data					

1. Samples filtered with 10um filter
2. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2) using the Canyon-specific hardness of 43 mg/L for Sandia Canyon from the Individual Stormwater Permit Appendix B1, Table B-1, NM0030759. The hardness-dependent Target Action Level (TAL) for copper is 6.07 µg/L, and the TAL for aluminum is 1,077 µg/L. The Wildlife Habitat TAL for mercury is 0.77 µg/L. The TALS for aluminum and copper are based on NMED's hardness dependent calculator for acute exposures to stormwater as required by the permit NM0030759.
3. Samples filtered with 10um filter.
4. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2)

The SWMP monitoring program focus on stormwater discharges into Sandia Canyon. Figures contained in Appendix 1 show the Sandia Canyon watershed within LANL, the upper and lower assessment units and monitoring locations. S-01 and S-02 are the primary storm drain outfalls from TA-03 and will be used as run-on sampling locations for the upper AU. Gage station location E-124 will be used as the runoff sampling location for the upper AU and one of the run-on sampling locations for the lower AU. Sampling locations S-03, S-04 and S-05 will be used as TA-53 run-on sampling locations for the lower AU. Sampling location S-06 is located just upstream from the Lower Sandia Grade Control Structure and will be used as the runoff sampling location for the lower AU. Sampling results in Tables 19 – 21 represent samples collected in 2020 through August, 2023.

Table 19
Dissolved Copper SWMP-Monitoring Plan (January 2020 through June, 2023)

Monitoring Location	Min (ug/L)	Max (ug/L)	Mean (ug/L)	No. of Samples	No. of Acute WQC Exceedances[1,2]
SWMP-S-01	4.37	30	15.8	9	6
SWMP-S-02	5.36	15.7	10.6	9	8
SWMP-S-03	Not Sampled[3]				
SWMP-S-04	Not Sampled[3]				
SWMP-S-05	Not Sampled[3]				
SWMP-S-06	Not Sampled[3]				

1. Hardness of 61 mg/l (based on value established for MSGP)
2. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2)
3. Insufficient flows for sample collection

Table 20
Mercury SWMP Monitoring Sites (January 2020 through June, 2023)

Monitoring Location	Min (ug/L)	Max (ug/L)	Mean (ug/L)	No. of Samples	No. of Acute (Wildlife Habitat) WQC Exceedances
SWMP-S-01	No Data				
SWMP-S-02	No Data				
SWMP-S-03	<0.067	NA	NA	10	0
SWMP-S-04	<0.067	NA	NA	9	0
SWMP-S-05	<0.067	0.0940	NA	8	0
SWMP-S-06	<0.067	0.244	0.14	4	0

Table 21
Total Recoverable Aluminum SWMP Monitoring Sites (January 2020 through July 21, 2021)

Monitoring Location	Min (mg/L)	Max (mg/L)	Mean (mg/L)	No. of Samples	No. of Acute WQC Exceedances[1,2]
SWMP-S-01	35.5	1880	296	13	0tothis after
SWMP-S-02	68.0	446	207	10	0

SWMP-S-03	179	950	452	11	0
SWMP-S-04	238	4960	1572	9	4
SWMP-S-05	19.3	538	184	8	0
SWMP-S-06	<0.067	13200	3511	8	4

1. Hardness of 61 mg/l (based on value established for MSGP)
2. Samples prepared with 10u filter
3. Samples were not collected due to extended dry conditions and insufficient storm water

In addition to ESP, and SWMP surface water monitoring and assessments at the Laboratory occur at several levels.

1. The annual Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) includes monitoring of base flow or persistent surface water in main drainages and some tributary channels for an extensive list of constituents.
2. Sampling of snowmelt runoff and storm water at gaging stations occurred as part of the Laboratory's environmental surveillance activities.
3. Storm water sampling at locations and frequencies specified in the IP.
4. Ongoing storm water sampling at MSGP active facilities per the requirements of and at frequencies specified in the MSGP.
5. On-going monitoring to determine compliance with Industrial Outfall permit limitations.
6. Continuation of storm water sampling as part of a special study to evaluate background and baseline concentrations of PCBs, metals, and gross-alpha radiation in and near the Laboratory.

The demonstration should identify how and when assessment results from the monitoring will be reported to the public and USEPA.

The Laboratory's environmental data records are available on a single cloud-based, web-accessible system to the public. The cloud-based data system houses more than 12 million records, including 27,000 locations and 250,000 samples. All sampling data used in the 4b Demonstration are available to the public. The sampling locations described in the SWMP will also be placed in the cloud-based system. The publicly available view of the database requires no feeds or transformations of the data. The site can be accessed at http://www.intellusnmdata.com/.

Information on Environmental Surveillance activities is reported annually in the Laboratory's Annual Environmental Report. The most recent report, issued in December 2019, is for the 2018 calendar year (5). The report can be accessed at http://www.lanl.gov/community-environment/environmental-stewardship/environmental-report.php.

6. COMMITMENT TO REVISE POLLUTION CONTROLS, AS NECESSARY

The demonstration should provide a statement with a commitment to revise the pollution controls, as necessary, if progress towards meeting water quality standards is not being shown.

To achieve attainment of water quality standards, DOE/Triad employs compliance options including NPDES permit conditions and limitations as well as a number of pollution controls. In the event that progress towards meeting water-quality targets are not achieved, changes in permit and regulatory requirements may be sought. This provided it can be demonstrated that changes will result in compliance

with water quality targets. NPDES permits provide an array of procedures and mechanisms to measure and ensure progress is achieved, including (1) schedules of compliance, (2) compliance status reports, (3) reopener clauses, (4) inspections, and (5) reporting requirements. EPA may change permit limitations and conditions. Under section 401 of the CWA, NMED certifies that permitted activities will comply with New Mexico WQS.

The Laboratory has constructed or established a number of pollution controls, including the SWMP, LANL Engineering Standards, LID Master Plan, Sandia Grade Control Structure, and Supplemental Environmental Projects in lower Sandia Canyon. These and others in this report will be evaluated for effectiveness.

- The SWMP includes increased controls to manage storm water runoff from urban and developed areas at the Laboratory. This plan will aid in further identifying storm water runoff locations, quantifying runoff volumes, identifying potential pollutant sources affecting water quality, and assisting in the identification of appropriate Best Management Practices and control measures for both current and future sites and activities. Monitoring under the plan will continue and revised, as necessary, based on attainment of water quality.
- The Sandia Grade Control structure was completed in 2013. Water level, water quality, vegetative and geomorphic changes are being monitored. The objectives of the GCS was to minimize erosion, provided even grade, prevent draining of alluvial soils, facilitate nonchannelized flow and support wetland functions. The objectives and performance are outline in the Sandia Wetland Performance Report (6) contained in the Public Reading Room (Public Reading Room). The objectives are largely being achieved and no revision to these controls is anticipated in the near future.
- Execution of the SEPs provided the Laboratory the opportunity to address storm water management issues including design and installation of engineering structures to slow storm water flow and decrease sediment load to improve water quality. Two SEP structures were constructed in the lower Sandia Canyon AU. In 2020, a sampler (SWMP-S-06) was located between the two structures. Due to insufficient stormflow, the site has not been sampled. Once sampled, results will be compared with standards and monitoring results from E124 and E125.
- A Low Impact Development (LID) Master Plan has been developed and finalized. The LID Master Plan will guide and prioritize future development of LID projects at LANL. The LID Master Plan applies to developed areas across the Laboratory and focuses on identifying opportunities for storm water quality and hydrological improvements in the heavily urbanized areas of Technical Areas 03, 35 and 53. TA-03 primarily drains to Sandia, Mortandad, Two Mile and Los Alamos Canyons. The LID Master Plan will be changed as needed and is organized to allow the addition of LID projects for other technical areas as time and funds allow in the future.
- The LANL Engineering Standards Manual was revised to streamline and clarify NPDES Construction General Permit and Energy Independence & Security Act, Section 438 requirements for designing and implementing stormwater management features. The revision includes the addition of LANL site specific data (i.e., rainfall data, hydrologic curve numbers, design storm precipitation totals) to ensure projects equal to or greater than 5,000 square feet implement the appropriate stormwater controls necessary to restore the pre-development hydrology of the site. Additional requirements were added for sizing LID water quality treatment BMPs such as extended detention stormwater controls.

The 4B Demonstration was approved by the WQCC on December 18, 2020 and by EPA on January 22, 2021. Therefore the 4-year duration of the demonstration will span January 2021 through January 2025.

7. REFERENCES

The following list includes all documents cited in this report. They can be accessed at the following links: Electronic Public Reading Room, Public Reading Room.

1. NMED. State of NM 2020-2022 Clean Water Act § 303(d)/§ 305 (b) Integrated List.
2. New Mexico Water Quality Control Commission (NMWQCC). State of New Mexico Standards of Interstate and Intrastate Surface Waters, 20.6.4 NMAC.
3. NMED (2005 and 2012 revision). Compliance Order on Consent – The United States Department of Energy and the Regents of the University of California
4. LANL (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.
5. LANL (December 2019). Los Alamos National Laboratory Environmental Report 2018, Los Alamos National Laboratory document LA-UR-19-28950, Los Alamos, New Mexico.
6. LANL (2021). 2020 Sandia Wetland Performance Report
7. EPA (2015). Los Alamos National Laboratory (LANL) Industrial Wastewater Permit - NPDES Permit No. NM0028355
8. EPA (2022a). Los Alamos National Laboratory (LANL) Industrial Wastewater Permit - NPDES Permit No. NM0028355.
9. EPA (2022b). Los Alamos National Laboratory (LANL) FINAL Industrial Wastewater Permit - NPDES Permit No. NM0028355.

8. REVISION HISTORY

January 2024 Revision 2 addressing estimates of reduction needed to meet water quality standards.

November 2023 Revision 1 addressing EPA and NMED comments.

August 2023 Version 1 updating water quality data and interpretation.

August 2021 – Updated storm water monitoring data for SWMP-S-01, 02, 03, 04

August 2021 – Updated and corrected water quality data for LANL-based gages E123, E124 and E125

August 2012 – Added LANL-based gages E123 and E125 to Category 4B Demonstration. Samples from these gages are collected as part of the Laboratory's Environmental Surveillance Program.

August 2021 - Flows were insufficient for sample collection at LANL-Based gages E124 and E125 in 2020 and early 2021. Results of samples that may have been collected in summer 2021 are not, at the time of this report, posted in Intellus or EIM.

August 2021 – To measure effectiveness of the 4B Demonstration, the watershed-based gages E123, E124 SWMP-S-06 and E125 will be monitored as described in section 2.1.3 and Table 14.

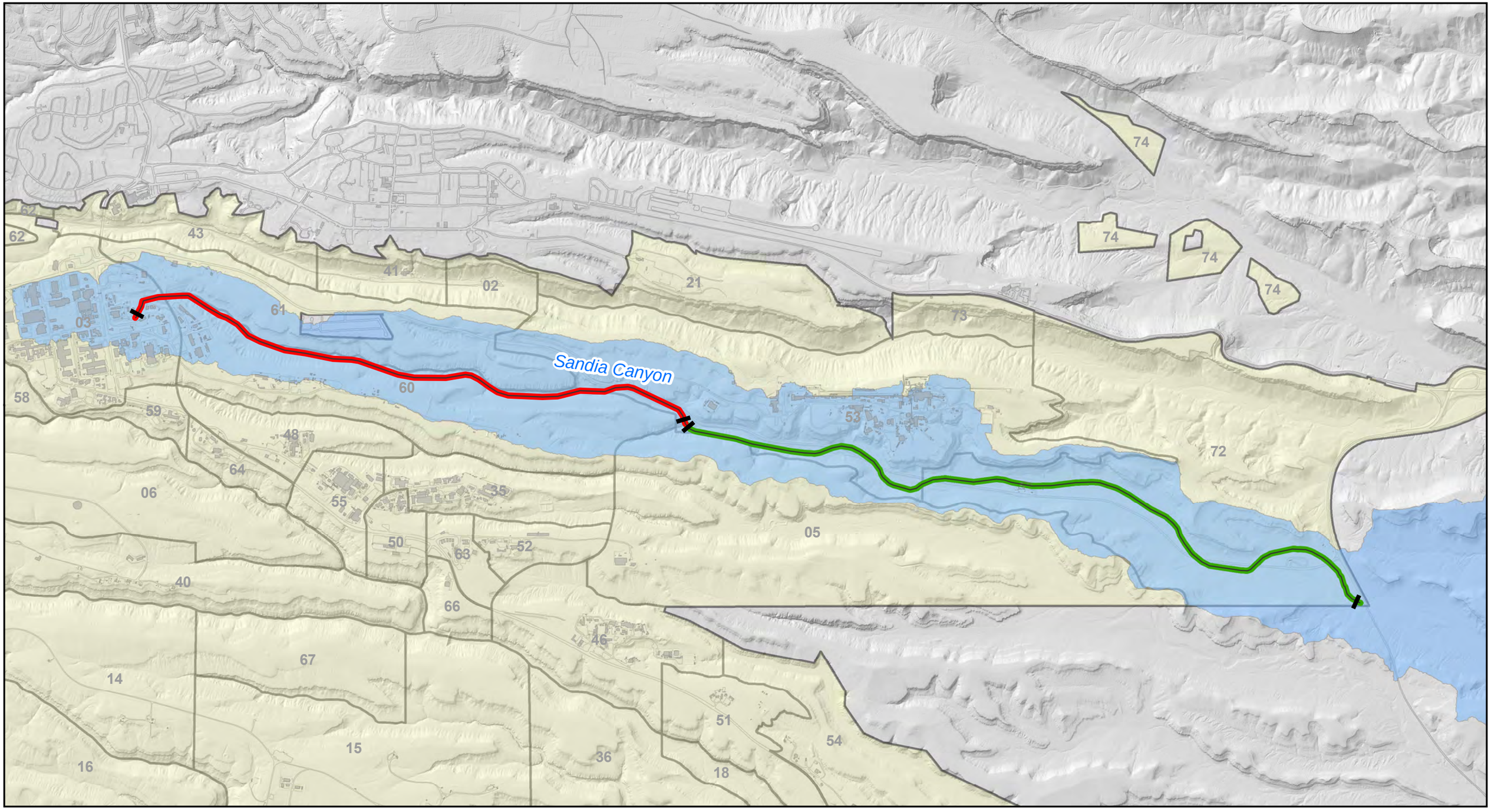
August 2021 – Added Appendix 3 to include time trend graphs with measurements from stations E123, E124 and E125 (y-axis) each year (x-axis).

Appendix 1

Site Maps

Appendix 1

Category 4B MAPS



4B Demonstration Sandia Canyon Assessment Units

- Assessment Unit demarcation
- Sandia Canyon (NM-9000.A_047)
- Sandia Canyon (NM-128.A_11)
- Paved Road
- Sandia Canyon Watershed
- LANL Structure
- Technical Area
- LANL

Map #19-227-04_4B_Overview
Created by Ben Sutter, IFPROG.
November 26, 2019.

This map was created for work processes associated with EPC. All other uses for this map should be confirmed with LANL EPC-CP staff.

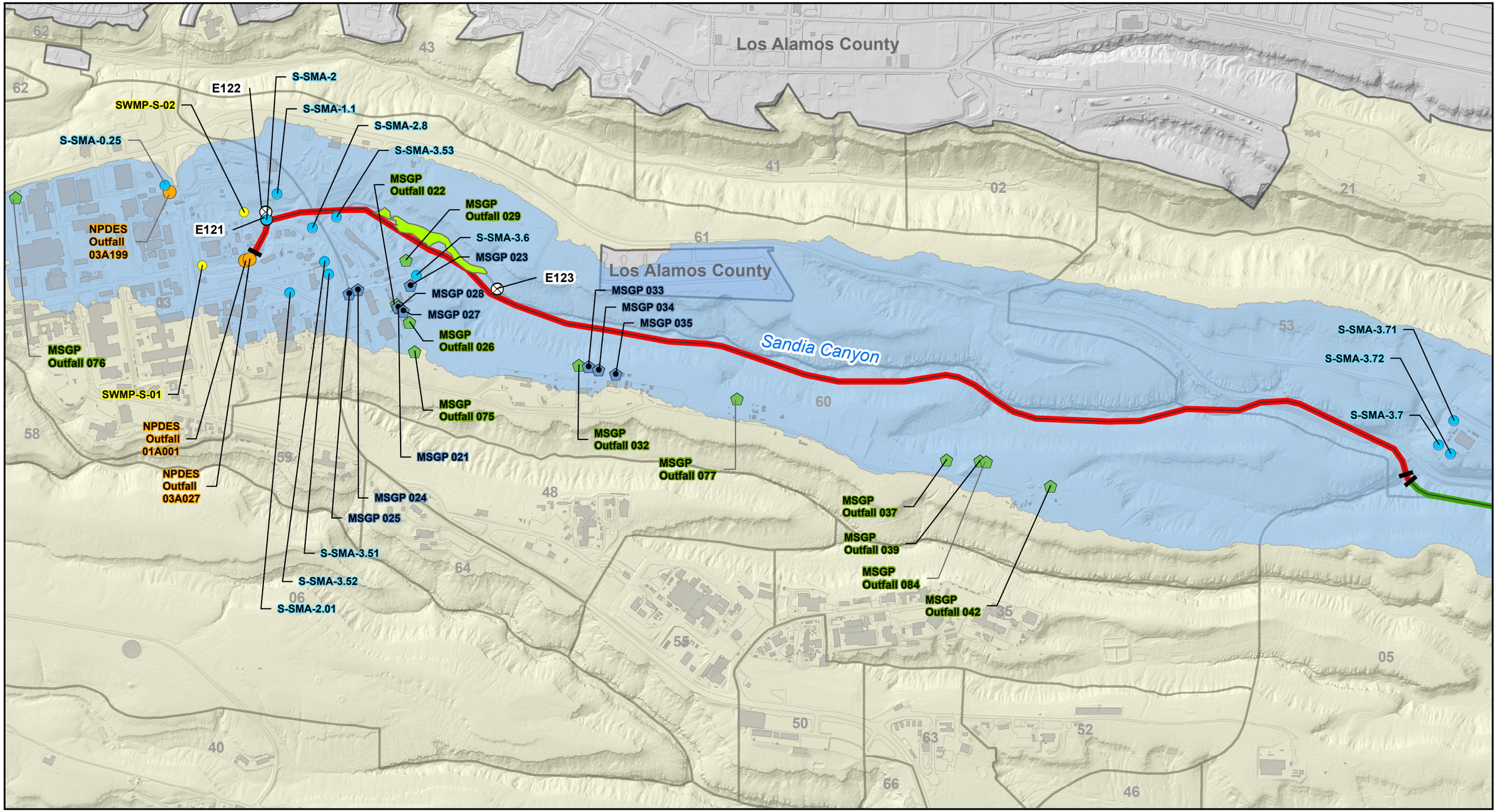
State Plane Coordinate System
New Mexico, Central Zone, US Feet
NAD 1983 Datum

0 0.25 0.5 1 Miles

N W E S

GIS Program

Los Alamos NATIONAL LABORATORY EST.1943



4B Demonstration Sandia Canyon Assessment Units (Upper Sandia)

- SWMP Sampler
- IP Sampler
- Active Gage
- Substantially Identical Discharge Point
- Monitored Outfall
- NPDES Outfall
- Assessment Unit demarcation
- Sandia Canyon (NM-9000.A_047)
- Sandia Canyon (NM-128.A_11)
- Paved Road
- Sandia Canyon Watershed
- Wetland and Upper Sandia Canyon Grade Control Structure
- LANL Structure
- Technical Area
- LANL

Map #19-227-02_Upper_Sandia.
Created by Ben Sutter, IPPO.
Updated August 10, 2023.

