Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Protection Division
Environmental Compliance Programs (ENV-CP)
PO Box 1663, K490
Los Alamos, New Mexico 87545
(505) 667-0666

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Ms. Lynette Guevara
Assessment Coordinator
Monitoring and Assessment Section
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, New Mexico 87502

Dear Ms. Guevara:

Subject: **Category 4B 2015 Progress Report - Sandia Canyon Assessment Unit: AU NM-9000.A047 – Dissolved Copper Pollutant Pair**

Attached is the Los Alamos National Security, LLC (LANS) Category 4B 2015 Progress Report for the Sandia Canyon Assessment Unit – NM-9000.A_047 (AU). The report provides a summary of the steps taken and progress made towards attainment of the dissolved copper water quality criteria, including:

1. A new Industrial Point Source Permit (IPSP – NPDES Permit No. NM0028355) became effective on October 1, 2014. The IPSP Permit includes 11 outfalls, three of which discharge to AU. The new permit includes monitoring requirements and effluent limits for dissolved copper at the three outfalls. The effluent limits were added through the State of New Mexico 401 Water Quality Certification and based on the most limiting applicable State Water Quality Standards numeric criteria for the receiving stream in Segment 20.6.4.126 NMAC.

2. The Storm Water Individual Permit (IP – NPDES Permit No. NM0030759) renewal application was submitted on March 27, 2014 and February 10, 2015. The renewal application contains substantive changes to reflect new information from investigations and analysis conducted under the Consent Order and IP storm water collection. Within the AU there are thirteen sites that meet the definition of a SWMU or AOC and are covered in the IP. Copper has not been identified as a significant industrial material historically used at any of the Sites in the AU.

3. On June 4, 2015 the Environmental Protection Agency (EPA) issued the final Storm Water Multi-Sector General Permit (MSGP – NPDES Permit Tracking No. NMR05GB21). The permit replaces the 2008 MSGP that expired on September 29, 2013. The MSGP authorizes storm water discharges from industrial facilities. There are seven MSGP regulated facilities with the potential to discharge storm water to the AU. Per the MSGP, copper is identified as a potential pollutant at only one of the MSGP facilities: the TA-60 Material Recycling Facility (E122.35). Benchmark monitoring concentrations were modified in the new permit to reflect the New Mexico Water Quality Standards. This includes a new benchmark value for copper. Monitoring under the new permit is not schedule to begin until November 2015. In addition, LANS must determine the hardness value of the receiving waters. Storm water monitoring under the 2008 MSGP was initiated in April 2009. Monitoring results for copper since that time have been below either the MSGP sector-specific benchmarks or the Laboratory's specific background value for storm water.

4. Gages E121, E123 and Middle Sandia at WP Terminus (SCS-2) serve as the monitoring locations for determining reduction in copper concentration and attainment of water-quality targets for the 4B Demonstration. The SCS-2 sampler is located at the terminus of the perennial reach in the AU and was reactivated in June of 2015. In 2013, 2014 and 2015 sixty-one (61) samples were collected and analyzed for dissolved copper and hardness. Samples collected under storm conditions typically exceed the water quality criteria. The one sample collected, during storm conditions, at the SCS-2 sampler on June 16, 2015 was below the water quality criteria. The data do not indicate improvements in dissolved copper concentrations.

5. Load-duration curves for E-121 and E-123 were updated with 2013 and 2014 flow and analytical data. The water-quality criteria for dissolved copper continue to be exceeded at the higher storm driven flow rates. However, a modest decrease in copper waste loads was observed between 2012 and 2014. This was due to lower measured copper levels at the outfalls and a reduction in flow volumes.

6. The Metals Background Report is scheduled for update in 2015. Data used to calculate load allocations from urbanized areas within the Laboratory were not changed from the original report.

7. Completed in November of 2013, the Sandia Grade Control Structure (GCS) has effectively arrested headcutting at the terminus of the wetland. Water levels have not dropped below the levels observed in 2013, even in light of reduced effluent volumes, and remain sufficiently high to sustain obligate wetland vegetation. Storm water data indicate the GCS has had a positive impact in terms of contaminant mobility. Improvements in dissolved copper concentrations are not evident from AU storm water gage data collected between 2008 and 2014.

8. Storm water urban runoff is a significant contributor to dissolved copper water quality exceedances in the AU. LANS' Storm Water Management Plan was identified as a key to addressing non-point source contamination and eventual attainment of water quality standards in the AU. On March 6, 2015 EPA issued their preliminary determination that discharges of storm water from municipal separate storm water sewer system (MS4) 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. The preliminary designation applies to MS4s within the Laboratory, including the Department of Energy and LANS located within Los Alamos County. As a result of EPAs preliminary determination, LANS has suspended development and implementation of the Storm Water Management Plan until a final MS4 determination is made. LANS' Storm Water Management Plan and MS4 share key objectives. An MS4 can complement LANS' existing NPDES permit coverage by directly addressing storm water runoff from urbanized areas at the Laboratory.