This map was created for work processes associated with EPC. All other uses for this map should be confirmed with LANL EPC-CP staff.

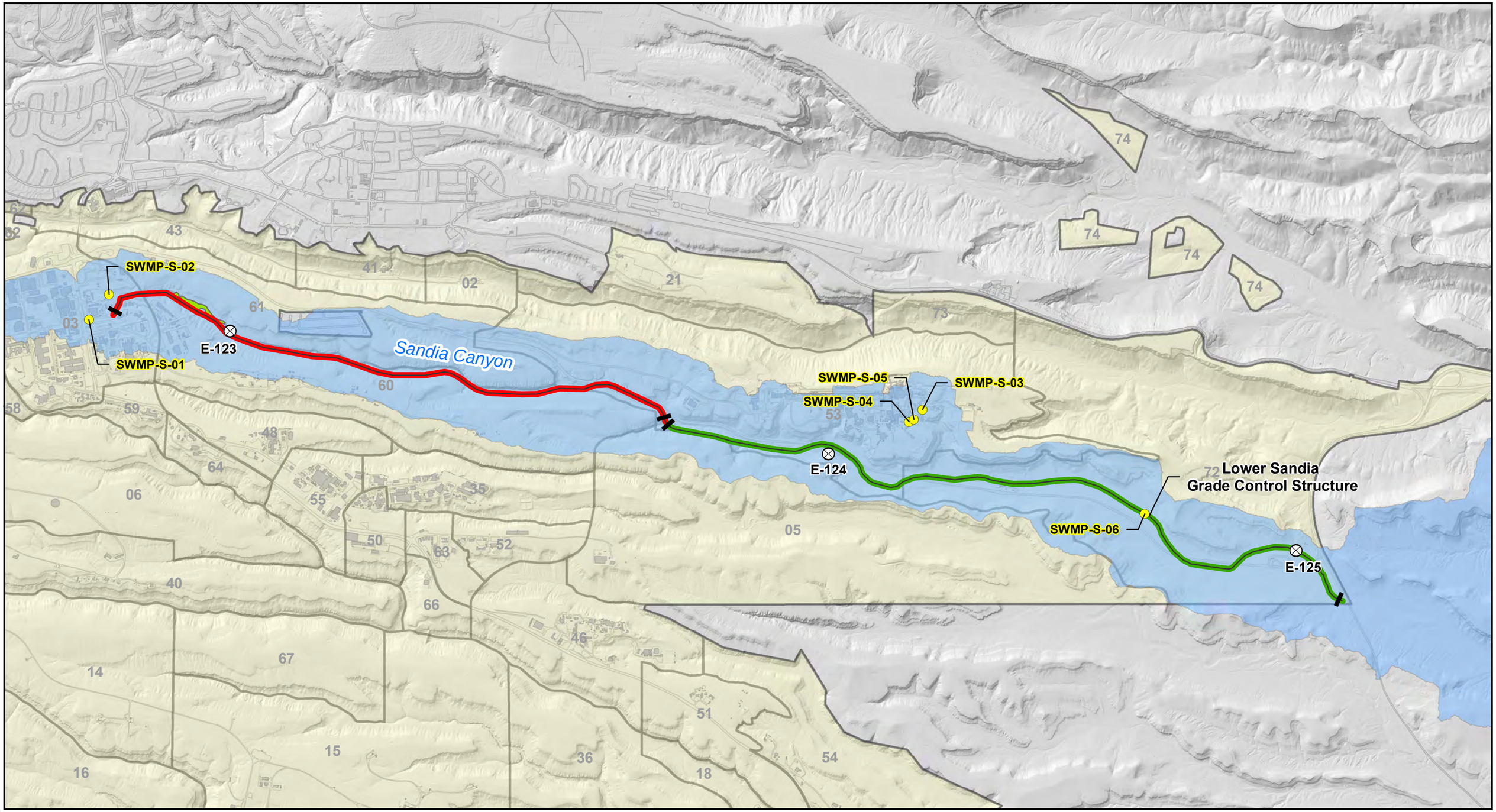
State Plane Coordinate System
New Mexico, Central Zone, US Feet
NAD 1983 Datum

0 0.125 0.25 0.5 Miles

N W E S

GIS Program

Los Alamos NATIONAL LABORATORY



Sandia Stormwater Management Plan

- SWMP Sampler
- Active Gage
- Sandia Canyon (NM-9000.A_047)
- Sandia Canyon (NM-128.A_11)
- Paved Road
- Wetland and Upper Sandia Grade Control Structure
- Sandia Canyon Watershed
- LANL Structure
- LANL
- Technical Area

Map #19-227-01_Stormwater_Management_Plan
Created by Ben Sutter, IFPROG.
November 26, 2019.

This map was created for work processes associated with EPC. All other uses for this map should be confirmed with LANL EPC-CP staff.

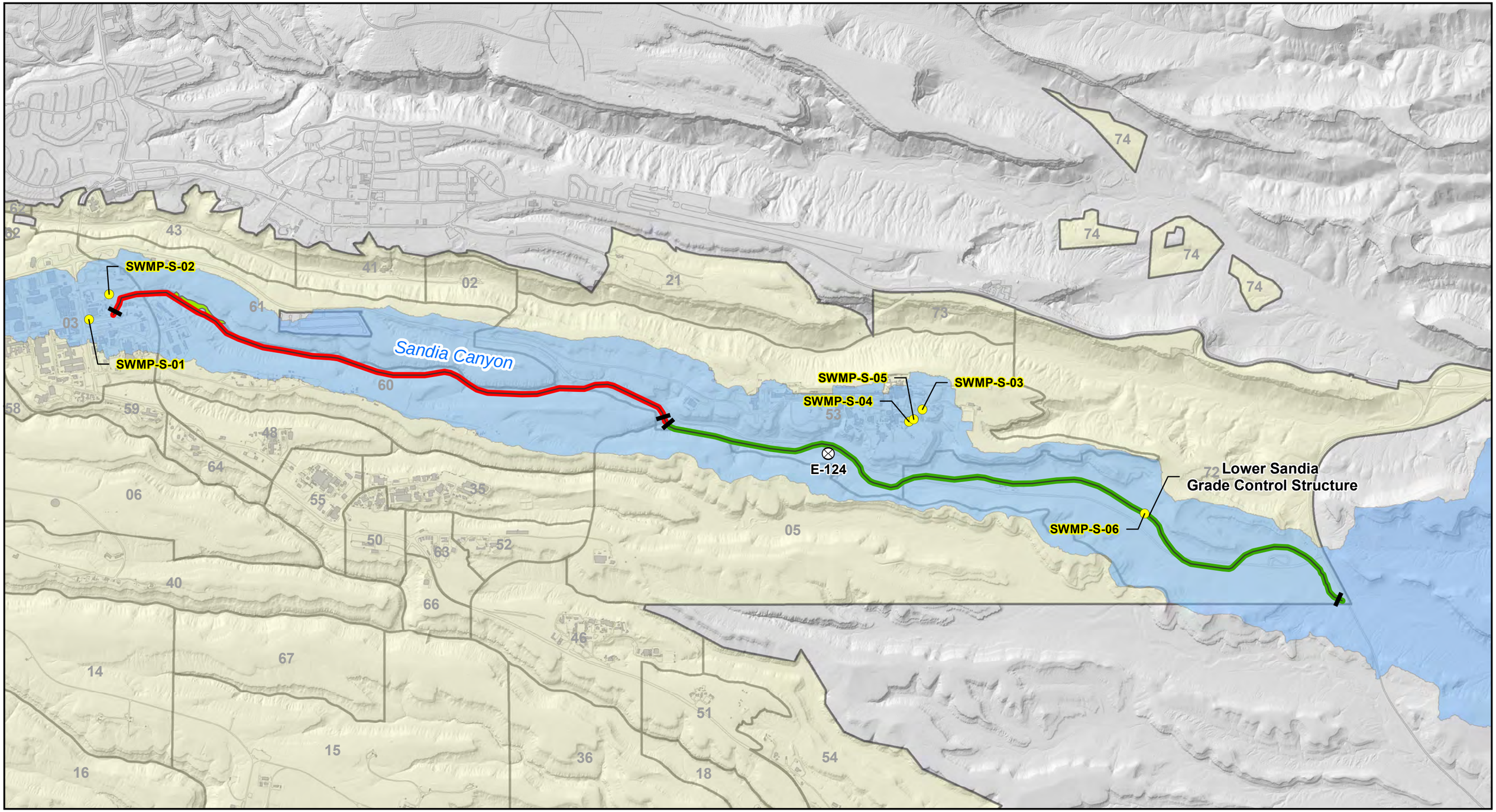
State Plane Coordinate System
New Mexico, Central Zone, US Feet
NAD 1983 Datum

0 0.25 0.5 1 Miles

N W E S

GIS Program

Los Alamos NATIONAL LABORATORY EST. 1943



Sandia Stormwater Management Plan

- SWMP Sampler
- Active Gage
- Sandia Canyon (NM-9000.A_047)
- Sandia Canyon (NM-128.A_11)
- Paved Road
- Wetland and Upper Sandia Grade Control Structure
- Sandia Canyon Watershed
- LANL Structure
- LANL
- Technical Area

Map #19-227-01_Stormwater_Management_Plan
Created by Ben Sutter, IFPROG.
November 26, 2019.

This map was created for work processes associated with EPC. All other uses for this map should be confirmed with LANL EPC-CP staff.

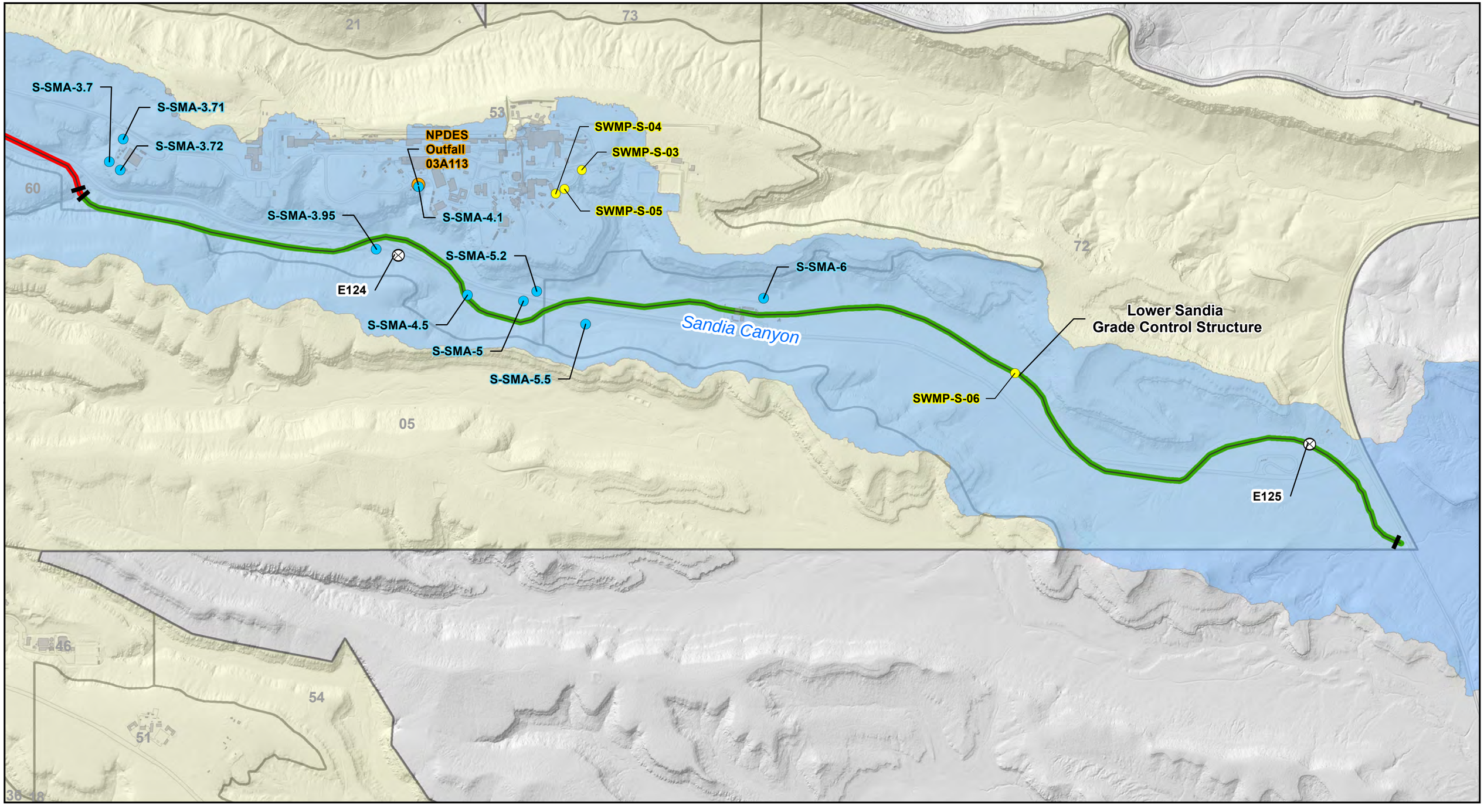
State Plane Coordinate System
New Mexico, Central Zone, US Feet
NAD 1983 Datum

0 0.25 0.5 1 Miles

N W E S

GIS Program

Los Alamos NATIONAL LABORATORY EST. 1943



4B Demonstration Sandia Canyon Assessment Units (Lower Sandia)

- SWMP Sampler
- IP Sampler
- Active Gage
- NPDES Outfall
- Assessment Unit demarcation
- Sandia Canyon (NM-9000.A_047)
- Sandia Canyon (NM-128.A_11)
- Paved Road
- Sandia Canyon Watershed
- LANL Structure
- Technical Area
- LANL

Map #19-227-02_Lower_Sandia
Created by Ben Sutter, IFPROG.
November 26, 2019.

This map was created for work processes associated with EPC. All other uses for this map should be confirmed with LANL EPC-CP staff.

State Plane Coordinate System
New Mexico, Central Zone, US Feet
NAD 1983 Datum

0 0.125 0.25 0.5 Miles

N W E S

GIS Program

Los Alamos NATIONAL LABORATORY EST.1943

Appendix 2

Storm Water Management Plan

Sandia Canyon Storm Water Management Plan

1. Introduction

The Sandia Canyon Storm Water Management Plan (SWMP) Program will be managed through EPC-CP with collaboration with personnel from Planning, UI, and Project Management. The MS4 Phase II Storm Water Program requires that permittees develop measurable goals to assess the effectiveness of storm water controls that address the six minimum control measures defined in the regulations. Although this SWMP is not directly in support of an MS4 permit, we feel it will be beneficial to use this template in anticipation of an MS4 permit for the Laboratory. Section 3 outlines the details of the monitoring program.

2. Minimum Control Measures

The standard MS4 Six Minimum Control Measures have been modified to better represent a LANL-internal approach. Planned activities and measurable goals for each control measure are outlined and described below. We anticipate it will require up to 5 years to implement all planned activities in support of the SWMP.

A. LANL Workforce Education and Outreach

An informed and knowledgeable workforce is crucial to the success of our program. The LANL SWMP program will need to communicate program goals, processes and progress to the LANL workforce. Activities and measurable goals for this Control Measure include:

I. Outreach to Lab personnel via website, presentations, newsletters and email. At a minimum we will establish a link to our SWMP from the Environmental Protection Division website.
II. Training for LANL personnel. We will investigate the possibility to incorporate storm water management goals and awareness into the General Employee Training and Environmental Management System curricula.
III. Both the Annual Site Environmental Report and the Site Wide Environmental Impact Statement Yearbook will be used to provide information on Storm Water Program activities. The reports will be available online or through the Publications Reading Room in Pojoaque.
IV. Informational signs will be used at locations such as drop inlets and LID stormwater controls to inform and remind the workforce about storm water management features or issues in the field.
V. We will work with the Bradbury Museum in Los Alamos to develop a display communicating the issues, goals and progress of the Storm Water Management Program.
VI. We will participate in workforce outreach opportunities such as the annual Worker Safety and Security Team Festival or Earth Day Celebration.

B. LANL Workforce Participation/Involvement

Our workforce can provide valuable input and assistance in developing and implementing the SWMP. Workforce participation and involvement in the development and implementation of the SWMP will be encouraged and facilitated. Activities and measurable goals for this Control Measure include:

I. Outreach and feedback from Lab personnel via website, presentations, newsletters and email. At a minimum we will establish a link to our SWMP from the Environmental Protection Division website and include links for questions and comments.
II. Utilize the Stormwater@lanl.gov email address to solicit feedback on the Storm Water Management Program.
III. We could develop employee surveys to evaluate worker knowledge and interest in storm water management.
IV. We will co-sponsor and/or participate in the annual Garbage Grab event sponsored by the LANL Pollution Prevention Program.
V. LANL will investigate the practicality of developing an Adopt-A-LID type program to facilitate workforce awareness and involvement in storm water management.

C. Illicit Discharge Detection and Elimination

Stormwater and certain authorized types of uncontaminated non-stormwater are the only allowable non-permitted discharges from LANL property. Illegal dumping and storm drain connections can result in illicit discharges of non-stormwater wastes like car oil and sanitary waste. The LANL SWMP will include a program to detect and eliminate illicit discharges. Activities and measurable goals for this Control Measure include:

I. The Spill Prevention, Control, and Countermeasure (SPCC) Program ensures current pollution prevention and emergency response controls are in place and can be implemented in the event of an accidental release at specific oil containing facilities.
II. The LANL Spill Response Program provides immediate mitigation and timely notification of appropriate regulatory organizations in the event of a spill or unplanned discharge that has or may affect the environment
III. ChemDB is the LANL institutional chemical inventory database used to manage potentially hazardous chemicals and assure proper storage and disposal practices.
IV. The National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for Storm Water Discharges associated with Industrial Activities (MSGP) is a general permit (not LANL-specific) that regulates storm water discharges from specific industrial activities and their associated facilities. Triad National Security, LLC (Triad) manages 8 active facilities in 6 industrial sectors for the Laboratory, including a steam electric generating plant, an asphalt batch plant, metal fabrication, warehousing, heavy equipment maintenance, material recycling, and timber products, and 57 no-exposure

facilities. Seven of these active facilities are located within the Sandia Canyon watershed. The MSGP provides specific conditions for permit authorization, such as implementation of control measures, development of storm water pollution prevention plans (SWPPPs), inspection requirements, monitoring of storm water discharges at all active facilities, compliance with numeric and non-numeric effluent limits, corrective actions, and compliance with biological and cultural resource protection laws.

V. The Deployed Environment, Safety and Health Division provides ESH support throughout the Laboratory via trained Deployed Environmental Professionals that work with EPC-CP and facility personnel.

VI. LANL has a robust and well established NPDES Construction General Permit compliance program managed by EPC-CP. All projects that disturb ≥ 1 acre or are part of a common plan of development, are required to develop a Storm Water Pollution Prevention Plan (SWPPP) that includes storm water controls and an inspection schedule. LANL is a permittee or co-permittee on all LANL projects and EPC-CP writes the SWPPPs and conducts the training and all inspections. EPC-CP conducts on average, over 600 SWPPP inspections a year.

VII. All subcontracts for construction work at LANL contain language that explicitly describes all storm water compliance requirements, including CGP and EISA requirements.