Thank you for your assistance. Please contact Robert Gallegos (505) 665-0450 of the Environmental Compliance Programs (ENV-CP) if you have questions.

Sincerely,

Anthony R. Grieggs
Group Leader
Environmental Compliance Programs (ENV-CP)
Los Alamos National Security, LLC

ARG:RMG/lm

Enclosures:
1. Category 4B 2014 Progress Report – Sandia Canyon Assessment Unit – NM-9000.A_047
2. Category 4B 2015 Progress Report – Data Set and Graphs (CD)
3. Category 4B 2015 Progress Report – Map of Sandia Canyon Assessment Units
4. Category 4B 2015 Progress Report – MSGP Site Locations in Sandia Canyon AU

Cy: James Hogan, NMED/SWQB, Santa Fe, NM, (E-File, w/o enc.)
Gene E. Turner, LASO-NS-LP, (E-File, w/o enc.)
Kirsten M. Laskey, (LASO-SUP), (E-File, w/o enc.)
Jordan Arnswald, (LASO-NS-PI), (E-File, w/o enc.)
Craig S. Leasure, PADOPS, (E-File, w/o enc.)
Amy E. De Palma, PADOPS, (E-File, w/o enc.)
Michael T. Brandt, ADESH, (E-File, w/o enc.)
Raeanna Sharp-Geiger, ADESH, (E-File, w/o enc.)
Alison M. Dorries, ENV-DO, (E-File, w/o enc.)
Michael T. Saladen, ENV-DO, (E-File, w/o enc.)
Robert M. Gallegos, ENV-DO, (E-File, w/o enc.)
lasomailbox@nnsa.doe.gov, (Hard copy)
locatesteam@lanl.gov, (Hard copy)
env-correspondence@lanl.gov

ENCLOSURE 1

Category 4B 2015 Progress Report – Sandia Canyon Assessment Unit - NM-9000.A_047

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

1.1 Assessment Unit Description

The 4b Demonstration covers the upper Sandia Canyon Assessment Unit (AU), which consists of the Sandia Canyon reach within Los Alamos National Laboratory (Laboratory) property between NPDES Outfall 001 and Sigma Canyon. This AU represents the upper portion of Sandia Canyon with perennial flows generated primarily from NPDES Outfall 001. This AU is classified as perennial water (20.6.4.126 NMAC) and has designated uses of coldwater aquatic life, livestock watering, wildlife habitat, and secondary contact.

- AU Name: Upper Sandia Canyon AU (NPDES Outfall 001 to Sigma Canyon)
- AU ID: NM-9000.A_047
- 2.21-mi reach comprised primarily of discharge from NPDES Outfall 001

Three NPDES Permits continue to provide coverage for current and historical activities in the AU:

1. The Industrial Point Source Permit (IPSP, NPDES Permit No. NM0028355) covers three outfalls,
2. The Storm Water Individual Permit (IP, NPDES Permit No. NM0030759) covers thirteen 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. NMR05GB21) covers seven ongoing operational industrial facilities subject to this EPA general permit.

1.2 Impairment and Pollutant Causing Impairment

The following Water Quality Standards are not supported (2014-2016 CWA §3039(d)/§305(b) Integrated Report):

Designated Use Not Supported	Parameter with Associated WQS	Sandia Canyon (Sigma Canyon to NPDES outfall 001)
Coldwater AL	Dissolved Copper-Acute AL	Non Support

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1.3 Sources of Pollutant Causing the Impairment

1.3.1 Industrial Point Source Permit (IPSP, NPDES Permit No. NM0028355)

The IPSP Discharge Permit is currently the only active NPDES Industrial and Sanitary Outfall Discharge Permit at the Laboratory. A new permit was issued on August 15, 2014 with an effective date of October 1, 2015 to September 30, 2019. The IPSP Permit includes 11 outfalls, three of which discharge to the upper AU (Table 1). The locations of these outfalls are shown on the map in Enclosure 3. A new requirement in the permit is monitoring requirements and effluent limits for dissolved copper at the three outfalls that discharge to the AU. The effluent limits were added through the State of New Mexico 401 Water Quality Certification and based on the most limiting applicable State WQS numeric criteria for the receiving stream in Segment 20.6.4.126 NMAC.

Table 1
Industrial Point Source Permit Outfalls Discharging to the Upper Sandia AU

Outfall Category	ID No.	Location/ Facility	Watershed
Power Plant/Sanitary Effluent Reclamation Facility (SERF) Discharge (001)	001	TA-3-22	Sandia
Treated Cooling Water (03A)	03A027	TA-3-2327	Sandia
Treated Cooling Water (03A)	03A199	TA-3-1837	Sandia

Table 2 provides a summary of operational copper data for Outfalls 001, 03A027, and 03A199 for the period 2013 and 2014. Monitoring for dissolved copper under the new permit has not started. Consequently, the table includes only one sample for dissolved copper.

Table 2
Copper (Operational) Data for Outfalls 001, 027, and 199 (2013 – 2014)

Monitoring Location	Min (µg/L)	Max (µg/L)	Mean (µg/L)	Median (µg/L)	No. of Samples	Effluent Limit (ug/l)
Outfall 001	2.16 [d]	3.16 [d]	—[a]	—[a]	2	7.3
Outfall 027	7.15[d]	7.44 [d]	—[a]	—[a]	2	7.3
Outfall 199	—[b]	1.44[c]	—[b]	—[b]	1	7.3

a. Data not sufficient to calculate median
b. Only one data point available
c. Dissolved Copper Result
d. Total Copper Result

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1.3.2 Storm Water Individual Permit (IP, NPDES Permit No. NM0030759)

The IP authorizes discharges of storm water associated with industrial activities from specified Solid Waste Management Units (SWMUs) and Areas of Concern (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. Within the AU there are thirteen sites that meet the definition of a SWMU or AOC and included 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); and
3. Potentially impacts surface water. The selection of SWMUs and AOCs for inclusion in the IP was based on storm water, sediment, and soil data available at the time the permit application was submitted.

The current status of the 13 IP sites in the AU are summarized in Table 4. Copper is not identified in as a significant industrial material historically used at any of the sites in this AU. Storm water monitoring for metals, including copper, is required at all thirteen 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 map in Enclosure 3 shows the locations of the SMAs in the AU. The Laboratory has been collecting storm water samples under the IP since the spring of 2011.

Monitoring and runoff controls are implemented per the IP, as applicable. For those sites not under the IP, investigation and characterization, risk assessment and appropriate remediation will be conducted per the Consent Order, providing full protection of human health and the environment.

On March 27, 2014, the renewal application for the NPDES Individual Permit was submitted to EPA. Three categories of changes are proposed in the draft Permit: (1) substantive changes to reflect substantial new information from investigations and analysis conducted under the Consent Order and Individual Permit storm water collection; (2) organizational changes to clarify, improve, and facilitate understanding of requirements of the Individual Permit; and (3) nonsubstantive changes and correction of minor typographical errors.

1.3.3 Storm Water Multi-Sector General Permit (MSGP, NPDES Permit Tracking No. NMR05GB21)

On June 4, 2015 EPA issued the final 2015 MSGP permit. The permit replaces the existing permit that expired on September 29, 2013.

The MSGP regulates storm water discharges from identified industrial activities and their associated facilities. Currently, there are seven MSGP-regulated facilities with the potential to discharge storm water to the AU. Four of the seven are located immediately adjacent to upper Sandia Canyon. The other three MSGP facilities convey runoff to upper Sandia Canyon via the Laboratory's storm drain

infrastructure. Table 5 lists the seven MSGP sites, along with the monitored outfalls for each facility, their impaired water monitoring constituents, and the current monitoring status. Monitoring under the new permit will not begin until October 2015. The map in Enclosure 4 shows the location of the MSGP sites.

MSGP-regulated industrial activities within the AU include metal fabrication, vehicle and equipment maintenance, recycling activities, electricity generation, and warehousing activities. EPA has identified potential pollutants, such as copper, applicable to the regulated activities. For each identified potential pollutant, the MSGP stipulates a pollutant benchmark concentration that may be applicable to a storm water discharge. Per the MSGP, copper is identified as a potential pollutant at only one of the MSGP facilities: the TA-60 Material Recycling Facility (E122.35).

1.4 Gages Used in Evaluation of Upper Sandia Canyon AU

The Laboratory's environmental surveillance storm water monitoring gages E121, E123 and Middle Sandia at WP Terminus (SCS-2) serve as the monitoring locations for determining reduction in copper concentration and attainment of water-quality targets for the 4b Demonstration. These gages are located in the AU as indicated below and are shown on the map in Enclosure 3.

1. Gaging Station E121 – South Fork of Sandia Canyon near power plant. E121 is located west of wetland and down gradient of NPDES Outfall 001.

2. Gaging Station E123 – Sandia Canyon just east of wetland. The location selected to monitor persistent surface flows exiting the wetland.

3. Surface Water Sampling Station SCS-2 – Middle Sandia Canyon. Location selected to monitor surface water near the eastern terminus of persistent base flow. This gage has been inactive since 2011. The gage was recently activated under the 4b Demonstration.