D. Construction Site Runoff Control

Management of storm water, sediments and potential pollutants during construction activities is essential for a successful storm water management program. Potential activities and measurable goals for this Control Measure includes:

I. The Laboratory has an Integrated Review Tool (IRT) to review projects for issues and requirements. All projects submitted to the IRT are reviewed for compliance with the CGP and EISA as well as best management practices.

II. Storm Water Compliance personnel participate in 30, 60 and 90% project design reviews prior to project construction to assure compliance with CGP and EISA requirements. LANL uses an automated online Design Review System to manage the review process.

III. LANL has a robust and well established NPDES Construction General Permit compliance program managed by EPC-CP. All projects that disturb ≥ 1 acre or are part of a common plan of development, are required to develop a Storm Water Pollution Prevention Plan (SWPPP) that includes storm water controls and an inspection schedule. LANL is a permittee or co-permittee on all LANL projects and EPC-CP writes the SWPPPs and conducts the training and all inspections. EPC-CP conducts on average, over 600 SWPPP inspections a year.

IV. Required pre-construction project-specific SWPPP training is provided by EPC-CP for all CGP projects and informs construction workers of the storm water controls and requirements in the project SWPPP.

V. The Deployed Environment, Safety and Health Division provides ESH support throughout the Laboratory via trained Deployed Environmental Professionals that work with EPC-CP and facility personnel.

VI. EPC-CP has produced a Best Management Practices Manual which provides information on types of BMPs and BMP installation. The BMP manual is available on line and through a link from the LANL online Engineering Standards Manual.

VII. Construction-related wastes and appropriate waste disposal practices are identified through the LANL Waste Compliance and Tracking System process. Each project is assigned a Waste Management Coordinator to assist project personnel with the process.

E. Post-Construction Runoff Control

Managing stormwater after construction activities end is a key part of the SWMP. The LANL SWMP will include a program to reduce pollutants from new development and redevelopment projects that disturb ≥ 5,000 ft^2 of land. Activities and measurable goals for this Control Measure include:

I. The Laboratory has an Integrated Review Tool (IRT) to review projects for issues and requirements. All projects submitted to the IRT are reviewed for compliance with the CGP and EISA as well as best management practices.

II. Storm Water Compliance personnel participate in 30, 60 and 90% project design reviews prior to construction to assure compliance with CGP and EISA requirements. LANL uses an automated online Design Review System to manage the review process.

III. LANL has a relatively new but effective EISA 438 compliance program. All development or re-development projects over 5,000 ft^2 are required to use LID to provide detention for the 95th percentile storm.

IV. The NPDES Construction General Permit requires permanent controls to manage the 2-yr, 24-hr storm to pre-development discharge rates. EPC-CP assists in the design and installation of required controls.

V. The LANL LID Master Plan and LID Standards documents provide information on LID construction and maintenance information and options for LID throughout developed areas of the Laboratory. Existing buildings and facilities will be retrofitted with LID as funding is available.

VI. We are revising of the Engineering Standards Manual to streamline CGP and EISA storm water requirements for LANL project managers.

VII. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regulates the distribution, sale, and use of pesticides (chemicals that destroy plant, fungal, or animal pests). The New Mexico Pesticide Control Act requires that LANL license and certify pesticide workers, inspect equipment and maintain a database that tracks application, storage, and disposal of pesticides. LANL compliance with FIFRA is managed in accordance with our National Pollutant Discharge Elimination System Pesticide General Permit. FIFRA activities are reported in the Annual Site Environmental Report.

F. Pollution Prevention/Good Housekeeping

Minimizing the potential pathways for contaminants carried in runoff is a key way to control pollutant discharges. The LANL SWMP will include a program to prevent or reduce pollutant runoff from municipal operations into the storm drain system. Activities and measurable goals for this Control Measure include:

I. Training for LANL personnel. We will investigate the possibility to incorporate storm water management goals and awareness into the General Employee Training and Environmental Management System curricula.

II. The Laboratory has an Integrated Review Tool (IRT) to review projects for issues and requirements. All projects submitted to the IRT are reviewed for environmental compliance as well as best management/good housekeeping practices.

III. EPC-CP will work with Utilities and Institutional Facilities to review and update maintenance and inspection procedures for storm water features and activities.

IV. EPC-CP will work with Utilities and Institutional Facilities to review and update street sweeping and snow removal/de-icing procedures.

V. The LANL Pollution Prevention program actively works to fund source reduction opportunities wherever possible with regard to potential pollutants entering the environment. The program places particular emphasis on water resources. One such example is setting up an on-site PCB analysis capability to better understand site contributions of PCBs from legacy buildings and aging infrastructure which can affect storm water. Additionally, Pollution Prevention is working closely with acquisition services management, and LANL vendors, to identify more sustainable products with surface water at the forefront of this mission.

VI. The MSGP regulates storm water discharges from specific industrial activities and their associated facilities. Triad manages 8 active facilities in 4 industrial sectors for the Laboratory, including an asphalt batch plant, metal fabrication, warehousing, heavy equipment maintenance, and material recycling, , and 39 no-exposure facilities. Five of these active facilities are located within the Sandia Canyon watershed. The MSGP provides specific conditions for permit authorization, such as implementation of control measures, development of SWPPPs, inspection requirements, monitoring of storm water discharges at all active facilities, compliance with numeric and non-numeric effluent limits, corrective actions, and compliance with biological and cultural resource protection laws.

VII. EPC-CP will co-sponsor and/or participate in the annual Garbage Grab event sponsored by the Pollution Prevention Program.

VIII. LANL will investigate the practicality of developing an Adopt-A-LID type program to help maintain LID features and facilitate workforce awareness and involvement in storm water management.

IX. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regulates the distribution, sale, and use of pesticides (chemicals that destroy plant, fungal, or animal

pests). The New Mexico Pesticide Control Act requires that LANL license and certify pesticide workers, inspect equipment and maintain a database that tracks application, storage, and disposal of pesticides. LANL compliance with FIFRA is managed in accordance with our National Pollutant Discharge Elimination System Pesticide General Permit. FIFRA activities are reported in the Annual Site Environmental Report.

3. Monitoring Program

The initial scope of the SWMP will focus on stormwater discharges into Sandia Canyon. Figure 1 shows the Sandia Canyon watershed within LANL, the upper and lower assessment units (AUs) and proposed monitoring locations. S-01 and S-02 are the primary storm drain outfalls from TA-03 and will be used as run-on sampling locations for the upper AU. Gage station location E-124 will be used as the runoff sampling location for the upper AU and one of the run-on sampling locations for the lower AU. Sampling locations S-03, S-04 and S-05 will be used as TA-53 run-on sampling locations for the lower AU. Sampling location S-06 is located just upstream from the Lower Sandia Grade Control Structure and will be used as the runoff sampling location for the lower AU.

In addition, a Sampling and Analysis Plan (SAP) has been prepared that identifies analytical suites and sampling frequencies for each monitoring location. Table 1 is a summary of the SAP. We plan to collect four samples a year at each location. All sample analytical results will be posted on Intellus New Mexico.

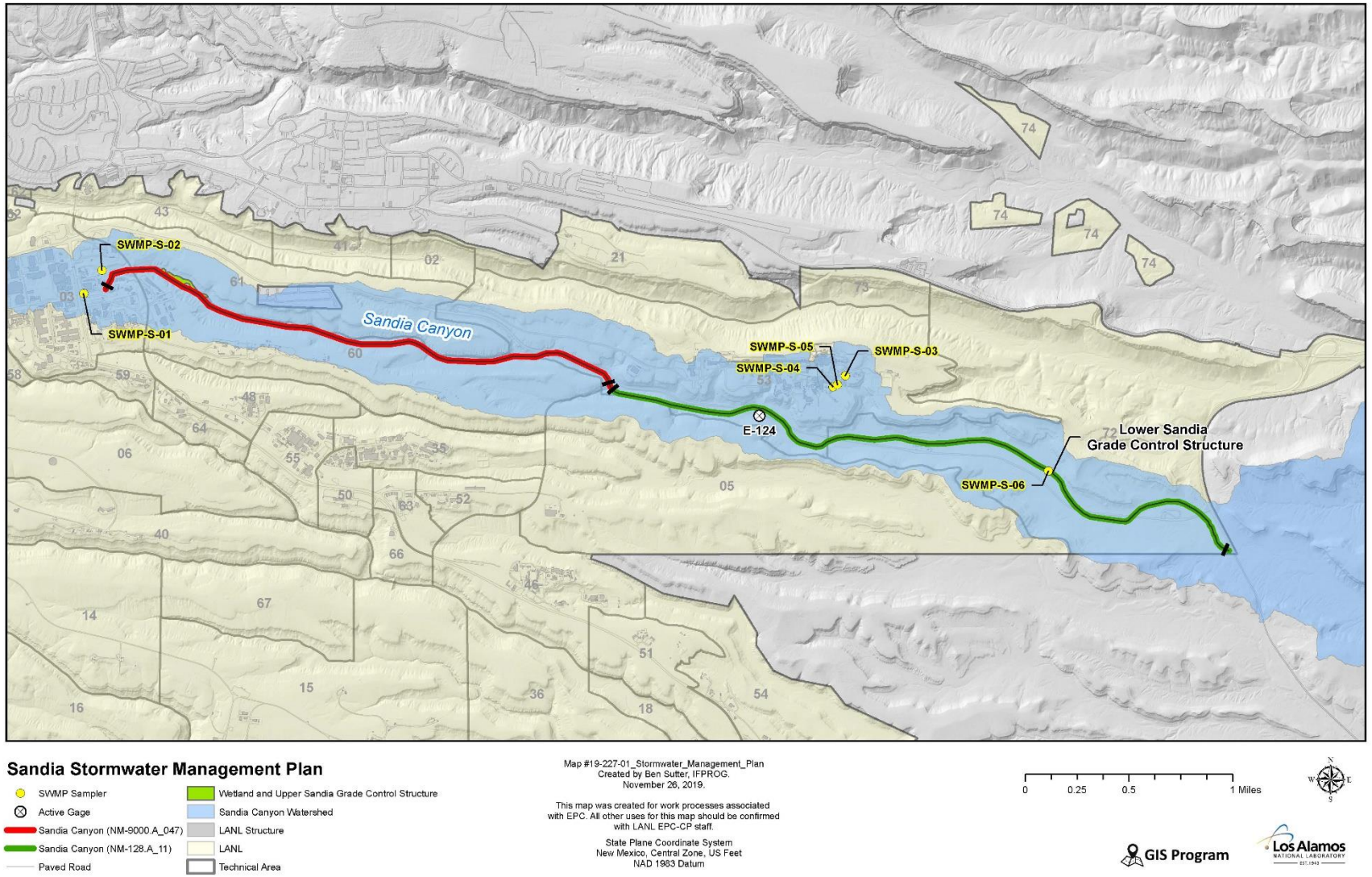


Figure 1. Map showing Sandia Canyon watershed within LANL, upper and lower Assessment Units and proposed sampling locations.

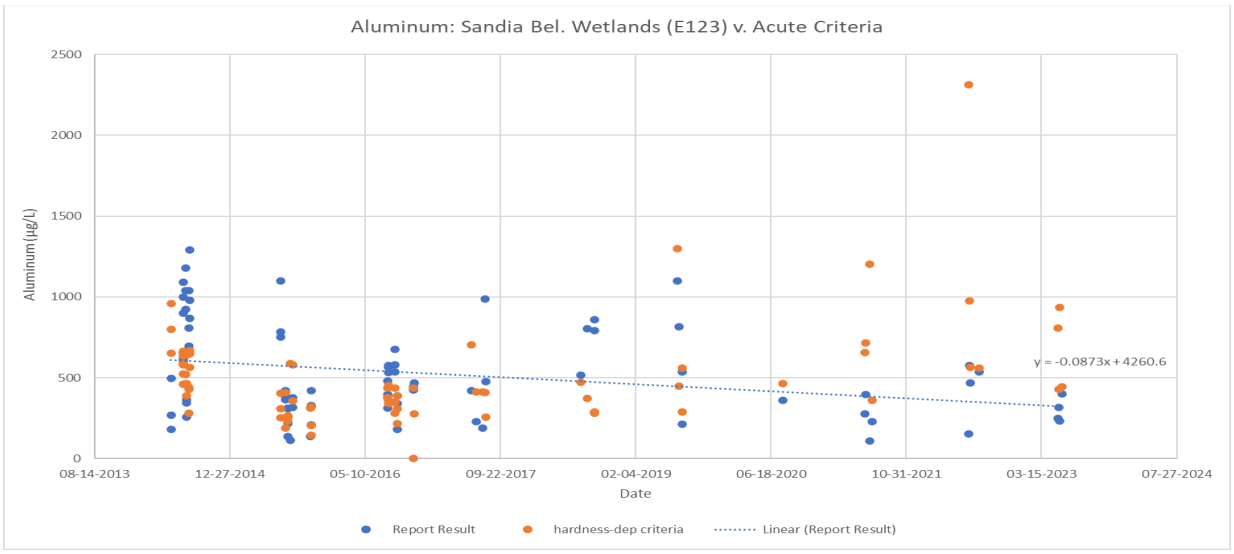
Assessment Unit	Sample Location	DOC (F)	Ca/Mg/ Hardness (F)	Copper (F)	Mercury (UF)	Total Recoverable Aluminum (F10u)	Adjusted Gross Alpha (UF)
(Upper) Sandia Canyon (Sigma Canyon to NPDES outfall 001) NM-9000.A_047	SWMP-S-01	4	4	4		4	4
	SWMP-S-02	4	4	4		4	4
Upper and Lower	Sandia above Firing Range/E124	4	4	4	4	4	4
(Lower) Sandia Canyon (within LANL below Sigma Canyon) NM-128-A_11	SWMP-S-03	4	4		4	4	4
	SWMP-S-04	4	4		4	4	4
	SWMP-S-05	4	4		4	4	4
	SWMP-S-06	4	4		4	4	4

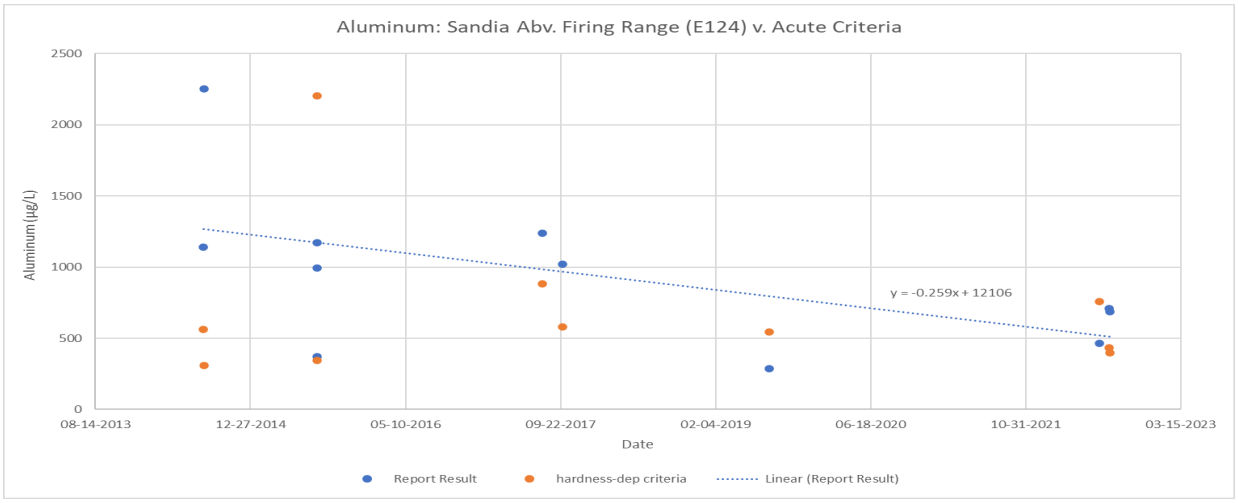
F = Filtered with 0.45 µm filter
UF = Unfiltered
F10u = Filtered with 10 µm filter

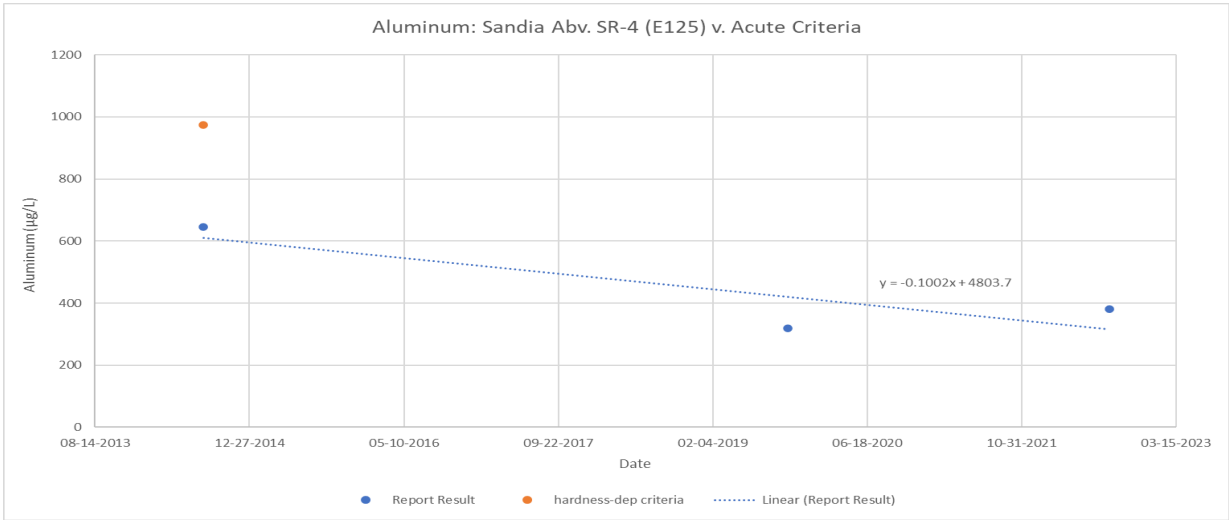
Table 1. Summary of the Storm Water Management Plan SAP.