1.5 Non-point Source Locations and Potential Magnitudes

The watershed discharging to upper Sandia Canyon is comprised of approximately 150 acres Laboratory property and 29 acres of area under the control of Los Alamos County. The majority of the Laboratory area is impervious surfaces located within an urban environment consisting of buildings, parking lots, and light industrial facilities. Remaining areas are comprised of native perennial vegetation or landscaping. The majority of the watershed area within the Laboratory is located west of the head of Sandia Canyon. Runoff within this area is primarily managed through the Laboratory'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 seven NPDES MSGP regulated facilities with a combined total area of 35 acres. These facilities manage storm water runoff and potential pollutants in accordance with the MSGP requirements. 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.

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

The "Background Metals Concentrations and Radioactivity in Storm Water on the Pajarito Plateau, Northern New Mexico" (the Metals Background Report) was developed from storm water samples collected from 2009 to 2012 at developed urban monitoring locations throughout the Laboratory and within the Los Alamos County townsite to determine potential nonpoint source urban/developed runoff for metals. The report is scheduled for update in 2015.

The principal objectives of the study were to (1) determine background concentrations in undeveloped Reference watersheds and Western Boundary locations, and (2) determine the baseline/non-point source concentrations of metals and radioactivity in urban runoff from the Los Alamos County townsite and developed landscapes within the Laboratory.

Estimates of the upper limit of baseline conditions, intended for use in determining if runoff from these non-point source conditions is exceeding associated water quality criteria, were calculated based on upper tolerance limits (UTLs).

The copper baseline UTL for storm water runoff from combined urban runoff from the Los Alamos County townsite and developed landscapes within the Laboratory on the Pajarito Plateau is 32.3 µg/L. The UTL for storm water runoff from developed landscapes within the Laboratory is 34.19 ug/l. Copper baseline data from urban and developed Laboratory sites are presented in Table 3a.

Table 3a
Baseline Pajarito Plateau Storm Water Dissolved Copper Concentrations (µg/L)

Urban and Laboratory developed site Runoff Baseline Values[a]	Laboratory Developed Site Runoff Baseline Values
32.3	34.19

a. Urban Runoff BVs—Urban runoff in the vicinity of Los Alamos townsite and Laboratory property.

1.7 Non-point Source from Natural Background

Naturally occurring sources of copper are summarized in the Metals Background Report. 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. 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 . The copper background values from undeveloped areas are presented in Table 3b.

Table 3b
Background Pajarito Plateau Storm Water Dissolved Copper Concentrations (µg/L)

Reference Area[a] Background Values	Western Boundary[b] Background Values
3.43	5.7

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 stations 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.

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

2.1 Numeric Targets

The load-duration curves for E-121 and E-123 are updated with 2013 and 2014 flow and analytical data. The load-duration curve provides a framework to identify target daily loads over the full range of flow conditions (Figures 1 and 2). By displaying the instantaneous loads calculated from ambient water-quality data and the average flow on the date of the sample, a pattern develops that describes the characteristics of the water-quality impairment. Loads that plot above the curve indicate an exceedance of the water-quality criterion (dissolved copper in this case), while those that fall below the load-duration curve show compliance. The water-quality criteria for dissolved copper are exceeded at the higher storm-driven flow rates.

Table 4
Upper Sandia Canyon AU Site Monitoring Areas (S-SMA) Authorized to Discharge under Storm Water Individual Permit NM0030579

SMA	Site ID	Site Description	AU	Site Monitoring Requirements[1]	Is Site a Potential Source of Copper?	Dissolved Copper (Cu) TAL Exceedance	IP Status[1] (as of March 27, 2014)
S-SMA-0.25	03-013(a)	A 1500-ft-long corrugated metal pipe (CMP) storm drain that served building 03-0038. The storm drain ran underground around building 03-0038, east along the south side of the Otowi Building (building 03-0261) and connected to four other storm drains before daylighting 100 ft east of the Otowi Building where it became an open concrete- and rock-lined ditch. Most of the CMP associated with SWMU 03-013(a) was removed in 2004 to accommodate the construction of the NSSB (03-1400) and a new parking structure (03 1402) east of the Otowi Building. The excavated CMP was managed as nonhazardous/nonradioactive industrial waste. Inspection of the drain line trench showed no evidence of a release from the drainpipe. A new storm drain pipe was installed west of SWMU 03 052(f) to manage storm water runoff from the new parking structure. The new storm drain discharges to the SWMU 03 052(f) outfall. Potential contaminants associated with industrial materials historically managed at this Site are metals and petroleum products. The SMA sampler associated with 03-013(a) receives runoff from a large storm drain system that captures runoff from roof drains, roads, and parking areas from a 33-acre developed area consisting of approximately 50% of TA-03. The concentration of copper detected in the SMA samples is less than the developed area background UTLs, consistent with the Site not being the source of these TAL exceedances.	NM-9000.A_047	Gross alpha, Cu, Zn, polychlorinated biphenyls (PCBs)	No. Copper is not known to be associated with industrial materials historically managed at the Site. No data are available, and Consent Order sampling has been delayed until the demolition of building 03 1400 and structure 03 1402	Yes; 9.7-10.9 µg/L Cu detected.	On July 11, 2014 submitted certification of Installation of Enhanced Control Measures. In corrective action; enhanced controls installed (Q2 2013); A request for alternative compliance that included this site was submitted to EPA on April 30, 2013 and EPA's response was issued on March 27, 2014. EPA stated in its findings and determinations that this site was eligible for completion of corrective action under Part I.E.2 (i.e.: control measures that totally eliminate exposure of pollutants to storm water).The Permittees will submit a certification of completion of corrective action to EPA in accordance with this Part.
	03-052(f)	A formerly permitted outfall (EPA 03A023) that received wastewater from floor drains, sinks, water fountains, and a storm drain, which served building 03-0038 until 1987 when the drains in building 03-0038 were rerouted to the TA-03 sanitary sewer system. Potential contaminants associated with industrial materials historically managed at this Site are volatile organic solvents, petroleum products, and metals included in discharges from the maintenance contractor's shop in building 03-38 and three reported petroleum hydrocarbon spills. The only discharge to the outfall since 1987 is storm water runoff from parking lots and the surrounding areas in the north-central portion of TA-03 including the SWMU 03-013(a) storm drain. Outfall 03A023 was removed from the NPDES permit on July 11, 1997. The SMA sampler associated with 03-013(a) receives runoff from a large storm drain system that captures runoff from roof drains, roads, and parking areas from a 33-acre developed area consisting of approximately 50% of TA-03. The concentration of copper detected in the SMA samples is less than the developed area background UTLs, consistent with the Site not being the source of these TAL exceedances.	NM-9000.A_047	Gross alpha, Cu, Zn, SVOCs and PCBs	No. Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above BVs in 9 of 14 shallow Consent Order samples at a maximum concentration 2.1 times the tuff BV.	Yes; 9.7-10.9 µg/L Cu detected.	On July 11, 2014 submitted certification of Installation of Enhanced Control Measures. In corrective action; a request for alternative compliance that included this site was submitted to EPA on April 30, 2013 and EPA's response was issued on March 27, 2014. EPA established a new compliance date of 10/31/2015 for this site. The Site meets industrial and construction worker risk levels and was recommended for a CoC with controls. SWMU 03-052(f) was included in the Supplemental Investigation Report for the Upper Sandia Canyon Aggregate Area, submitted to the NMED under the Consent Order on August 27, 2013.