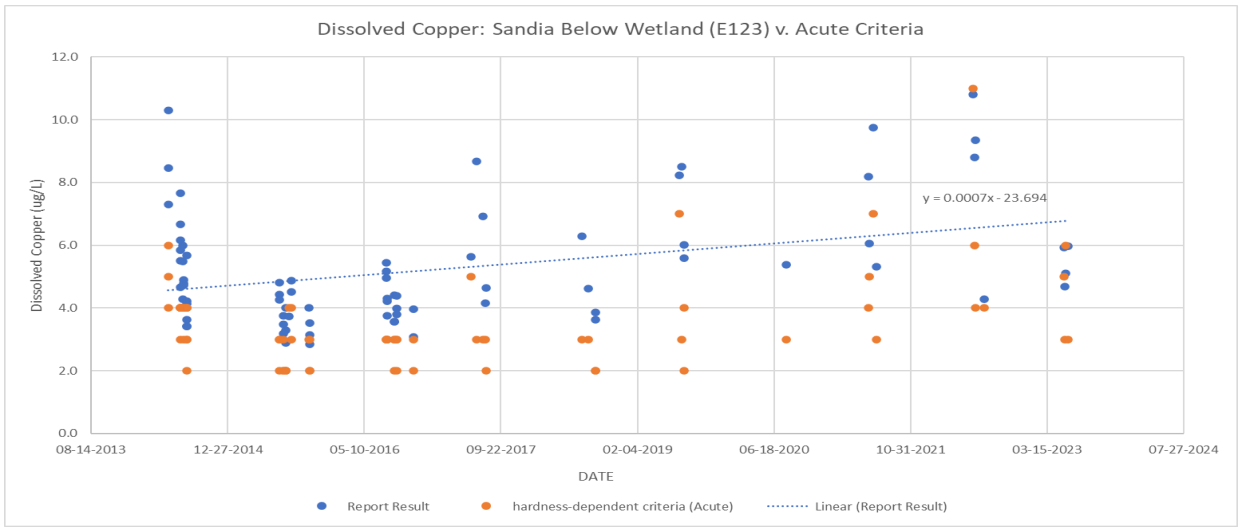
Appendix 3

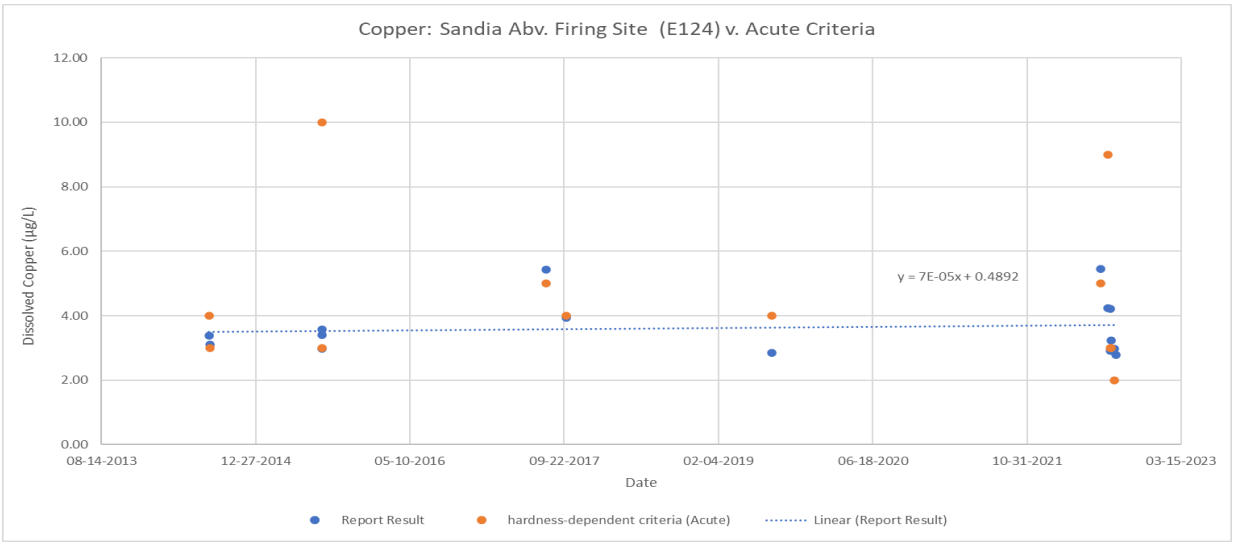
Measured Results v. Water Quality Criteria – Graphs of sampler data near E123, E124 and E125

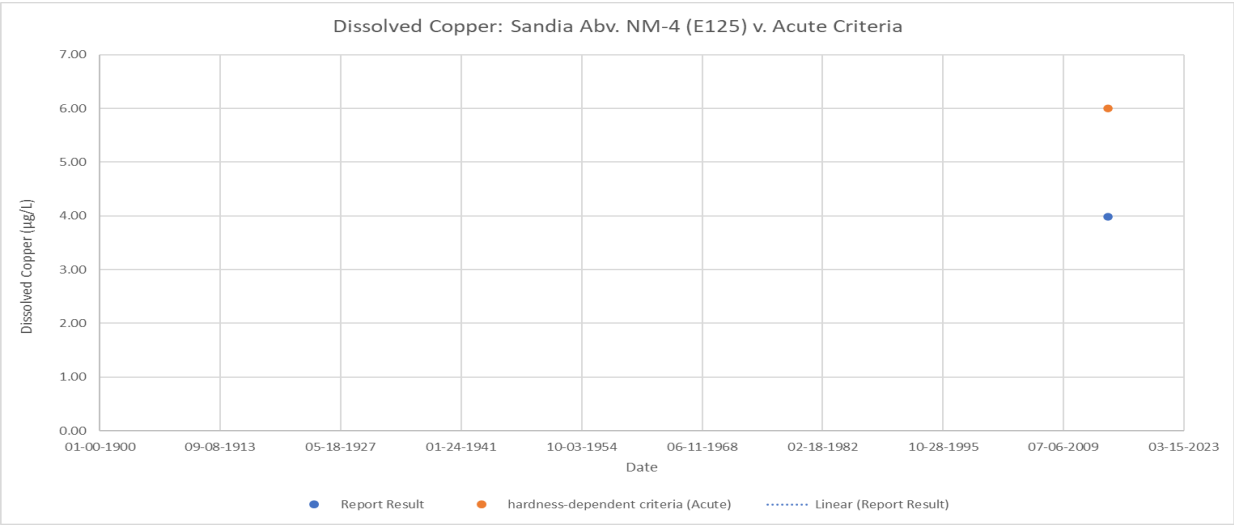

Aluminum: Sandia Bel. Wetlands (E123) v. Acute Criteria
Aluminum (µg/L)
2500
2000
1500
1000
500
0
08-14-2013
12-27-2014
05-10-2016
09-22-2017
02-04-2019
06-18-2020
10-31-2021
03-15-2023
07-27-2024
Date
y = -0.0873x + 4260.6
Report Result
hardness-dep criteria
Linear (Report Result)

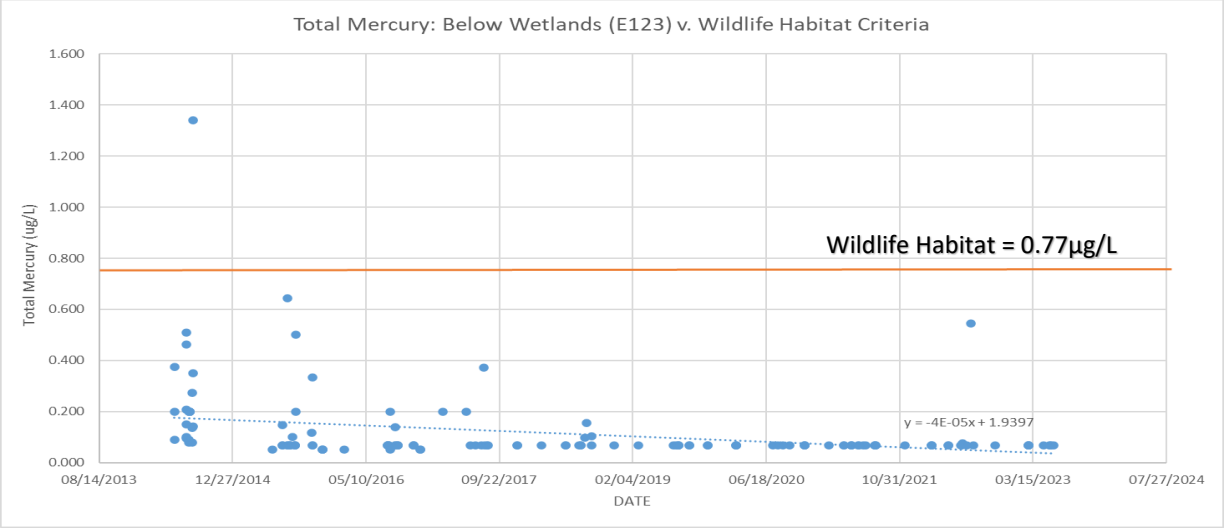

Aluminum: Sandia Abv. Firing Range (E124) v. Acute Criteria
Aluminum (µg/L)
2500
2000
1500
1000
500
0
08-14-2013
12-27-2014
05-10-2016
09-22-2017
02-04-2019
06-18-2020
10-31-2021
03-15-2023
Date
y = -0.259x + 12106
Report Result
hardness-dep criteria
Linear (Report Result)

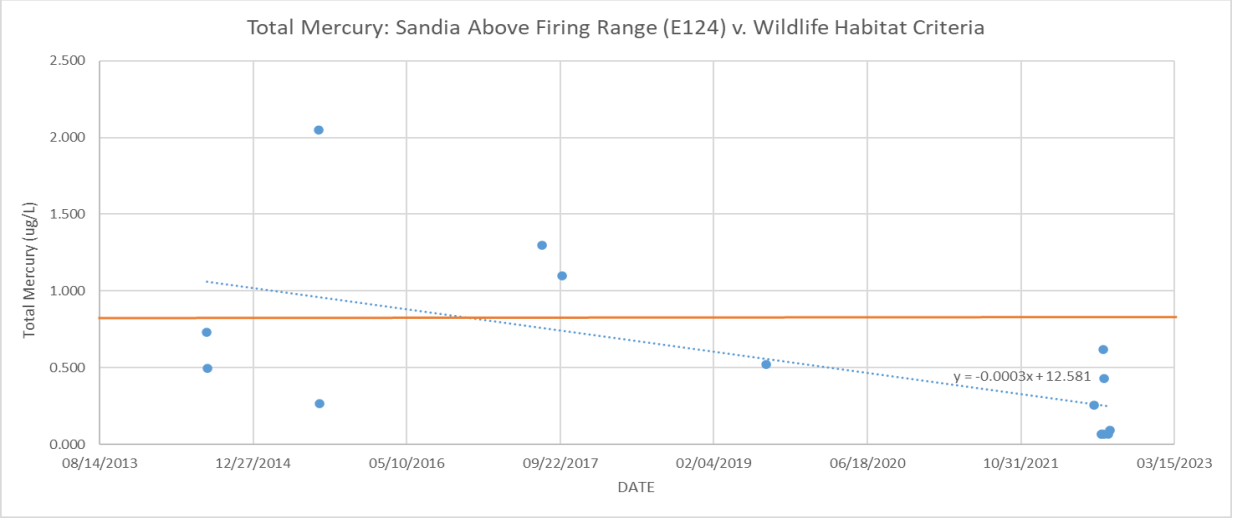

Aluminum: Sandia Abv. SR-4 (E125) v. Acute Criteria
Aluminum (µg/L)
1200
1000
800
600
400
200
0
08-14-2013
12-27-2014
05-10-2016
09-22-2017
02-04-2019
06-18-2020
10-31-2021
03-15-2023
Date
y = -0.1002x + 4803.7
Report Result
hardness-dep criteria
Linear (Report Result)

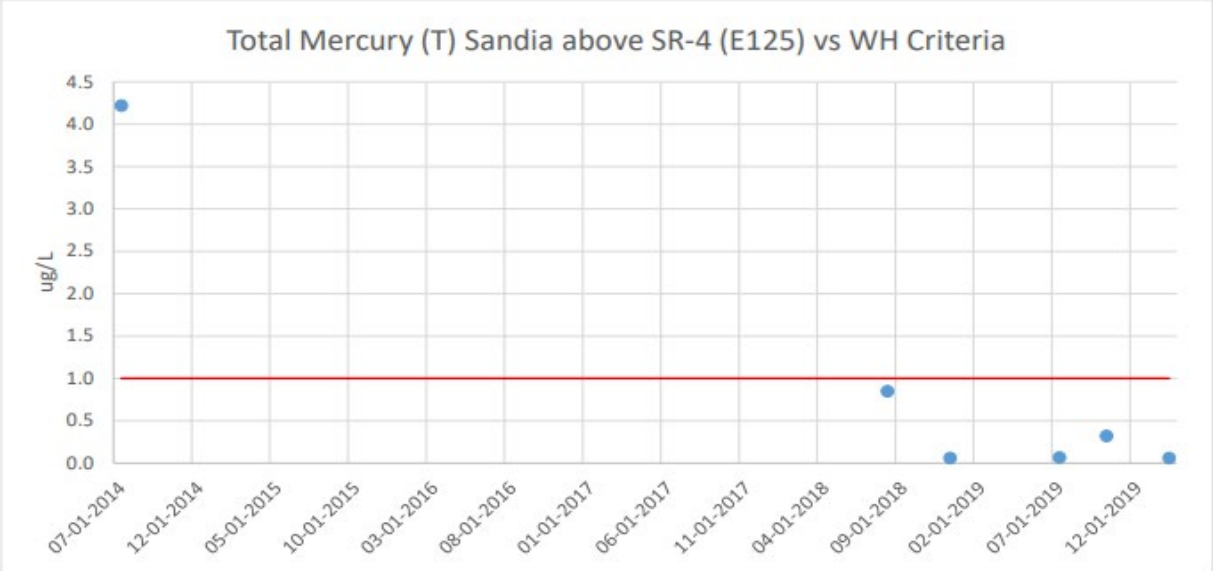

Dissolved Copper: Sandia Below Wetland (E123) v. Acute Criteria
Dissolved Copper (ug/L)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
y = 0.0007x - 23.694
08-14-2013
12-27-2014
05-10-2016
09-22-2017
02-04-2019
06-18-2020
10-31-2021
03-15-2023
07-27-2024
DATE
Report Result
hardness-dependent criteria (Acute)
Linear (Report Result)


Copper: Sandia Abv. Firing Site (E124) v. Acute Criteria
Dissolved Copper (µg/L)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
y = 7E-05x + 0.4892
08-14-2013
12-27-2014
05-10-2016
09-22-2017
02-04-2019
06-18-2020
10-31-2021
03-15-2023
Date
Report Result
hardness-dependent criteria (Acute)
Linear (Report Result)


Dissolved Copper: Sandia Abv. NM-4 (E125) v. Acute Criteria
Dissolved Copper (µg/L)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
01-00-1900
09-08-1913
05-18-1927
01-24-1941
10-03-1954
06-11-1968
02-18-1982
10-28-1995
07-06-2009
03-15-2023
Date
Report Result
hardness-dependent criteria (Acute)
Linear (Report Result)


Total Mercury: Below Wetlands (E123) v. Wildlife Habitat Criteria
Total Mercury (ug/L)
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Wildlife Habitat = 0.77µg/L
y = -4E-05x + 1.9397
08/14/2013
12/27/2014
05/10/2016
09/22/2017
02/04/2019
06/18/2020
10/31/2021
03/15/2023
07/27/2024
DATE


Total Mercury: Sandia Above Firing Range (E124) v. Wildlife Habitat Criteria
Total Mercury (ug/L)
2.500
2.000
1.500
1.000
0.500
0.000
y = -0.0003x + 12.581
08/14/2013
12/27/2014
05/10/2016
09/22/2017
02/04/2019
06/18/2020
10/31/2021
03/15/2023
DATE


Total Mercury (T) Sandia above SR-4 (E125) vs WH Criteria
ug/L
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
07-01-2014
12-01-2014
05-01-2015
10-01-2015
03-01-2016
08-01-2016
01-01-2017
06-01-2017
11-01-2017
04-01-2018
09-01-2018
02-01-2019
07-01-2019
12-01-2019

Sandia Canyon Assessment Unit NM-9000.A_047 and NM-128.A_11 Dissolved Copper, Mercury, and Total Recoverable Aluminum 4B Demonstration – 2023 Progress Report. Revision 2

LA-UR-24-20868
January 31, 2024
EPC-DO: 24-XXX

Prepared by the Environmental Protection and Compliance Division.

EXECUTIVE SUMMARY

EPA regulations recognize that alternative pollution control requirements that are stringent enough, in place, and monitored may make developing a TMDL unnecessary because both mechanisms would essentially achieve the same surface water-quality goal. Specifically, TMDLs are not required if technology-based effluent limitations, more stringent effluent limitations, or other pollution control requirements (e.g., best management practices) required by local, state, or federal authority are stringent enough to implement an applicable WQS [see 40 Code of Federal Regulations 130.7(b)(1)] within a reasonable period of time. Impaired water with adequate alternatives to TMDLs in place are commonly referred to as "Category 4b waters".

A Category 4b progress report must be submitted by July 1 of every odd-number year demonstrating that the six elements are being addressed and that adequate progress is being made towards the goal of water quality standard attainment. This report is submitted pursuant to the guidelines contained in the Comprehensive Assessment and Listing Methodology (CALM) Appendix I. On June 4, 2020 the Department of Energy (DOE)/Triad National Security, LLC (Triad) submitted to NMED, the Sandia Canyon AU 4B Demonstration (4B Demonstration). The 4B Demonstration was approved by the WQCC on December 18, 2020, and by EPA on January 22, 2021. The report provides updated information on the six elements for the approximate timeframe through August 23, 2023.

In accordance with the EPA integrated listing guidance, the state of New Mexico's 2022-2024 Integrated Report listed the Sandia Canyon water quality Assessment Unit (AU) NM-9000.A_047 as not supporting coldwater aquatic life, and wildlife habitat designated uses and listed AU NM-128.A_11 as not supporting limited aquatic life, livestock watering and wildlife habitat. Further, the pollutants associated with the two AUs were assigned Categories 4B, 5B and 5C status. Assessment Units assigned Category 5 constitute New Mexico's CWA §303(d) List of Impaired Waters and may require either a TMDL (category 5A), a review of water quality standards (5B), or additional data (5C). Section 303(d) and supporting regulations require the state of New Mexico to develop a total maximum daily load (TMDL) for each impaired AU-pollutant combination. TMDLs establish pollution reduction goals and load allocations necessary for impaired water to attain applicable water-quality standards (WQS). The Sandia Canyon AU (NM-9000.A_047), in the most recent 2022-2024 IR Appendix A Integrated List, was assigned to Category 5B for temperature, 5C for PCBs and 4B for total recoverable aluminum and dissolved copper. The Sandia Canyon AU (NM-128.A_11) was assigned to Category 5C for adjusted gross alpha and PCBs and 4B for total recoverable aluminum, dissolved copper and total mercury.

The two Category 4B parameters determined to be associated with impairments in NM-9000.A_047 are dissolved copper and total recoverable aluminum. AU NM-9000.A_47 was first identified as impaired in 2002. Aluminum was added in 2006 and copper was added in 2010. The three Category 4B parameters determined to be associated with impairments in NM-128.A_11 are dissolved copper, total mercury, and total recoverable aluminum. AU NM-128.A_11 was first identified as impaired in 2006. Aluminum and mercury were added in 2006. This document presents information provided by the U.S. Department of Energy (DOE) and Los Alamos National Laboratory (LANL) to the New Mexico Environmental Department (NMED) to justify changing 303(d) listings to Category 4B status for NM-9000.A_047 (dissolved copper and total recoverable aluminum) and NM-128.A_11 (dissolved copper, total mercury, and total recoverable aluminum). A 4B status identifies an AU as impaired or threatened for one or more designated uses but does not require developing a TMDL because other pollution control requirements are reasonably expected to result in the attainment of the WQS in the near future.

The Sandia Canyon AU 4B Demonstration provides the justification that regulatory controls, currently in place and planned, are protective enough to implement applicable WQS. Water quality data has been

collected pursuant to the sampling plan contained in this document and will be used to support this 4B Demonstration going forward.

The 4B Demonstration encompasses the entire reach of Sandia Canyon within lands managed by the USDOE. The upper AU - NM-9000.A_047 is located between National Pollutant Discharge Elimination System– (NPDES) permitted Outfall 001 and Sigma Canyon and the lower - AU NM-128.A_11 is located between Sigma Canyon and the LANL boundary near State Road 4. The upper Sandia AU is classified under water quality Segment 20.6.4.126 as perennial and the lower Sandia AU is classified under water quality Segment 20.6.4.128 as intermittent-ephemeral. A number of NPDES permits including Industrial Outfall, Multi-Sector General, Construction General and the Individual Permit provide a regulatory framework for water quality standards (WQS) attainment. The Sandia Wetland Stabilization, Supplemental Environmental Projects (SEPs) and implementation of LANL's Storm Water Management Plan are expected to reduce potential migration of contaminated sediments and provide the necessary controls for eventual attainment WQS within the Sandia Canyon AUs.

CONTENTS

Tables

Appendices

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1. IDENTIFICATION OF ASSESSMENT UNITS AND STATEMENT OF PROBLEM CAUSING THE IMPAIRMENT

Appendix 1 contains a series of maps of the Sandia Canyon watershed, located within Los Alamos National Laboratory (the Laboratory). The maps show the two assessment units (AUs) as defined by the New Mexico Environment Department (NMED). The AUs range from National Pollutant Discharge Elimination System (NPDES) Outfall 001 east to the Laboratory boundary at New Mexico State Road 4 (SR-4). The 4b Demonstration covers the upper perennial reach from NPDES Outfall 001 to Sigma Canyon and the lower ephemeral reach from Sigma Canyon to the Laboratory boundary at SR-4. The AUs are described in the state of New Mexico 2020-2022 Clean Water Act (CWA) §303(d)/§305(b) Integrated Report (1).

1.1 Assessment Unit Description

The demonstration should identify the impaired assessment unit, including name, general location and State-specific location identifier.

1. AU Name: Upper Sandia Canyon AU (NPDES Outfall 001 to Sigma Canyon)
    - AU ID: NM-9000.A_047
    - 2.21-mi reach
2. AU Name: Lower Sandia Canyon AU (Sigma Canyon to LANL Boundary)
    - AU ID: NM-128.A_11
    - 3.4-mi reach

Sandia Canyon originates in the main Laboratory Technical Area 03 (TA-03) at an elevation of approximately 7,300 ft. The reach extends downstream for 5.5 mi to the Laboratory boundary at SR-4. Overall, the drainage area for the two AUs is approximately 2.52 mi^2, encompassing Laboratory property, private property, and the now-closed Los Alamos County landfill.

Three NPDES Permits provide coverage for current and historical activities within the upper and lower Sandia Canyon AUs:

1. The Industrial Point Source Permit (IPSP, NPDES Permit No. NM0028355) covers four outfalls,
2. The Storm Water Individual Permit (IP, NPDES Permit No. NM0030759) covers nineteen Resource Conservation and Recovery Act (RCRA) solid waste management units (SWMUs) and areas of concern (AOCs) associated with historical Laboratory activities, and
3. The Storm Water Multi-Sector General Permit (MSGP, NPDES Permit Tracking No. NMR050013) covers five ongoing operational industrial facilities subject to this EPA general permit.

The upper AU is classified as perennial, in Water Quality Segment (Segment) 20.6.4.126 NMAC, with designated uses of coldwater aquatic life, livestock watering, wildlife habitat, and secondary contact (2). The lower AU is classified as ephemeral-intermittent, in Segment 20.6.4.128 NMAC, with designated uses of limited aquatic life, livestock watering, wildlife habitat and secondary contact (2).

1.2 Impairment and Pollutant Causing Impairment

The demonstration should identify the applicable water quality standards not supported and associated pollutant causing the impairment.

According to the 2022-2024 CWA §303(d)/§305(b) Integrated List, the following Water Quality Standards (WQS) are not supported (Table 1):

Table 1
Sandia Canyon AUs Water Quality Standards not Supported[1] (Category 4B)

Designated Use Not Supported	Parameter with Associated WQS	Sandia Canyon AU (LANL Boundary at SR-4 to NPDES outfall 001)
Coldwater Aquatic Life	Dissolved Copper	NM-9000.A_047
Coldwater Aquatic Life	Total Recoverable Aluminum	NM-9000.A_047
Limited Aquatic Life	Total Recoverable Aluminum	NM-128.A_11
Limited Aquatic Life	Dissolved Copper	NM-128.A_11
Livestock Watering	Total Recoverable Aluminum	NM-128.A_11
Wildlife Habitat	Total Mercury	NM-128.A_11

1.3 Sources of Pollutant Causing the Impairment

The demonstration should include a description of the known and likely point, nonpoint, and background (upstream inputs) sources of the pollutant causing the impairment, including the potential magnitude and locations of the sources. In cases where some portion of the impairment may result from naturally occurring sources (natural background), the demonstration should include a description of the naturally occurring sources of the pollutant to the impaired assessment unit.

1.3.1 Point Source Locations and Potential Magnitudes

1. The Industrial and Sanitary Point Source Permit (IPSP, NPDES Permit No. NM0028355)
2. The Storm Water Individual Permit (IP, NPDES Permit No. NM0030759)
3. The Storm Water Multi-Sector General Permit (MSGP, NPDES Permit Tracking No. NMR050013)

[1] Since chronic aquatic life criteria associated with Assessment Unit NM-90000.A_047 are more stringent than the Acute criteria reported throughout this document they would, by default, also be chronic impairments for this perennial AU. Acute criteria are reported throughout because the 4B demonstration addresses stormwater pollutants wherein exposures are brief, and are the reportable limits for the stormwater permits. For chronic exposures and impairments, the reader is referred to the Facility-Wide Groundwater Monitoring Plan (*IFGMP*) which includes baseflow monitoring of LANL surface waters. Since Appendix A to the 2022-2024 CWA §303(d)/§305(b) Integrated List does not denote whether the aquatic life impairments are acute or chronic, these are not listed in Table 1 above.

1.3.1.1 Industrial Point Source Permit (IPSP) Outfalls

Los Alamos National Laboratory (LANL or Laboratory) has been permitted under the requirements of the Clean Water Act Section 402 and Code of Federal Regulations Title 40, Section 122 NPDES Program requirements since 1978. On March 29, 2019, the Laboratory submitted a permit renewal application for 11 outfalls. The 2022 NPDES IPSP Permit (NM0028355) was subsequently issued by the United States Environmental Protection Agency (US EPA) on March 30, 2022 (EPA 2022a). The permit included effluent limits and conditions in Part I, Section A that are subject to a compliance schedule and the semi-annual reporting requirements defined in Part I, Section B.

On May 9, 2022, Concerned Citizens for Nuclear Safety, Honor Our Pueblo Existence, and Veterans for Peace filed a petition under 40 CFR 124.19(a) requesting that EPA's Environmental Appeals Board deny permit authorization for Outfalls 051, 13S, 03A027, 03A113, 03A160, and 05A055. On June 28, 2022, the EPA stayed the permit conditions for the six outfalls included in the appeal and delayed the implementation of the new permit for the remaining five outfalls until July 28, 2022 (EPA 2022b). This resulted in the implementation (on August 1, 2022) of a hybrid NPDES permit that continued 2014 NPDES Permit requirements (EPA 2015) and implemented the 2022 NPDES Permit requirements (EPA 2022a) as shown in Table 1. In addition, the EPA agreed to align the permit monitoring year to August 1 - July 31 regardless of coverage under the 2014 or 2022 NPDES permit. The stayed permit conditions were resolved after a second public comment period in 2023 and the EPA issued a a final revised NPDES permit on September 29, 2023, with an effective date of November 1, 2023.

Four of the outfalls permitted under the NPDES IPSP discharge to the upper and lower Sandia AUs, as presented in Table 2 below. The locations of the outfalls are indicated in the maps contained in Appendix 1. NPDES Outfall 001, which is the main effluent source of water to the AU, averages approximately 235,000 gal/d and consists of power plant once-through cooling water, treated sanitary wastewater, treated reclaimed sanitary wastewater, and blowdown from the Strategic Computing Center (SCC) Cooling towers. Outfall 03A027 is also associated with the SCC Cooling Towers with the effluent currently routed to Outfall 001 when not reclaimed. Outfall 03A199 and 03A113 also discharge cooling tower blowdown contributing an average 35,000 gal/d and 1,100 gal/day, respectively.

Table 2
Industrial Point Source Permit Outfalls Discharging to the Upper and Lower Sandia AU

Outfall ID No.	Facility	Watershed	Type of Discharge	Outfall Category	Permit Status
001	TA-3-22 Power Plant SWWS SERF SCC	Sandia (upper)	Continuous Once Through Cooling Water, Treated Sanitary Effluent, Treated Reclaimed Water, and Cooling Tower Blowdown	Power Plant (001)	2023 NPDES Permit
03A027	TA-3-2327	Sandia (upper)	Cooling Tower Blowdown Routed to Outfall 001	Treated Non-Contact	2023NPDES Permit

	SCC			Cooling Water (03A)	
03A113	TA-3-1837 LEDA	Sandia (lower)	Intermittent Cooling Tower Blowdown	Treated Non-Contact Cooling Water (03A)	2023 NPDES Permit
03A199	TA-53-952 LDCC	Sandia (upper)	Intermittent Cooling Tower Blowdown	Treated Non-Contact Cooling Water (03A)	2023 NPDES Permit
SCC = Strategic Computing Center; SERF = Sanitary Effluent Reclamation Facility; SWWS = Sanitary Wastewater System Treatment Facility; LDCC = Laboratory Data Communications Center; LEDA = Low Energy Demonstration Accelerator					

The NPDES IPSP Outfall Permit requires weekly, monthly, quarterly, yearly, and term sampling of the effluents released to the environment to demonstrate compliance with the permit's water quality limits. Monitoring for these four outfalls includes reporting and/or limits as shown in Table 3,

Table 3
Monitoring for Parameters Included as Impairments

Outfall ID No.	Monitoring Requirement 2014	Monitoring Requirement 2023
001	Total Recoverable Aluminum (limit) Dissolved Copper (limit)	Total Recoverable Aluminum (report only) Total Copper (limit)
03A027	Total Recoverable Aluminum (limit) Dissolved Copper (limit) Total PCB (limit)	Total Recoverable Aluminum (report only) Total Copper (limit) Total PCB (limit)
03A113	Total Recoverable Aluminum (limit) Dissolved Copper (limit)	Total Recoverable Aluminum (report only) Total Mercury (report only) Total PCB (limit)
03A199	Total Recoverable Aluminum (limit)	Total Recoverable Aluminum (report only)

	Dissolved Copper (limit) Total/Dissolved Mercury (limit)	Total Copper (report only) Total PCB (limit)

The sampling results are compared to the permit limits (if any) and are reported every month in a Discharge Monitoring Report to the U.S. Environmental Protection Agency and the New Mexico Environment Department. Additionally, any engineering changes or flow changes that would affect quality or quantity of the effluents are reported in a Notice of Planned Change to the U.S. Environmental Protection Agency and the New Mexico Environment Department.

1.3.1.2 Point Sources Covered Under the Storm Water Individual Permit (IP)

The IP (NPDES NM0030759) authorizes discharges of storm water associated with industrial activities from specified SWMUs and AOCs. A SWMU is a discernible unit at which solid wastes may have been "routinely and systematically released" and could result in a release of hazardous constituents. The Sites regulated under the IP are a subset of the SWMUs and AOCs that are being addressed under the March 2005 Compliance Order of Consent or the more recent update in 2016 (the Consent Order) (3).

For purposes of monitoring and management under the IP, Sites are grouped into small watersheds called site-monitoring areas (SMAs). An SMA is a single drainage area within a subwatershed and may include more than one Site. The IP treats the potential historical releases at a Site as an "industrial activity" that creates a "point source discharge" and directs the Permittees to monitor storm water discharges from Sites at specified SMAs. Storm water from a Site may drain to multiple subwatersheds and may be associated with multiple SMAs.

A Site that met the definition of a SWMU or AOC was evaluated for inclusion in the IP based on the following criteria:

1. The SWMU/AOC is exposed to storm water (e.g., not capped or subsurface);
2. The SWMU/AOC contains "significant industrial material" (e.g., not cleaned up or has contamination in place based on storm water, sediment, and soil data available at the time the permit application was submitted); and
3. Potentially impacts surface water. Based on an evaluation in the field for potential to discharge sediment to a Water of the U.S. or Water of the State.

SWMUs and AOCs are grouped for investigation under the Consent Order into watershed-based geographic areas known as aggregate areas. The upper Sandia Canyon Aggregate Area is located in TA-03, TA-60, and TA-61 with a boundary approximately equal to the upper Sandia Canyon AU. Nineteen Sites within Sandia Canyon area are permitted under the IP (Table 3). These nineteen Sites are grouped into nine SMAs.

Storm water monitoring for metals, including copper and total recoverable aluminum is required at all nineteen sites. The IP establishes target action levels (TALs) that are equivalent to New Mexico State water-quality criteria. These TALs are used as benchmarks to determine the effectiveness of control measures implemented under the IP. The maps in Appendix 1 show the locations of the SMAs in the AUs. The Laboratory has been collecting storm water samples under the IP since the spring of 2011.

The IP Program is required, at a minimum, to install and maintain baseline control measures at every SMA to minimize pollutants in storm water discharges. If SMA stormwater samples exceed any TAL, Corrective Actions must be taken to either meet the TAL, achieve total retention of storm water discharge, totally eliminate exposure of pollutants at the Site, or demonstrate that the Site has achieved "corrective action complete with/without controls" status or a Certificate of Completion under NMED's Consent Order.

The draft permit was issued by EPA on November 19, 2019. NMED provided the 401 Certification of draft permit on November 30, 2020, which included a condition that monitoring requirements at sites discharging into impaired waters monitor for those impairments if related to a material that was historically managed at the site.

1.3.1.3 Point Sources Covered Under the Storm Water Multi-Sector General Permit *(*MSGP)

The MSGP regulates storm water discharges from identified industrial activities and their associated facilities. Currently, there are five active MSGP-regulated facilities with the potential to discharge storm water to the AU. Four of the five are located immediately adjacent to upper Sandia Canyon. One MSGP facility conveys runoff to upper Sandia Canyon via the Laboratory's storm drain infrastructure. There are no active MSGP facilities located in lower Sandia Canyon.

Table 4 lists the five MSGP facilities, along with the monitored outfalls for each facility, and monitoring requirements for aluminum and copper in upper Sandia Canyon. A map in Appendix 1shows the location of the MSGP outfalls.

MSGP industrial activities within the AU include metal product fabrication, vehicle and equipment maintenance, recycling activities, and warehousing activities. For each type of industrial activity regulated by the MSGP, specific constituents (i.e., potential pollutant for that activity) are identified and required to be analyzed as part of permit-required storm water monitoring. The MSGP then stipulates a benchmark concentration for each potential pollutant. Section 9.6.2.2 of the MSGP contains conditions modifying some of these benchmark concentrations to reflect State of New Mexico water quality standards. Per the MSGP, aluminum is identified as a potential pollutant at two active MSGP facilities: the TA-3-38 Metals Fabrication Shop (Sector AA) and TA-60-1 Heavy Equipment Yard (Sector AA). Copper is not identified as a potential pollutant associated with MSGP industrial activities located in upper Sandia Canyon.

In addition to monitoring for the MSGP specified benchmark pollutants, if an industrial facility discharges to an impaired water body, the MSGP requires monitoring for all pollutants for which the water body is impaired. Therefore, storm water monitoring for dissolved copper and total recoverable aluminum is conducted at all the MSGP facilities discharging to upper Sandia Canyon.

20.6.4.900 NMAC requires hardness-based water quality standards for dissolved copper and total recoverable aluminum. Based on an average calculated hardness of 61 mg/L, the New Mexico hardness-based water quality standards for total recoverable aluminum and dissolved copper in upper Sandia Canyon are 1738 µg/L and 8 µg/L, respectively.

The MSGP permit period is from March 1, 2021 to February 28, 2026. Authorization to discharge was granted to Triad National Security, LLC, the Laboratory's current maintenance and operations contractor, under permit tracking number NMR050013 on June 25, 2021. For the period July 1, 2021 –June 30, 2023, 16 of 27 (59%) of dissolved copper and 12 of 43 (28%) of total recoverable aluminum values at MSGP facilities in upper Sandia Canyon exceeded the hardness-based water quality standard.

- Routine facility inspections are performed monthly. Part 3.1 of the MSGP requires qualified inspectors to examine the following areas exposed to storm water: industrial materials or

activities, potential pollutant sources, discharge points, storm water control measures and spills or leaks that have occurred in the past three years. The inspector is looking for the following: Industrial material, residue or trash that may have or could come into contact with storm water;

- Leaks or spills from industrial equipment, drums, tanks, and other containers;
- Offsite tracking of industrial or waste materials, or sediments where vehicles enter or exit the site;
- Tracking or blowing of raw, final or waste materials from areas of no exposure to exposed areas;
- Erosion of soils; and
- Control measures needing replacement, maintenance or repair.

Part 5.1.1.1-5.1.1.5 and 5.1.3.1 of the MSGP requires immediate corrective action be taken when any of the following conditions have occurred:

- An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by an NPDES permit);
- A discharge exceeds a numeric effluent limit;
- Control measures are not stringent enough for the storm water discharge to be controlled as necessary to such that receiving water of the United States will meet applicable water quality standards or the non-numeric effluent limits in the permit;
- A required control measure was never installed, was installed incorrectly, or is not being properly operated or maintained; or
- A visual assessment shows evidence of stormwater pollution.

During the current permit period through the end of monitoring year 2, approximately 189 corrective actions have been performed at active MSGP facilities in upper Sandia Canyon. Of those, approximately 4 were in response to the exceedance of a benchmark for total recoverable aluminum. Immediate actions are required until permanent solutions can be implemented. Additional implementation measures are required for benchmark threshold exceedances. These may include additional monitoring, implementation of additional (more robust) storm water control measures to prevent offsite migration of pollutants, good housekeeping measures and installation of permanent structural source and treatment controls.

Under the 2021 MSGP facilities discharging to impaired waters without a TMDL must monitor once during the first year of coverage for all pollutants causing impairment, then once the fourth year for only those associated with industrial activity and or benchmarks. If not detected, this monitoring can discontinue for the remainder of permit coverage. However, monitoring must continue if detected.

Table 3

Sandia Canyon Site Monitoring Areas Authorized to Discharge under Storm Water Individual Permit NM0030759

SMA	AU	Site Monitoring Requirements[1]
S-SMA-0.25	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-1.1	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-2	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-2.01	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-2.8	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.51	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum a, Total Mercury and, Copper
S-SMA-3.52	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.53	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.6	NM-9000.A_047	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.7	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.71	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.72	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-3.95	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-4.1	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-4.45	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-5	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-5.2	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-5.5	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper
S-SMA-6	NM-128.A_11	Adjusted Gross Alpha, Total Recoverable Aluminum, Total Mercury and, Copper

1. Source: Appendix B, NPDES Permit No. NM030759, November 2010.

2. Source: 2012 Update to the Site Discharge Pollution Prevention Plan, Revision 1, Los Alamos National Laboratory NPDES Permit No. NM0030759, May 1, 2013, Sandia/Mortandad Watershed Receiving Waters: Sandia Canyon, Cañada del Buey, Mortandad Canyon, and Ten Site Canyon, Volume 2.