SMA	Site ID	Site Description	AU	Site Monitoring Requirements[1]	Is Site a Potential Source of Copper?	Dissolved Copper (Cu) TAL Exceedance	IP Status[1] (as of March 27, 2014 and February 10, 2015)
S-SMA-1.1	03-029	SWMU 03-029 is a 30-ft × 70-ft purported former landfill located near the rim of Sandia Canyon at TA-03. This landfill reportedly received excess asphalt from the batch plant and was subsequently covered with sand, however during surveys in 2005, no buried asphalt was encountered. Potential contaminants associated with industrial materials historically managed at this Site are petroleum products associated with asphalt. Dense grass cover was established and maintained on all fill slopes and disturbed areas. Water samples collected from the storm drain indicated that oil, grease, or other chemicals typically associated with asphalt plant operations were not present indicating the effectiveness of the corrective action. The asphalt batch plant operated at TA-03 from 1953 to 1990. The SMA sampler receives runoff primarily from developed areas (buildings, parking lots, roads, and a former salvage yard (SWMU 03-059) as well as from landscape consisting of Bandelier Tuff sediment. The concentrations of copper detected in the SMA samples are less than the developed site UTL but are slightly above the undeveloped UTL, which is consistent with the land use in the S-SMA-1.1 drainage area.	NM-9000.A_047	Gross alpha, Cu, and PCBs	No. Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above BVs in 2 of 6 shallow samples (i.e., less than 3 ft bgs) at a maximum concentration 2.8 times the soil BV but was not statistically different from background.	Yes; 5.2-5.8 µg/L Cu detected.	SWMU 03-029 is included in the supplemental investigation report for the Upper Sandia Canyon Aggregate Area, submitted to NMED under the Consent Order on August 27, 2013, and is recommended for corrective action complete without controls in that report. SWMU 03 029 will be eligible for a CoC upon approval of the report by NMED.
S-SMA-2	03-012(b)	SWMU 03-012(b) is soil contamination associated with operational releases from the TA-03 power plant, building 03-22, and associated cooling towers, including cooling tower drift. Potential contaminants associated with industrial materials historically managed at this Site are chromium and PCBs. The original IP Site narrative for Site 03-045(b) stated that Sites 03-012(b) and 03-045(b) are the same. The August 2013 supplemental investigation report for Upper Sandia Canyon Aggregate Area treats them separately: Site 03-012(b) addresses potential soil contamination associated with the historical operation of the cooling towers, and Site 03-045(b) is the outfall itself. The SMA receives run-on primarily from developed areas in TA-03. The SMA result for copper is less than the backgrounds for developed sites.	NM-9000.A_047	Gross alpha, Cu, Zn, and PCBs	No. Copper is not known to be associated with industrial materials historically managed at this Site. Copper was detected above the soil BV in shallow (i.e., less than 3 ft bgs) soil samples collected before construction activities in 2002 and 2003. Copper was detected above BV in 2 of 42 shallow samples at a maximum concentration 1.8 times the soil BV.	Yes;4.43-ug/l, Corrective action monitoring	In corrective action; a request for alternative compliance that included this site was submitted to EPA on [date] and EPA's response was issued on March 27, 2014. EPA established a new compliance date of 10/31/2015 for this site. The Consent Order Phase I investigation has been completed for SWMUs 03-012(b), 03-045(b), and 03 045(c), and these Sites were included in the August 2013 supplemental investigation report for Upper Sandia Canyon Aggregate Area. SWMU 03-012(b) was recommended for corrective action complete without controls. A force majeure request was submitted to EPA on September 23, 2013, based upon the anticipated issuance by the NMED of a CoC without controls. This Site was also included in the alternative compliance request for S-SMA-2 that was submitted to EPA in October 2013.

SMA	Site ID	Site Description	AU	Site Monitoring Requirements[1]	Is Site a Potential Source of Copper?	Dissolved Copper (Cu) TAL Exceedance	IP Status1 (as of March 27, 2014 and February 10, 2015)
S-SMA-2.8	AOC 03-014(c2)	AOC 03-014(c2) is the inactive overflow outfall that previously received treated effluent from the former TA-03 wastewater treatment plant (WWTP) from 1975 to 1985, when the WWTP chlorination system[SWMU 03-014(j)] was constructed. Following the construction of the chlorination system, the outfall was rerouted underground where the final effluent discharged freely into Sandia Canyon. This outfall was abandoned in 1988 or 1989, when the WWTP effluent was routed to a new outfall, AOC 03-014(b2).	NM-9000.A_047	Gross alpha, Ra-226, Ra-228, cyanide, metals, PCBs, and SVOCs	No. Copper is not known to be associated with industrial materials historically managed at this Site.	No.	No IP sample collected. Proposed additional sampling for PCBs under the Consent Order to define the vertical extent of Aroclor-1254 and Aroclor-1260 at one sampling location. AOC 03-014(c2) will likely be recommended for corrective action upon completion of the Phase II sampling recommended in the Upper Sandia Canyon Aggregate Area investigation report.
S-SMA-3.51	03-009(i)	SWMU 03-009(i) is an inactive surface disposal site located east of the liquid and compressed-gas facility (building 03-0170). This site consists primarily of clean fill from TA-03 construction sites with construction debris, including crushed tuff, pieces of concrete, and asphalt mixed in with some of the fill material.	NM-9000.A_047	Gross alpha, Ra-226, Ra-228, cyanide, metals, PCBs, and SVOCs	No. Copper is not known to be associated with industrial materials historically managed at this Site.	No.	No IP sample collected. SWMU 03-009(i) is included in the supplemental investigation report for the Upper Sandia Canyon Aggregate Area, submitted to NMED under the Consent Order on August 27, 2013; the Site meets residential risk levels and is recommended for corrective action complete in that report. SWMU 03 009(i) will be eligible for a CoC upon approval of the report by NMED.
S-SMA-3.52	03-021	SWMU 03-021 is an outfall and associated daylight channel located near the liquid and compressed gas facility (building 03-0170). The outfall is a formerly NPDES-permitted outfall (EPA 04A094) and was removed from the 1997 permit. From 1964 to 1976, the outfall discharged caustic wash and rinse water from compressed-gas-cylinder cleaning operations. The end of the outfall pipe discharged into a surface ditch that continued about 180 ft to the main drainage ditch. This outfall was not used after 1976.The outfall was buried when 5 to 10 ft of fill material was placed over the former outfall area and graded during site-preparation activities.	NM-9000.A_047	Gross alpha, Ra-226, Ra-228, cyanide, metals, PCBs, and SVOCs	No. Copper is not known to be associated with industrial materials historically managed at this Site.	No.	No IP sample collected. SWMU 03-021 is included in the supplemental investigation report for the Upper Sandia Canyon Aggregate Area, submitted to NMED under the Consent Order on August 27, 2013; the Site meets residential risk levels and is recommended for corrective action complete in the report. SWMU 03-021 will be eligible for a CoC upon approval of the report by NMED.

SMA	Site ID	Site Description	AU	Site Monitoring Requirements[1]	Is Site a Potential Source of Copper?	Dissolved Copper (Cu) TAL Exceedance	IP Status1 (as of March 27, 2014 and February 10, 2015)
S-SMA-2	03-45(b)	SWMU 03-045(b) is the NPDES-permitted outfall (Outfall 001) that currently receives treated sanitary effluent from the TA-46 Sanitary Wastewater Systems Consolidation (SWSC) Plant and SERF as well as occasional discharges of power plant cooling tower blowdown. The original IP Site narrative for Site 03-045(b) stated that Sites 03-012(b) and 03-045(b) are the same. The August 2013 supplemental investigation report for Upper Sandia Canyon Aggregate Area treats them separately: Site 03-012(b) addresses potential soil contamination associated with the historical operation of the cooling towers, and Site 03-045(b) is the outfall itself. Phase I Consent Order Phase investigations are complete for SWMU 03-045(b), and the Site was included in the August 2013 supplemental investigation report for Upper Sandia Canyon Aggregate Area. SWMU 03-045(b) was recommended for additional extent sampling.The SMA receives run-on primarily from developed areas in TA-03. The SMA result for copper is less than the backgrounds for developed sites.	NM-9000.A_047	Gross alpha Cu, Zn, and PCBs	No. Copper is not known to be associated with industrial materials historically managed at this Site. Copper was not detected above soil BV in shallow (i.e., less than 3 ft bgs) 2009 Consent Order samples.	Yes;	In corrective action; a request for alternative compliance that included this site was submitted to EPA on [date] and EPA's response was issued on March 27, 2014.EPA stated in its findings and determinations that non-storm water discharges from an active industrial NPDES permit cannot be considered point source discharges under the IP. As a result, the Permittees proposed to delete this site from the IP in its March 27, 2014 renewal application.
	03-045(c)	SWMU 03-045(c) is an NPDES-permitted outfall (EPA 03A027) that previously received effluent from a cooling tower (structure 03-285), which served the generators powering a Laboratory computer system and may have historically received chromate-treated water. Outfall 03A027 is currently permitted for the discharge of cooling tower blowdown water and other wastewater from structures 03-285 and 03-2327. The Consent Order Phase I investigation has been completed for SWMUs 03-012(b), 03-045(b), and 03 045(c), and these Sites were included in the August 2013 supplemental investigation report for Upper Sandia Canyon Aggregate Area. SWMU 03-045(c) was recommended for additional sampling to define extent. The SMA receives run-on primarily from developed areas in TA-03. The SMA result for copper is less than the backgrounds for developed sites.	NM-9000.A_047	Gross alpha, Cu, Zn, and PCBs	No. Copper is not known to be associated with industrial materials historically managed at this Site. Copper was not detected above soil BV in shallow (i.e., less than 3 ft bgs) Consent Order soil samples.	Yes;	In corrective action; a request for alternative compliance that included this site was submitted to EPA on [date] and EPA's response was issued on March 27, 2014. EPA stated in its findings and determinations that non-storm water discharges from an active industrial NPDES permit cannot be considered point source discharges under the IP. As a result, the Permittees proposed to delete this site from the IP in its March 27, 2014 renewal application.
	03-056(c)	SWMU 03-056(c) is a former outdoor storage area located at TA-03 on the north side of a utilities shop, building 03-0223. The outdoor storage area was used to store electrical equipment, capacitors, and transformers with PCB-containing dielectric fluids. Waste solvents used for cleaning electrical equipment were also stored at this location. Two actions have been performed at SWMU 03-056(c) to remove historical PCB contamination. NMED issued a CoC with controls for SWMU 03-056(c) on February 18, 2011. In its certificate, NMED stated that the nature and extent of contamination were defined, confirmatory sample results indicated the Site met the EPA's PCB cleanup criterion, and the Site poses no potential unacceptable human health and ecological risks from PCBs or VOCs. The required controls were to institute and maintain a control on the Site by monitoring storm water discharge for potential off-site transport of residual PCB contamination. The basis for the required control under the Consent Order was the possibility that storm water discharge may mobilize residual contamination from the Site. NMED also indicated the storm water monitoring was currently implemented pursuant to the Individual Permit. and organic solvents. The SMA receives run-on primarily from developed areas in TA-03. The SMA result for copper is less than the backgrounds for developed sites.	NM-9000.A_047	Gross alpha, Cu, Zn, SVOCs and PCBs	No. Copper is not known to be associated with industrial materials historically managed at this Site. Copper was detected above the soil BV in shallow VCA confirmation samples. Copper was detected above BV in 2 of 21 shallow soil and tuff samples at a maximum concentration 1.02 times the soil BV, which is less than the maximum background concentration.	Yes;	In corrective action; a request for alternative compliance that included this site was submitted to EPA on [date] and EPA's response was issued on March 27, 2014. EPA stated in its findings and determinations that corrective action has been completed at this site because of the CoC issued by NMED.
S-SMA-2.01	AOC 03-052(b)	AOC 03-052(b) consists of five storm water collection areas near the Sigma Building (03-66). Potential contaminants associated with industrial materials historically managed at this site would likely be those associated with upstream sites that are the source of the storm water runoff received at AOC 03-052(b).	NM-9000.A_047	Gross alpha, Cu, Al, and PCBs	No. Copper is not known to be associated with industrial materials historically managed at this Site.	Yes; 10.7-10.9 µg/L Cu detected.	Recommended for corrective action complete under the Consent Order.