3. Upper Sandia Canyon Aggregate Supplemental Investigation Report, August 2013.

Table 4
Multi-Sector General Permit Sites in Sandia Canyon Assessment Unit NM-9000.A_47

Facility Name	Outfall / Location ID#	Sector	Total Recoverable Aluminum	Dissolved Copper
TA-3-38 Metals Fab Shop	076 / MSGP07601	AA	B[2], IW	IW
	077 / MSGP07701	AA	B, IW	IW
TA-60 Materials Recycling Facility	029 / MSGP02901	N	IW	IW
TA-60 Roads and Grounds	032 / MSGP03201	P	IW	IW
	042 / MSGP04201	P	IW	IW
	037 / MSGP03701	P	IW	IW
	039 / MSGP03901[3]	P	IW	IW
	084 / MSGP08401[3]	P	IW	IW
TA-60-1 Heavy Equipment Yard	022 / MSGP02201	AA, P	B, IW	IW
TA-60-2 Warehouse	026 / MSGP02601	P	IW	IW
	075 / MSGP07501	P	IW	IW

[1]Annual Impaired Waters monitoring requirement.
[2]Quarterly Benchmark monitoring requirement.
[3]Outfall 084 replaced 039 on August 5, 2022.

1.3.2 Non-point Source Locations and Potential Magnitudes

The watershed discharging to the Sandia Canyon AUs is approximately 2.52mi^2 and includes 29 acres of area under the control of Los Alamos County. Approximately 350 acres are comprised of impervious surfaces located within an urban environment. The majority of the upper watershed consist of impervious surfaces located within an urban environment consisting of buildings, parking lots, and light industrial facilities. Several terrestrial habitats exist within the Upper Sandia AU, including mixed conifer, semi-evergreen shrub-land, dense oak shrub-land and non-forested wetland riparian. Runoff in all urbanized areas is primarily managed through LANL's storm drain infrastructure system and discharged at specific locations near the head of the canyon. Remaining areas discharge to surface conveyances that flow directly to the canyon.

Within this 150-acre area are five NPDES MSGP active facilities with a combined total area of 39.25 acres. These facilities manage storm water runoff and potential pollutants in accordance with the MSGP requirements, as described in section 1.3.1.3. Also, within the 150 acres are nine SWMUs, which are authorized to discharge under the IP, and comprise less than an acre. However, the drainage to these SWMUs comprises discharge to the SMA from 100 acres of developed locations.

1.3.2.1 Non-point Source from Urban and Developed Areas within the Laboratory

Storm water samples from developed areas within TA-3 were collected in 2018 under the Sampling and Monitoring Supplemental Environmental Project (SEP). With the exception of monitoring completed under the SWMP, no other developed sites have been sampled since completion of the SEP project. The purpose of the SEP was to fill data gaps and characterize the sources of pollutants in storm water runoff and impacts on receiving waters in and around the Laboratory. A broad range of pollutants were targeted from Laboratory developed areas and natural landscapes. In the developed areas of the Laboratory, parking lots and associated buildings runoff were characterized. The data will be helpful as a reference when evaluating other monitoring locations down gradient of these sites where multiple sources contribute to water and sediment quality. Only those parameters identified as causing a 4B impairment are summarized in Table 6.

Table 5
SEP Urban Range of Findings (µg/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum ug/l
11.1 - 18.2	<0.067 – 0.11	23.3 - 411

1.3.2.2 Non-point Source from Natural Background

Naturally occurring sources of copper, aluminum and mercury are summarized in the Metals Background Report (4). Background Storm water samples were derived from two primary groups of locations: tributaries that enter the Laboratory's western (upstream) boundary and tributaries in a remote area north of the community of Los Alamos or Reference Area. The results from Reference Area stations reflect background runoff conditions from landscapes at Sandia Canyon with surficial geological materials derived from Bandelier Tuff, Puye Formation, and the Tschicoma Formation (4). The results from Western Boundary stations reflect background runoff conditions from landscapes with surficial geological materials derived from Bandelier Tuff and diorite-rich Tschicoma Formation (4). Copper, aluminum and mercury background values from undeveloped areas are presented in Table 6.

Table 6
Background Pajarito Plateau Storm Water Pollutant Concentrations (µg/L)

Parameter	Reference Area[a] Background Values	Western Boundary[b] Background Values
Copper	3.43	5.7
Mercury	c	c
Aluminum	2210	1780

Note: All the Reference and Western Boundary station locations were upstream of and distant from Laboratory liquid discharges.

[a] Reference Area—Ephemeral tributaries to the Rio Grande north of the Laboratory and urban Los Alamos County. The northernmost tributary sampling station is located in middle portion of the Pajarito Plateau. Surface water monitored at the Reference sites is mostly generated as storm water from local storms affecting the northern portion of the Pajarito Plateau.

[b] Western Boundary—Ephemeral, intermittent, and perennial tributaries to the Rio Grande to the west and upstream of the Laboratory and urban Los Alamos County.

c. Insufficient number of detections to calculate statistical distribution.

1.3.2.3 Non-point Source from SEP Undeveloped Reference Sites

On January 22, 2016 NMED and DOE reached a settlement agreement to resolve issues as they relate to an incident at the Waste Isolation Pilot Project (WIPP). The settlement agreement called for several corrective actions including increased sampling and monitoring capabilities for storm water runoff in and around the Laboratory. Water Quality Monitoring sampling under the SEP was carried out in 2017 and 2018. The purpose of the monitoring was to fill data gaps to characterize the sources of pollutants in storm water runoff and impacts on receiving waters in and around the Laboratory including the Sandia Canyon AUs. A broad range of pollutants (including dissolved copper, total recoverable aluminum and total mercury) are targeted from the following sources: Laboratory developed areas, Laboratory firing sites, natural landscapes, and atmospheric deposition. Additionally, storm water samples from undeveloped reference sites on the Pajarito Plateau were collected. Appendix 1 includes maps with the sampling locations. As indicated above past investigations of storm water quality from undeveloped reference sites have been previously conducted by the Laboratory. The SEP selected sampling and monitoring of storm water and related media in undeveloped watersheds to quantify concentrations of pollutants sourced from natural landscapes (primarily originating from natural geologic sources in sediments). The data from the four undeveloped reference are summarized in Tables 7-10:

Table 7
SEP Reference (Burnt Mesa 1) Range of Findings (µg/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
1.39 – 3.2	<0.067 – 0.164	1030 - 2860

d. Sample prepared with 10um filter.

Table 8
SEP Reference (Ponderosa 1) Range of Findings (ug/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
1.57 – 2.84	<0.067 – 0.079	1290 - 3580

d. Sample prepared with 10um filter.

Table 9
SEP Reference (San Juan Mesa 1) Range of Findings (ug/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
1.1 – 2.44	<0.067 – 0.482	766 - 22700

d. Sample prepared with 10um filter.

Table 10
SEP Reference (San Juan Mesa 4) Range of Findings (ug/L)

Dissolved Copper ug/l	Total Mercury ug/l	Total Recoverable Aluminum[d] ug/l
0.601 – 22.2	<0.067 – 0.215	751 - 2210

d. Sample prepared with 10µm filter.

2. DESCRIPTION OF POLLUTION CONTROLS AND HOW THEY WILL ACHIEVE WATER-QUALITY STANDARDS

2.1 Water Quality Targets

The demonstration should identify a numeric water quality target(s). That is the chemical causing the impairment and the numeric criteria for that chemical in the water quality standard (i.e., the chemical causing the impairment and the water quality standard). Express the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target.

2.1.1 Numeric Targets

The acute and chronic numeric water quality hardness-dependent targets for dissolved copper and total recoverable aluminum are described in 20.6.4.900(I)(1) and (2) NMAC. The use specific numeric targets for total mercury are described in 20.6.4.900(J)(1) NMAC.

2.1.2 Current Conditions

Water quality data for 4B parameters were obtained from Intellus (https://www.intellusnm.com/) and the Laboratory's Environmental Informational Management (EIM) system. 4B parameter data was obtained for E123 (Sandia below Wetlands), E124 Sandia above Firing Site) and E125 and Sandia above State Road 4) for the period of March 2014 through August 23, 2023. A summary of results for this period are included in Tables 16-18 For the LANL-based samplers E124 and E125, flows were insufficient for sample collection in 2020 and early 2021 and results of samples that may have been collected in summer of 2023 are not yet posted in Intellus or EIM. NMED obtained a sample from E125 in February of 2020, While the sample included a result for aluminum it is not clear that the sample was prepared with a 10µm filter. E123 is located in the upper portion of NM-9000.A_047 below the Sandia Wetlands, E124 is located approximately 0.7 miles below the NM-9000.A_047 in NM-128.A_11and E125 is located at the end of NM-128.A_11 just above SR-4 (Appendix 1).

Time trend graphs for gages E123, E124 and E125 are provided in Appendix 3. The graphs show measured copper, total recoverable aluminum and total mercury levels in relation to water quality criteria for the period of March 2014 through June 2023.

2.1.3 Necessary Reduction to Meet Target

The 4B Demonstration was approved by the WQCC on December 18, 2020 and by EPA on January 22, 2021. Therefore the 4-year duration of the demonstration will span January 2021 through January 2025. The eventual achievement of water quality targets requires addressing impacts from storm water flows. To help address this issue the Laboratory developed the Sandia Storm Water Management Plan (SWMP), which is included in Appendix 2. The SWMP uses the principles established for the MS4 Phase II Storm Water Program. This requires the development of measurable goals to assess the effectiveness of storm water controls that address the six minimum control measures defined in the regulations. The SWMP was developed in anticipation of an anticipated MS4 permit for the Laboratory. Urban non-point source discharges are an important source of pollutants to Sandia Canyon. The highest values of filtered copper are most often observed in storm water originating from urban runoff from parking lots, roads, and buildings in TA-03. Aluminum and copper exceedances are attributed to urban runoff and naturally occurring sediments. Mercury is associated with SWMU and AOCs. Target Action Levels vary by discharge permit and are based on New Mexico standards criteria (20.6.4 NMAC) and the average hardness for Sandia canyon if the pollutant is a hardness-dependent metal (see footnote 1 to tables 12 through 14).

The sampling points identified in Table 11 serve as the locations for determining reductions in concentrations of parameters causing impairment (dissolved copper, total recoverable aluminum and total mercury) for attainment of water-quality targets under the 4b Demonstration. The locations of the sampling points are shown in the maps in Appendix 1. Tables 16 – 18 provide a summary of 2020 water quality data from these sites. Due to insufficient storm water flows, samples were not obtained from SWMP-S-06 a sampler located within Sandia Canyon below the lower grade control structure.

Table 11
Storm Water Monitoring Plan[a]

Assessment Unit	Sample Location	DOC (F)	Ca/Mg/ Hardness (F)	Copper (F)	Mercury (UF)	Total Recoverable Aluminum (F10µ)
(Upper) Sandia Canyon (Sigma Canyon to NPDES outfall 001) NM-9000.A_047	SWMP-S-01	**4**	**4**	**4**		**4**
	SWMP-S-02	**4**	**4**	**4**		**4**
(Upper) Sandia Canyon (Sigma Canyon to NPDES outfall 001) NM-9000.A_047	E123	**a**	**a**	**a**		**a**
Upper and Lower	E124	**4**	**4**	**4**	**4**	**4**
(Lower) Sandia Canyon (within	SWMP-S-03	**4**	**4**		**4**	**4**

LANL below Sigma Canyon) NM-128-A_11	SWMP-S-04	**4**	**4**		**4**	**4**
	SWMP-S-05	**4**	**4**		**4**	**4**
	SWMP-S-06	**4**	**4**		**4**	**4**
Lower) Sandia Canyon (within LANL below Sigma Canyon) NM-128-A_11	E125	**a**	**a**	**a**	**a**	**a**

F = Filtered with 0.45 µm filter

a. Based on environmental surveillance program monitoring schedule

Sampling points for SWMP samplers do not have run on sampling thus individual site reductions are not calculable. However, exceedances higher in the watershed (e.g., SWMP-S-01) appear to be more prevalent than lower in the watershed.

2.2 Point and Nonpoint Source Loading That When Implemented Will Achieve WQS

Describe the cause-and-effect relationship between the water quality standard (and numeric water quality targets as discussed above) and the identified pollutant sources and, based on this linkage, identify what loadings are acceptable to achieve the water quality standard.

Existing data indicate that the water quality targets are not currently achieved. This is particularly true under storm water flow conditions. Recent data obtain from the SEP monitoring project indicate that the urban/developed landscapes at the Laboratory are a major source of pollutants to the AUs. Effective management of storm water flows is key to achieving numeric water quality targets. LANL is looking to the International Stormwater Database (2020) to identify pollutant-specific efficacy among categories of BMPs for future consideration.

Loadings acceptable to achieve WQ standards:

In this revision we address the numeric standards for aluminum and copper and reported results obtained from EIM and Intellus New Mexico to understand what reductions would be necessary to meet New Mexico's water quality standards. LANL sought a worst-case scenario for the multi sector general permit because this permit covers industrial activities in an urbanized setting which contribute moderate amounts of aluminum and high amounts of copper but with typically low hardness which is an ameliorating water quality parameter to the toxicity of some metals. In the MSGP LANL is held to a receiving water hardness of 61.1 mg/L which was determined for SANDIA CANYON (SIGMA CANYON TO NPDES OUTFALL 001 Assessment Unit NM-9000.A_047). This hardness leads to limits specific to the permit of 1,742 µg/L for aluminum and 8 µg/L for copper. MSGP outfalls collect storm water samples before they reach the canyon bottoms and the receiving waters. The most stringent limit for total mercury is for the Wildlife Habitat use and is 0.77 µg/L. Sources for mercury include industrial uses and wet and dry deposition.

For the hardness dependent metals (aluminum and copper), LANL filtered the data to samples that had accompanying hardness data and used these individual determinations of sample-specific acute criteria using a hardness dependent calculator based on NMED's hardness dependent metals criteria at 20.6.4.900 NMAC. This had the result of limiting the dataset to samples taken between 2013 and 2018 and thus before LANL embarked on building many of its institutional controls to reduce erosion and

sediment mobilization. Over half of these controls (17 of 31) were built after the MSGP dataset for which LANL had sample specific hardness data.

From 2013 to 2018, LANL had 24 sample for aluminum and copper with sample specific hardness data. Half (50%) exceeded the acute aluminum criteria and fully 86% exceeded the acute copper criteria. LANL calculated a need to reduce copper by an average of 9% but notes that this average is skewed by three samples taken on one day with copper concentrations above 25 µg/L likely related to a release event. Aluminum would need to be reduced by 1.2% but LANL notes that aluminum from industrial activities is low when compared to receiving waters that have come into contact with parent geology (the Bandelier tuff) which is rich in aluminosilicates. Aluminum exceedances are generally many fold the associated criteria the further down canyon one goes. Efforts to control this source in Sandia canyon include the wetland, the Sandia grade control structure, and BMPs to capture sediment in TA-72.

Success of current controls

For the upper (perennial) portions of Sandia Canyon, those most influenced by urban stormwater runoff [Assessment Unit NM-9000.A_ Sandia Canyon (Sigma Canyon to NPDES outfall 001)], the current draft of New Mexico's 2024-2026 303(d) listing of impaired waters proposes a delisting for copper. Sandia's perennial waters cease very soon after this AU as it flows into deeper sediments. Copper is still listed as an impairment in the downstream ephemeral AU [Sandia Canyon (within LANL below Sigma Canyon)] but this may be an unidentified source in TA-53 which discharges stormwater from an unnamed side canyon reaching Sandia Canyon in TA-72. Waters in TA-72 rarely reach the eastern boundary- on average reaching the lower boundary gage system 2 times a year in a 2012 to 2021 gage record. It is unknown how often waters reach the Rio Grande due to the lack of gages beyond the LANL boundary.

Mercury

LANL's data retrieval of MSGP data for total mercury returned 153 results and none exceeded NMED's Wildlife Habitat criteria. The highest recorded was 0.66 µg/L.

General efficacy of types of controls used at LANL to reduce erosion and sediment mobilization.

LANL references the Water Research Foundation's International Stormwater BMP Database (2020) for a statistical inference about the efficacy of specific controls. This database addresses copper only but may be useful to glean removal effectiveness of other sediment-associated pollutants. Below, LANL reproduces the types of controls present in upper Sandia Canyon and the expected reduction of total copper.

1) Detention Basin: ~50%
2) Retention Pond: ~50%[2]
3) Wetland Basin: ~45%
4) Grass Swale: ~55%
5) Media Filter: ~55%

[2] LANL BMPs are designed to allow for pre-development flows, thus retaining waters is not a feature of LANL designs but there are infiltration galleries onsite.

These average BMP efficiencies are in excess of reductions needed to meet water quality standards for copper and aluminum, however there may be occult inputs to receiving waters that LANL has yet to identify.

2.3 Controls That Will Achieve Water-Quality Standards

The following serve as the primary controls for eventual attainment of the water quality targets:

1. Continued application of NPDES permits and regulatory controls.
2. Sandia Wetland Grade Control Structure

3. Storm Water Management Plan

2.3.1 Point Source Controls

Three major NPDES permits provide the point source controls for the AUs. The permits are specifically designed to monitor and prevent or reduce the amount of pollutants entering the AUs. These programs contain mandated provisions and limits, with specified implementation timelines, to address impaired water conditions.

2.3.1.1 Industrial and Sanitary Point Source Discharge Permit (IPSP) Point Source Controls

The NPDES IPSP Outfall Permit NM0028355 is currently the only active NPDES Industrial and Sanitary Outfall Discharge Permit at the Laboratory. The hybrid permit included 6 outfalls permitted under the NPDES Permit issued on October 2014 (modified in May 2015) and 5 Outfalls under the NPDES Permit issued March 2022. In the most current permit, 10 outfalls are operating under the 2022 version and one outfall may be stayed and fall under the prior permit conditions. Three of the 11 outfalls discharge to the upper AU. The locations of these outfalls are shown in the maps in Appendix 1.

The primary effluent source of water discharges to Sandia Canyon are from NPDES Outfall 001. This outfall has a continuous average discharge of 235,000 gal. per day consisting of once through cooling water from the power plant; SWWS treated effluent; SERF treated effluent; and blowdown from the SCC cooling towers. The NPDES permit provides monitoring and/or permit limits for Total Recoverable Aluminum and copper based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The 2014 NPDES Permit included permit limits for total recoverable aluminum and dissolved copper. The new 2022 permit revised these limits as shown in Table 12.

Table 12. 2014 and 2023 NPDES Permit Limits for Outfall 001

Outfall ID No.	Parameter	NPDES ISPS Permit Requirement Oct 2014	NPDES ISPS Permit Requirement November 2023

001	Total Recoverable Aluminum	Daily Max = 0.9889 mg/L	Report Only
	Copper	Dissolved Copper Daily Max = 0.0073 mg/L	Total Copper Monthly Average = 0.0087 mg/L Daily Max = 0.0087 mg/L

Monitoring data for total recoverable aluminum at Outfall 001 under the 2014 NPDES permit resulted in the determination there was no longer a reasonable potential for discharges of aluminum above the water quality standard. This resulted in the removal of the permit limit with a requirement to continued monitoring as report only in the 2022 NPDES Permit. Ongoing reasonable potential for copper in the outfall discharges resulted in stricter permit limits than those in the 2014 permit. Mercury was determined to have no reasonable potential in both the 2014 and 2022 NPDES permits.

The NPDES Outfall 03A027 is located <100-ft from Outfall 001 and has the capability of intermittent discharging but would only be used in an emergency or maintenance situations. Outfall 03A027 has not discharged since 2017 as a result of cooling tower blowdown waters being re-routed to Outfall 001. The NPDES permit provides monitoring and/or permit limits for Total Recoverable Aluminum and copper based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The 2014 NPDES Permit included permit limits for total recoverable aluminum and dissolved copper. The new 2022 permit revised these limits as shown in Table 13.

Table 13. 2014 and 2023 NPDES Permit Limits for Outfall 03A027

Outfall ID No.	**Parameter**	**NPDES ISPS Permit Requirement Oct 2014**	**NPDES ISPS Permit Requirement November 2023**
001	Total Recoverable Aluminum	Daily Max = 0.9889 mg/L	Report Only
	Copper	Dissolved Copper Daily Max = 0.0073 mg/L	Total Copper Monthly Average = 0.0087 mg/L Daily Max = 0.0087 mg/L

Monitoring data for total recoverable aluminum at Outfall 03A027 under the 2014 NPDES permit resulted in the determination there was no longer a reasonable potential for discharges of aluminum above the water quality standard. This resulted in the removal of the permit limit with a requirement to continued monitoring as report only in the 2022 NPDES Permit. Ongoing reasonable potential for copper in the outfall discharges resulted in stricter permit limits than those in the 2014 permit. Mercury was determined to have no reasonable potential in both the 2014 and 2022 NPDES permits. Outfall 03A027 was routed to Outfall 001 in 2016 and is currently routed to the Reuse Tank at the Power Plant where it is combined with SWWS effluent and either discharged to Outfall 001 or to the Sanitary Effluent Reclamation Facility (SERF) for reuse. The SERF, located at the head of Sandia Canyon, provides tertiary treatment of the SWWS facility treated sanitary effluent and/or SCC Cooling Tower Blowdown so that it can be reused/recycled as makeup water in the cooling towers at the Laboratory The facility utilizes chemical precipitation, pH adjustment, filtration, and reverse osmosis to treat water to remove silica and other contaminants and improves water quality for discharges to Outfall 001 and/or 03A027.

A smaller volume of effluent is discharged to upper Sandia Canyon from NPDES Outfall 03A199. This outfall has an intermittent discharge of 35,000 gal./day that consists of LDCC Cooling Tower blowdown. The 2014 NPDES permit provides monitoring and/or permit limits for total recoverable aluminum, copper, mercury based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The new 2022 permit revised these limits as shown in Table 14.

Table 14. 2014 and 2023 NPDES Permit Limits for Outfall 03A199

Outfall ID No.	**Parameter**	**NPDES ISPS Permit Requirement Oct 2014**	**NPDES ISPS Permit Requirement November 2023**
03A199	Total Recoverable Aluminum	Daily Max = 0.9889 mg/L	Report Only
	Copper	Dissolved Copper Daily Max = 0.0073 mg/L	Report Only
	Total & Dissolved Mercury	Daily Max = 0.77 ug/L	NA

Monitoring data for total recoverable aluminum and copper at Outfall 03A199 resulted in the determination there was no longer a reasonable potential for discharges above the standard. This resulted in the removal of the respective permit limits with a requirement to continued monitoring as report only in the 2022 NPDES Permit. Monitoring data for total and dissolved mercury at the outfall resulted in a determination that there was no longer a reasonable potential for discharges above the standard. This resulted in the removal of the monitoring requirements in the 2022 NPDES permits.

Outfall 03A113 discharges to an intermittent discharge o lower Sandia canyon that consists of cooling tower blowdown from the LEDA cooling towers at TA-53. The 2014 NPDES permit provides monitoring and/or permit limits for total recoverable aluminum and copper based upon historical monitoring and permit application data used by EPA to determine if there is reasonable potential that a pollutant will exceed the groundwater standard. The new 2022 permit revised these limits as shown in Table 15.

Table 15. 2014 and 2026 NPDES Permit limits for Outfall 03A113

Outfall ID No.	Parameter	NPDES ISPS Permit Requirement Oct 2014	NPDES ISPS Permit Requirement March 2022
03A113	Total Recoverable Aluminum	Daily Max = 6.904 mg/L	Report Only
	Dissolved Copper	Daily Max = 0.0218 mg/L	NA
	Total Mercury	NA	Report Only

Monitoring data for total recoverable aluminum, dissolved copper, and total mercury at Outfall 03A113 resulted in the determination there was no longer a reasonable potential for discharges above the standard. This resulted in the removal of the permit limits for aluminum and copper and an ongoing requirement to monitor as report only in the 2022 NPDES Permit.

2.3.1.2 Individual Permit (IP) Point Source Controls Related to Certain RCRA SWMUs and AOCs

Section 1.3.1.2 provides an overview of the key provisions of the IP and the relationship to the Consent Order requirements. The IP categorizes a Site as having had an “industrial activity” that creates a “point source discharge” and directs the Permittees to monitor representative storm water discharges from Sites at specified sampling points known as SMAs.

The selection of analytical monitoring suites and Site priority designations is based on historical information and any storm water, sediment, and soil data available at the time the Permit application was submitted. The investigation and remediation of SWMUs and AOCs began during the 1990s before the effective date of the Individual Permit (November 1, 2010) and continue concurrently with implementation of the Individual Permit.

The Permit establishes Target Action Levels (TALs) that are equivalent to New Mexico water-quality criteria. These TALs are used as benchmarks to determine the effectiveness of control measures implemented under the Permit. That is, confirmation monitoring sample results for an SMA are compared with applicable TALs. If one or more confirmation monitoring results exceed a TAL, the Permittees must take corrective action through the installation of measures reasonably expected to (1) meet applicable TALs at the Site, (2) achieve total retention of storm water discharges from the Site, or (3) totally eliminate exposure of pollutants to storm water; otherwise, the Permittees must demonstrate the Site has a Certificate of Completion (COC) under the Consent Order.

The Individual Permit requires that the Permittees certify to EPA completion of corrective action at each Site by a specific deadline based upon the Site's status as either a High Priority or Moderate Priority Site.

Table 3 lists the 13 permitted sites in the IP for the AUs. The maps in Appendix 1 show the locations of the SMAs.

Tables 16 through 18 indicate stormwater sampling events and exceedance ratios.

2.3.1.3 Storm Water Multi-Sector General Permit Controls

The NPDES MSGP regulates storm water discharges from identified industrial activities and their associated facilities. Table 4 lists the MSGP facilities and monitored outfalls discharging storm water to the AU and a map in Appendix 1 shows the location of these outfalls. MSGP regulated activities within the AU include metal fabrication, vehicle and equipment maintenance, recycling activities, and warehousing activities. Triad is permitted under the EPA 2021 NPDES Storm Water MSGP for Industrial Activities (2021 MSGP). The MSGP requirements include the implementation of control measures, development of facility-specific Storm Water Pollution Prevention Plans (SWPPPs), Corrective Action requirements for identified issues, and monitoring storm water discharges from permitted outfalls. Compliance with these requirements is achieved primarily by:

- Identifying potential pollutant sources and activities that could adversely impact water quality,
- Identifying and providing structural and nonstructural controls to limit the impact of potential pollutants,
- Developing and implementing facility-specific SWPPPs,
- Implementing permit-specified Corrective Actions for any identified issues,
- Monitoring storm water runoff for industrial sector-specific benchmark parameters, impaired water constituents, indicator parameters, and effluent limitations, and
- Visually inspecting storm water runoff to assess color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of storm water pollution.

Minimizing the exposure of potential pollutant sources and activities to storm water is primarily achieved through administrative controls associated with work processes and engineering controls such as covering, secondary containment, berms to direct runoff flow, and storm drain inlet protection. Erosion and sediment transport at facilities is also monitored and addressed through the implementation of structural controls or stabilization of areas with asphalt, concrete, or perennial vegetation.

Evaluation of storm water monitoring results is performed to identify the need to modify existing controls or implement new controls. Storm water monitoring under the 2021 MSGP is ongoing.

2.3.2 Non-Point Source Controls

A number of non-point source controls and initiatives have been established in the upper and lower Sandia Canyon AUs. Of particular importance to non-point source mitigation was the installation of the Sandia Grade Control Structure (GCS) and two grade control structures completed in the lower AU under the Supplemental Environmental Projects (SEPs). On January 22, 2016 NMED and DOE reached a

settlement agreement to resolve issues as they related to the incident at WIPP. The settlement agreement called for a number of corrective actions and SEPs. Execution of the SEPs provided the Laboratory the opportunity to address storm water management issues including design and installation of engineering structures to slow storm water flow and decrease sediment load to improve water quality. The SEP also called for increase sampling and monitoring capabilities for storm water runoff in and around the Laboratory as indicted in section 1.3.2.3.

2.3.2.1 Sandia Wetland Stabilization Project

The Sandia Canyon wetland is located within the AU below the primary developed Laboratory area in the upper watershed and approximately 100 yards above monitoring station E-123. A large head cut formed in the lower section of the wetland, resulting in increased sediment migration down canyon. The wetland is an important historical sediment deposition area. The head cut in the lower section of the wetland was stabilized by constructing a three stepped grade-control structure that allow a grade transition from the current elevation of the wetland to the stream bank near stream gage E-123. The area behind the grade-control structure was backfilled and wetland vegetation to allow expansion of the wetland area. These measures have physically stabilize the wetland by reducing sediment and associated contaminant transport into the lower sections of the canyon.

The grade-control structure was designed to meet the following objectives:

- Provide and even grade to allow wetland expansion and further stabilization
- Be sufficiently impervious to prevent the draining of alluvial soils
- Facilitate non-channelized flow
- Minimize erosion during large flow events
- Support wetland function under reduced effluent conditions

A 25-year, 2-hour storm event with a peak design flow of 500 cubic feet per second was used for the design of the grade-control structure as required by the Laboratory's design guidance. The primary goal was to reduce the stream velocity in the area of the grade control structure to less than 6 feet per second. Construction of the grade-control structures was completed in November 2013.

Construction of the grade-control structure was required based on the results of investigations conducted under the Order on Consent (Consent Order), which provides the time table and requirements for environmental cleanup of hazardous constituents for the Laboratory. Monitoring pursuant to Consent Order requirement will be conducted as follows:

- Surface water monitoring of base flows at gages upstream and downstream of wetland
- Storm water samples will be collected from gages upstream and downstream of wetland
- Vegetation monitoring will be conducted via semi-annual photo surveys
- A series of repeat cross sections will be established to document geomorphic changes

Suspended sediment concentrations have decreased significantly compared with pre- and post-GCS data immediately downgradient of the wetland at gaging station E123, presumably from eliminating headcutting at the terminus of the wetland and from trapping efficiency because of the dense vegetation within the wetland. The monitoring conducted during the performance period indicates the Sandia wetland remains stable following the installation of the GCS, even with generally lower, but variable, effluent volumes entering the wetland. The GCS continues to be effective in arresting headcutting at the terminus of the wetland. Groundwater within the shallow alluvium remains in a reducing condition, with no obvious detrimental temporal trends in chemistry observed (6).

Monitoring requirement includes:

- Photo documentation
- Vegetative species and cover qualification
- Extent of wetland vegetation
- Water level monitoring

2.3.2.2 Storm water Controls/Management from Developed Laboratory Areas

Controls within the LANL area primarily consist of several small detention ponds, riprap structures at various discharge locations, and a grade control structures within Sandia Canyon. The detention ponds capture runoff from adjacent buildings and surrounding impervious areas, and discharge flow through controlled outlet structures. These ponds are designed to manage runoff velocity to pre-development levels and also facilitate the settling and capture of sediment transported in storm water runoff. As an example, a bio detention pond is currently being constructed within LANL's primary administration area to address runoff from a large parking structure and an adjacent parking lot. The pond will minimize runoff velocity and is designed with a forebay to capture "first flush" sediments and manage site snow removal. This system will provide a first flush treatment before site runoff enters the existing storm drain infrastructure system.

Riprap is placed at various discharge locations to reduce runoff and minimize the potential for erosion within and adjacent to Sandia Canyon. For example, both surface runoff and flow collected in the storm drain infrastructure system from a significant portion of the LANL area discharge directly at the head of Sandia Canyon. A riprap structure and a small riprap basin have been installed at this discharge location to manage these flows. The riprap reduces runoff velocity in the flows prior to discharge into Sandia Canyon.

Approximately 0.7 miles downstream from the head of Sandia Canyon, a grade control structure has been installed within an existing wetland. This wetland is an important historical sediment deposition area, as the highest concentrations of copper in the AU are located within the wetland reach of the canyon. A large head cut formed in the lower section of the wetland, resulting in increased sediment migration down canyon. The grade control structure, consisting of a series of sheetpile structures designed to reduce flow velocity and increase the width of flow within the watercourse, will stabilize the head cut by facilitating a grade transition from the current elevation of the wetland to the downstream channel. The area behind the sheetpile structures was backfilled and wetland vegetation is being established in these areas. A cascading drop pool constructed with rock at the downstream end of the grade control structures serves as a final energy dissipater for the water flow. By reducing flow velocity and enhancing the sustainability of the wetland, this grade control structure will stabilize existing soils and enhance future sediment deposition, thereby maintaining hydrologic and geochemical conditions that will minimize the migration of pollutants of concern including copper.

A Low Impact Development (LID) Master Plan has been developed and finalized. The LID Master Plan will guide and prioritize future development of LID projects at LANL. The LID Master Plan applies to developed areas across the Laboratory and focuses on identifying opportunities for storm water quality and hydrological improvements in the heavily urbanized areas of Technical Areas 03, 35 and 53. TA-03 primarily drains to Sandia, Mortandad, Two Mile and Los Alamos Canyons. The LID Master Plan is organized to allow the addition of LID projects for other technical areas as time and funds allow in the future.

The LID Master Plan identifies a number of LID projects within the Sandia AU. Under the SEP, 5 projects were designed and 3 were completed in 2019. These projects are designed and constructed with the specific goal of improved storm water management.

2.3.2.3 Sandia Canyon Storm Water Management Plan (SWMP)

LANL has completed development of a Storm Water Management Plan (SWMP). The complete SWMP is included in Appendix 2. The SWMP will be managed through the Environmental Protection and Compliance Division (EPC-CP) with collaboration with personnel from Planning, Utilities and Project Management. The Plan is based on the municipal separate storm water sewer system (MS4) Phase II Storm Water Program that requires permittees develop measurable goals to assess the effectiveness of storm water controls that address the six minimum control measures defined in the regulations.

LANL completed a number of activities under the SWMP:

1. LANL Workforce Education and Outreach

   A link to the Sandia Storm Water Management Plan (SWMP) was added to the Los Alamos National Laboratory (LANL) Water Quality Support webpage which includes environmental tools and applications, water quality plans, procedures, NPDES permits and reports. The webpage serves as a resource for LANL staff to access information related to the stormwater management and other environmental programs.

   Informational signs were installed at two Low Impact Development (LID) projects to showcase sustainable (low water, low maintenance) landscaping and the use of natural processes to manage urban stormwater runoff and pollutant concentrations. These signs inform and remind LANL staff about the importance of stormwater management and how it can be applied at LANL.

   The LANL Stormwater Permitting & Compliance Team has participated in multiple community outreach events within and around Los Alamos during CY 2022 and 2023. At these events team members teach and expose community members to concepts of watersheds, erosion, stormwater management, and water quality utilizing a stream table for a hands-on demonstration.

2. Pollution Prevention/Good Housekeeping

The LANL Stormwater Permitting & Compliance team has developed a Long Term Stewardship Program that includes the assessment and inventory of institutional stormwater controls or BMPs located on the mesa tops and canyon systems within the Sandia Canyon drainage basin. Assessment and documentation has facilitated the establishment of an actively maintained database that tracks site specific attributes for each stormwater BMP (i.e., coordinates, BMP type, drainage area, date built, last inspection date, and inspection results). Annual or biannual inspections are conducted to assess the effectiveness and condition of each BMP. Frequency of inspection is dependent on the type of BMP and risk for exposure to damage caused by stormwater runoff or maintenance activities on co-located infrastructure. Controls are registered with LANL infrastructure management systems (Archibus/FIMS) and given a facility ID for tracking in DOE systems.

Additional developments include revisions to the LANL Snow and Ice Control Plan. In effort to reduce erosion and minimize the discharge of pollutants from snow melt (i.e., ice-melting chloride salts, asphalt, floatable debris, heavy metals, etc.), the LANL Stormwater Team is assessing snow pile storage locations

within the Sandia drainage basin to determine which areas need to be relocated or retrofitted with permanent BMPs for sediment management. Dedicated locations will be signed and added to an actively maintained database, registered with LANL infrastructure management systems (Archibus/FIMS), and given a facility ID for tracking in DOE systems. Biannual inspections are planned for each snow storage location to evaluate damage from snow clearing equipment, BMP effectiveness, and sediment accumulation.

3. Post-Construction Runoff Control

   The LANL Engineering Standards Manual was revised to streamline and clarify NPDES Construction General Permit and Energy Independence & Security Act, Section 438 requirements for designing and implementing stormwater management features. The revision includes the addition of LANL site specific data (i.e., rainfall data, hydrologic curve numbers, design storm precipitation totals) to ensure projects equal to or greater than 5,000 square feet implement the appropriate stormwater controls necessary to restore the pre-development hydrology of the site. Additional requirements were added for sizing LID water quality treatment BMPs such as extended detention stormwater controls.

   Subject matter experts from the LANL Storm Water Permitting & Compliance team provided technical input associated with development of the LANL Campus Master Plan. The plan projects near-term, mid-term, and long-term development of new buildings and infrastructure located in all areas at LANL, including areas covered under the SWMP. As part of this effort to ensure that all regulatory stormwater requirements are acknowledged and included in the plan, the team provided guidance on stormwater regulatory compliance requirements and Low Impact Development (LID) Standards. Through continued planning and integration, the team will incorporate LID concepts and other stormwater regulatory requirements into the final designs for all projects included in Campus Master Plan.

Following the completion of construction projects, permanent stormwater controls designed to manage post construction stormwater runoff are required to be maintained to ensure long term operation. NPDES Construction General Permit (CGP) and EISA 438 SMEs are working closely with GIS SMEs to register and track each post construction stormwater control in the LANL infrastructure management systems database (Archibus/FIMS). Similar to other institutional stormwater controls, post construction stormwater controls are inspected annually or biannually to assess the effectiveness and condition of the control. To promote dedicated routine maintenance support, EPC-CP is working with LANL Utilities and Infrastructure to prioritize O&M for all post construction and institutional storm water controls at the Laboratory.

On March 6, 2015 EPA issued their preliminary determination that discharges of storm water from MS4s on Laboratory property and urban portions of Los Alamos County result in or have the potential to result in exceedances of state water quality standards including impairment of designated uses, or other significant water quality impacts such as habitat and biological impacts. In December 2019, LANL received final designation from EPA as a MS4 regulated entity. Draft permits were then issued by EPA in December 2020 and March 2021 and permit negotiation continued between EPA and stakeholders through the remainder of 2021. In January 2022, due to a lawsuit between Los Alamos County and EPA, the Tenth Circuit Court of Appeals remanded the MS4 designation back to EPA for reevaluation and the MS4 permitting process is paused during reevaluation.

Until the MS4 permit is developed and finalized, the SWMP will serve as a bridge and key to management of stormwater flow in Sandia Canyon. The Sandia SWMP for the 4b designation was based

on EPA guidance for MS4 permit required SWMPs in anticipation of the future issuance of the MS4 permit to LANL, and to facilitate transition of 4b activities to implementation of MS4 permit requirements as stormwater discharges to Sandia Canyon are anticipated to be MS4 regulated discharges. It is expected that implementation of MS4 permit requirements, upon issuance of a permit by EPA, will further meet Sandia SWMP objectives and satisfy 4b designation requirements.

The initial scope of the SWMP will focus on stormwater discharges into Sandia Canyon. The maps in Appendix 1 show the Sandia Canyon watershed within LANL, the upper and lower assessment units (AUs) and proposed monitoring locations. S-01 and S-02 are the primary storm drain outfalls from TA-03 and will be used as run-on sampling locations for the upper AU. Gage station location E-124 will be used as the runoff sampling location for the upper AU and one of the run-on sampling locations for the lower AU. Sampling locations S-03, S-04 and S-05 will be used as TA-53 run-on sampling locations for the lower AU. Sampling location S-06 is located just upstream from the Lower Sandia Grade Control Structure and will be used as the runoff sampling location for the lower AU.

In addition, a Sampling and Analysis Plan (SAP) has been prepared that identifies analytical suites and sampling frequencies for each monitoring location. Table 1 is a summary of the SAP. We plan to collect four samples a year at each location. All sample analytical results will be posted on Intellus New Mexico.

In 2020 storm water flow were sufficient for samples to be collected at SWMP-S-01, 02, 03, 04 and 05. Storm water flows were insufficient for sampling collection at E124 and 06.

2.3.2.4 Storm water Controls/Management from Urban Townsite in Upper Watershed

Los Alamos County property discharging to Sandia Canyon is comprised of approximately 23 acres at the former municipal landfill site and 6 acres within the Royal Crest housing area. The landfill site has a soil cap and operates under a closure plan. At the east end of the site, the ground cover consists of sparse native perennial vegetation and approximately 3.5 acres of compacted basecourse housing a solar array. The west side of the site is primarily a flat area of compacted soil with light industrial activity. With the exception of a small area at the east end of the landfill site, the slopes along Sandia Canyon are stabilized with native perennial vegetation.

Within the Los Alamos County landfill site four rock lined open channel structures collect and convey runoff to Sandia Canyon. Three of the four structures discharge at locations upstream of the grade control structure. Runoff in remaining areas is conveyed to the canyon in multiple locations via sheetflow or minor concentrated flow. The six-acre site within the Royal Crest housing area has a system of storm drains that collect runoff from streets and surrounding structures and discharges runoff through a single culvert.

Controls within the Los Alamos County area consist primarily of maintenance of the landfill cap, compliance with the landfill closure plan, and erosion control structures on the east end of the landfill site. Previously, a significant portion of the runoff from the eastern half of the landfill site, from a single drainage area, was conveyed in rock rundowns to a single discharge location due north of the grade control structure. Significant erosion of the canyon slope at this discharge location was occurring, resulting in discharges of sediment into Sandia Canyon. Los Alamos County has initiated work to subdivide the current single drainage area on the east end into two basins, resulting in two new discharge locations. New riprap channels will convey runoff to small basins at these discharge points, facilitating additional reduction of runoff velocity prior to discharge. Creating new discharge locations also bypasses the existing eroded slope, minimizing sediment transport into Sandia Canyon.

In addition to the drainage modification on the landfill site, a large retention structure has been constructed within Sandia Canyon, on the north side of the grade control structure, to capture runoff from

approximately five acres of the landfill.. This structure is located within the area of the eroded slope and will retain runoff from the eroded area as well as the concentrated flow from one of the new discharge points. The structure has a controlled outlet and is designed to retain runoff from a 100-year storm event. For events of smaller magnitude this structure will prevent runoff from the landfill from reaching the water course within Sandia Canyon.

2.4 Description of Requirements under Which Pollution Controls Will Be Implemented

The demonstration should describe the basis for concluding that the pollution controls are requirements or why other types of controls already in place may be sufficient.

The programs and permits described above are based on specific requirements contained in the federal CWA or New Mexico State law. NPDES pollution controls and regulatory requirements described are specifically designed with the objective of meeting WQS at the point of compliance. Permit conditions and requirements are tailored specifically for discharges to impaired waters. The Consent Order (3) is the principal regulatory driver for the Laboratory's environmental restoration programs and requires the investigation and, if necessary, remediation of SWMUs and AOCs located on Laboratory property.

3. ESTIMATE OR PROJECTION OF TIME WHEN WQS WILL BE MET

The demonstration should provide a time estimate by which the controls will result in WQS attainment, including an explanation of the basis for the conclusion.

The 4B Demonstration was approved by the WQCC on December 18, 2020 and by EPA on January 22, 2021. Therefore the 4-year duration of the demonstration will span January 2021 through January 2025. For the pollutants identified, the controls in place are projected to provide measurable decreases in concentrations within 4 years of adoption of the Category 4B. The time-frame will allow implementation of control measures and confirmation monitoring against water-quality criteria targets. The time frame also facilitates coordination with listing cycles. Where the pollutant has no known anthropogenic source or where significant contributions originate from natural background sources, site-specific water quality criteria may be warranted, as provided for in 20.6.4.10 NMAC (2).

4. SCHEDULE FOR IMPLEMENTING POLLUTION CONTROLS

The demonstration should describe, as appropriate, the schedule by which the pollution controls will be implemented and/or which controls are already in place.

The Permits, projects and controls listed below are in effect. The NPDES permits or regulatory requirements set the schedule for implementation of pollution controls. Each permit or regulatory requirement imposes some combination of effluent limits, compliance schedules, monitoring requirements, enforcement provisions and compliance periods. The Sandia Wetland Stabilization Project is subject to requirements, including monitoring and reporting, under the Consent Order. The SEP and LID projects are completed and subject to maintenance, monitoring and inspection by NMED. LANL's SWMP will remain in effect until the MS4 is established and in effect.

- LANL Storm Water Monitoring Plan (SWMP)
- NPDES Industrial Outfall Permit (IPSP)
- NPDES Storm Water Individual Permit (IP)

- NPDES Storm Water MSGP
- Sandia Wetland Stabilization Project
- SEP Grade Controls and LID Projects
- NPDES – Construction General Permit

LANL continues to make progress on implementation of storm water controls. All NPDES permit monitoring requirements and permit limitations remain in effect. As indicated above LANL received the final designation from EPA as a MS4 regulated entity. The draft MS4 permit will be issued soon for public comment.

5. MONITORING PLAN TO TRACK EFFECTIVENESS OF POLLUTION CONTROLS

The demonstration should include a description of, and schedule for, monitoring milestones to track effectiveness of the pollution controls. The demonstration should describe water quality monitoring that will be performed to determine the combined effectiveness of the pollution controls on ambient water quality.

To track the effectiveness of the 4b Demonstration, the watershed-based gage stations E123, E124 SWMP-S-06 and E125 will be monitored as described in section 2.1.3 and Table 14.

Additionally, E123 is located within NM-9000.A_047 below the Sandia Canyon Wetland and E125 is located at the end of near the head of AU NM-128.A_11. Both gages are part of the Laboratory's Environmental Surveillance Program (ESP). E124, located above the TA-72 Firing Site, is also part of the ESP. The ESP has sampled and analyzed sediments and surface water in Sandia Canyon since approximately 1970. This work, reported in annual Environmental Reports, supports the evaluation of long-term trends in contamination in different media and understanding of the role of storm water transport.

Tables 16 – 18 provide a summary of sampling that occurred in calendar year 2020 through August 2023 water quality data from these sites. Due to insufficient storm water flows, limited samples were obtained from E124, SWMP-S-06 and E125. These samplers are located within the main stem of the Sandia Canyon water course and identified in Appendix 1.

Table 16
Dissolved Copper 2020 – August 2023

Monitoring Location	Min (µg/L)	Max (µg/L)	Mean (µg/L)	No. of Samples	Ratio of Storm water Samples	No. of Acute/Chronic WQC Exceedances[1]
SWMP-S-06		6.46	NA	1	1/1	1
E123	3.0	10.8	4.5	36	13/36	5/13
E124	2.78	5.46	3.7	7	7/7	0/1
E125	No Data[2]					

1. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2)

2. Insufficient flow for sample collection

Table 17
Total Mercury 2020 – June 2023

Monitoring Location	Min (µg/L)	Max (µg/L)	Mean (µg/L)	No. of Samples	Ratio of Storm water Samples	No of Wildlife Habitat WQC Exceedances
SWMP-S-06	<0.067	0.244	0.129	5	5/5	0
E123[3]	≤0.067	0.544		46	13/46	0
E124	0.07	0.619	0.295	5	4/5	0
E125	0.06	0.06		1	1	0

1. Not part of 4b in lower Sandia Canyon AU
2. Samples were not collected due to extended dry conditions and insufficient storm water.
3. Mercury is not a 4B parameter in the AU NM-9000,A_047

Table 18
Total Recoverable[2] Aluminum 2020 – June 2023

Monitoring Location	Min (ug/L)	Max (ug/L)	Mean (ug/L)	No. of Samples	Ratio of Storm water Samples	No. of Acute/Chronic WQC Exceedances[2]
SWMP-S-06	1830	13200	7023	4	4/4	4/4
E123	≤19.3	2600	868.7	34	29/34	11/26
E124	68	13800	5415	10	10/10	7/9
E125	No Data					

1. Samples filtered with 10um filter
2. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2) using the Canyon-specific hardness of 43 mg/L for Sandia Canyon from the Individual Stormwater Permit Appendix B1, Table B-1, NM0030759. The hardness-dependent Target Action Level (TAL) for copper is 6.07 µg/L, and the TAL for aluminum is 1,077 µg/L. The Wildlife Habitat TAL for mercury is 0.77 µg/L. The TALS for aluminum and copper are based on NMED's hardness dependent calculator for acute exposures to stormwater as required by the permit NM0030759.
3. Samples filtered with 10µm filter.
4. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2)

The SWMP monitoring program focus on stormwater discharges into Sandia Canyon. Figures contained in Appendix 1 show the Sandia Canyon watershed within LANL, the upper and lower assessment units and monitoring locations. S-01 and S-02 are the primary storm drain outfalls from TA-03 and will be used as run-on sampling locations for the upper AU. Gage station location E-124 will be used as the runoff sampling location for the upper AU and one of the run-on sampling locations for the lower AU. Sampling locations S-03, S-04 and S-05 will be used as TA-53 run-on sampling locations for the lower AU. Sampling location S-06 is located just upstream from the Lower Sandia Grade Control Structure and will be used as the runoff sampling location for the lower AU. Sampling results in Tables 19 – 21 represent samples collected in 2020 through August, 2023.

Table 19
Dissolved Copper SWMP-Monitoring Plan (January 2020 through June, 2023)

Monitoring Location	Min (ug/L)	Max (ug/L)	Mean (ug/L)	No. of Samples	No. of Acute WQC Exceedances[1,2]
SWMP-S-01	4.37	30	15.8	9	6
SWMP-S-02	5.36	15.7	10.6	9	8
SWMP-S-03	Not Sampled[3]				
SWMP-S-04	Not Sampled[3]				
SWMP-S-05	Not Sampled[3]				
SWMP-S-06	Not Sampled[3]				

1. Hardness of 61 mg/l (based on value established for MSGP)
2. Hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I (2)
3. Insufficient flows for sample collection

Table 20
Mercury SWMP Monitoring Sites (January 2020 through June, 2023)

Monitoring Location	Min (ug/L)	Max (ug/L)	Mean (ug/L)	No. of Samples	No. of Acute (Wildlife Habitat) WQC Exceedances
SWMP-S-01	No Data				
SWMP-S-02	No Data				
SWMP-S-03	<0.067	NA	NA	10	0
SWMP-S-04	<0.067	NA	NA	9	0
SWMP-S-05	<0.067	0.0940	NA	8	0
SWMP-S-06	<0.067	0.244	0.14	4	0

Table 21
Total Recoverable Aluminum SWMP Monitoring Sites (January 2020 through July 21, 2021)

Monitoring Location	Min (mg/L)	Max (mg/L)	Mean (mg/L)	No. of Samples	No. of Acute WQC Exceedances[1,2]
SWMP-S-01	35.5	1880	296	13	0tothis after
SWMP-S-02	68.0	446	207	10	0

SWMP-S-03	179	950	452	11	0
SWMP-S-04	238	4960	1572	9	4
SWMP-S-05	19.3	538	184	8	0
SWMP-S-06	<0.067	13200	3511	8	4

1. Hardness of 61 mg/l (based on value established for MSGP)
2. Samples prepared with 10u filter
3. Samples were not collected due to extended dry conditions and insufficient storm water

In addition to ESP, and SWMP surface water monitoring and assessments at the Laboratory occur at several levels.

1. The annual Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) includes monitoring of base flow or persistent surface water in main drainages and some tributary channels for an extensive list of constituents.
2. Sampling of snowmelt runoff and storm water at gaging stations occurred as part of the Laboratory's environmental surveillance activities.
3. Storm water sampling at locations and frequencies specified in the IP.
4. Ongoing storm water sampling at MSGP active facilities per the requirements of and at frequencies specified in the MSGP.
5. On-going monitoring to determine compliance with Industrial Outfall permit limitations.
6. Continuation of storm water sampling as part of a special study to evaluate background and baseline concentrations of PCBs, metals, and gross-alpha radiation in and near the Laboratory.

The demonstration should identify how and when assessment results from the monitoring will be reported to the public and USEPA.

The Laboratory's environmental data records are available on a single cloud-based, web-accessible system to the public. The cloud-based data system houses more than 12 million records, including 27,000 locations and 250,000 samples. All sampling data used in the 4b Demonstration are available to the public. The sampling locations described in the SWMP will also be placed in the cloud-based system. The publicly available view of the database requires no feeds or transformations of the data. The site can be accessed at http://www.intellusnmdata.com/.

Information on Environmental Surveillance activities is reported annually in the Laboratory's Annual Environmental Report. The most recent report, issued in December 2019, is for the 2018 calendar year (5). The report can be accessed at http://www.lanl.gov/community-environment/environmental-stewardship/environmental-report.php.

6. COMMITMENT TO REVISE POLLUTION CONTROLS, AS NECESSARY

The demonstration should provide a statement with a commitment to revise the pollution controls, as necessary, if progress towards meeting water quality standards is not being shown.

To achieve attainment of water quality standards, DOE/Triad employs compliance options including NPDES permit conditions and limitations as well as a number of pollution controls. In the event that progress towards meeting water-quality targets are not achieved, changes in permit and regulatory requirements may be sought. This provided it can be demonstrated that changes will result in compliance

with water quality targets. NPDES permits provide an array of procedures and mechanisms to measure and ensure progress is achieved, including (1) schedules of compliance, (2) compliance status reports, (3) reopener clauses, (4) inspections, and (5) reporting requirements. EPA may change permit limitations and conditions. Under section 401 of the CWA, NMED certifies that permitted activities will comply with New Mexico WQS.

The Laboratory has constructed or established a number of pollution controls, including the SWMP, LANL Engineering Standards, LID Master Plan, Sandia Grade Control Structure, and Supplemental Environmental Projects in lower Sandia Canyon. These and others in this report will be evaluated for effectiveness.

- The SWMP includes increased controls to manage storm water runoff from urban and developed areas at the Laboratory. This plan will aid in further identifying storm water runoff locations, quantifying runoff volumes, identifying potential pollutant sources affecting water quality, and assisting in the identification of appropriate Best Management Practices and control measures for both current and future sites and activities. Monitoring under the plan will continue and revised, as necessary, based on attainment of water quality.
- The Sandia Grade Control structure was completed in 2013. Water level, water quality, vegetative and geomorphic changes are being monitored. The objectives of the GCS was to minimize erosion, provided even grade, prevent draining of alluvial soils, facilitate nonchannelized flow and support wetland functions. The objectives and performance are outline in the Sandia Wetland Performance Report (6) contained in the Public Reading Room (Public Reading Room). The objectives are largely being achieved and no revision to these controls is anticipated in the near future.
- Execution of the SEPs provided the Laboratory the opportunity to address storm water management issues including design and installation of engineering structures to slow storm water flow and decrease sediment load to improve water quality. Two SEP structures were constructed in the lower Sandia Canyon AU. In 2020, a sampler (SWMP-S-06) was located between the two structures. Due to insufficient stormflow, the site has not been sampled. Once sampled, results will be compared with standards and monitoring results from E124 and E125.
- A Low Impact Development (LID) Master Plan has been developed and finalized. The LID Master Plan will guide and prioritize future development of LID projects at LANL. The LID Master Plan applies to developed areas across the Laboratory and focuses on identifying opportunities for storm water quality and hydrological improvements in the heavily urbanized areas of Technical Areas 03, 35 and 53. TA-03 primarily drains to Sandia, Mortandad, Two Mile and Los Alamos Canyons. The LID Master Plan will be changed as needed and is organized to allow the addition of LID projects for other technical areas as time and funds allow in the future.
- The LANL Engineering Standards Manual was revised to streamline and clarify NPDES Construction General Permit and Energy Independence & Security Act, Section 438 requirements for designing and implementing stormwater management features. The revision includes the addition of LANL site specific data (i.e., rainfall data, hydrologic curve numbers, design storm precipitation totals) to ensure projects equal to or greater than 5,000 square feet implement the appropriate stormwater controls necessary to restore the pre-development hydrology of the site. Additional requirements were added for sizing LID water quality treatment BMPs such as extended detention stormwater controls.

The 4B Demonstration was approved by the WQCC on December 18, 2020 and by EPA on January 22, 2021. Therefore the 4-year duration of the demonstration will span January 2021 through January 2025.

7. REFERENCES

The following list includes all documents cited in this report. They can be accessed at the following links: Electronic Public Reading Room, Public Reading Room.

1. NMED. State of NM 2020-2022 Clean Water Act § 303(d)/§ 305 (b) Integrated List.
2. New Mexico Water Quality Control Commission (NMWQCC). State of New Mexico Standards of Interstate and Intrastate Surface Waters, 20.6.4 NMAC.
3. NMED (2005 and 2012 revision). Compliance Order on Consent – The United States Department of Energy and the Regents of the University of California
4. LANL (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.
5. LANL (December 2019). Los Alamos National Laboratory Environmental Report 2018, Los Alamos National Laboratory document LA-UR-19-28950, Los Alamos, New Mexico.
6. LANL (2021). 2020 Sandia Wetland Performance Report
7. EPA (2015). Los Alamos National Laboratory (LANL) Industrial Wastewater Permit - NPDES Permit No. NM0028355
8. EPA (2022a). Los Alamos National Laboratory (LANL) Industrial Wastewater Permit - NPDES Permit No. NM0028355.
9. EPA (2022b). Los Alamos National Laboratory (LANL) FINAL Industrial Wastewater Permit - NPDES Permit No. NM0028355.

8. REVISION HISTORY

January 2024 Revision 2 addressing estimates of reduction needed

November 2023 Revision 1 addressing EPA and NMED comments

August 2023 Version 1 updating water quality data and interpretation

August 2021 – Updated storm water monitoring data for SWMP-S-01, 02, 03, 04

August 2021 – Updated and corrected water quality data for LANL-based gages E123, E124 and E125

August 2012 – Added LANL-based gages E123 and E125 to Category 4B Demonstration. Samples from these gages are collected as part of the Laboratory's Environmental Surveillance Program.

August 2021 - Flows were insufficient for sample collection at LANL-Based gages E124 and E125 in 2020 and early 2021. Results of samples that may have been collected in summer 2021 are not, at the time of this report, posted in Intellus or EIM.

August 2021 – To measure effectiveness of the 4B Demonstration, the watershed-based gages E123, E124 SWMP-S-06 and E125 will be monitored as described in section 2.1.3 and Table 14.

August 2021 – Added Appendix 3 to include time trend graphs with measurements from stations E123, E124 and E125 (y-axis) each year (x-axis).

November 2023 – Revised to address comments from NMED and EPA

November 2023 – Revised to include a table, as Appendix 4, locations and completion dates of stormwater BMPs.