SMA	Site ID	Site Description	AU	Site Monitoring Requirements[1]	Is Site a Potential Source of Copper?	Dissolved Copper (Cu) TAL Exceedance	IP Status1 (as of March 27, 2014 and February 10, 2015)
S-SMA-3.53	AOC 03-014(b2)	AOC 03-014(b2) is a former NPDES-permitted outfall (EPA SSSO1S) for the former TA-03 WWTP that received treated effluent from the SWSC plant at TA-46 from 1992 to 1998 when the effluent was switched to the outfall at the power plant, building 03-0022. From 1989 to 1993, radioactive constituents were reported over the detection limits. Potential contaminants associated with industrial materials historically managed at this Site are various organic chemicals, metals, and radionuclides present at low concentrations in the effluent from the former TA-03 WWTP. The SMA sampler is located on Bandelier Tuff and receives runoff from undeveloped and developed areas. The concentration of copper detected in the SMA sample is greater than the undeveloped area UTL and less than the developed site UTL.	NM-9000.A_047	Cu, Al, and PCBs	No. Copper is not known to be associated with industrial materials historically managed at the Site and was not detected above BVs in Consent Order samples collected at the Site.	Yes; 9.6 µg/L Cu detected.	No IP sample collected. AOC 03-014(b2) is included in the Supplemental Investigation Report for the Upper Sandia Canyon Aggregate Area submitted to NMED under the Consent Order on August 27, 2013, and is recommended for corrective action complete without controls in that report. AOC 03 014(b2) will be eligible for a CoC upon approval of the report by NMED.
S-SMA-3.6	60-007(b)	SWMU 60-007(b) is a storm drainage ditch at TA-60 that starts near the motor pool building (60-0001) and extends to the bottom of Sandia Canyon, including contribution from two parking lots located east of building 60-0001. Other former sources of potential contamination to the ditch are a steam-cleaning pad, a used-oil storage tank, and an oil/water separator. In addition, equipment that used PCB-containing oil was stored on an asphalt area east of building 60-0001. Potential contaminants associated with industrial materials historically managed at this Site are petroleum products and PCBs. The SMA sampler primarily receives runoff from developed areas (buildings, parking lots, roads) although some of the SMA drainage area is vegetated. The concentrations of copper detected in the SMA samples are less than the developed site UTLs, which is consistent with what is expected for runoff from a developed area, such as the S SMA-3.6 drainage area. These results, along with the low magnitude and frequency of copper detections in Consent Order samples, are consistent with the Site not being the source of TAL exceedances. In addition, the concentrations of copper in baseline monitoring samples are similar to those in enhanced control confirmation samples.	NM-9000.A_047	Cu, Zn, PCBs	No. Copper is not known to be associated with industrial materials historically managed at the Site. Copper was detected above BVs in 2 of 20 shallow samples (i.e., less than 3 ft bgs) with a maximum concentration 2.6 times the soil BV, but the copper results were not statistically different than background.	Yes.15.4ug/l corrective action monitoring	SWMU 60-007(b) is included in the supplemental investigation report for the Upper Sandia Canyon Aggregate Area submitted to NMED under the Consent Order on August 27, 2013, and the report recommends corrective action complete without controls for the Site. SWMU 60 007(b) will be eligible for a CoC upon NMED's approval of the report.

[1] Source: NPDES Individual Storm Water Permit Renewal and Supplemental Application

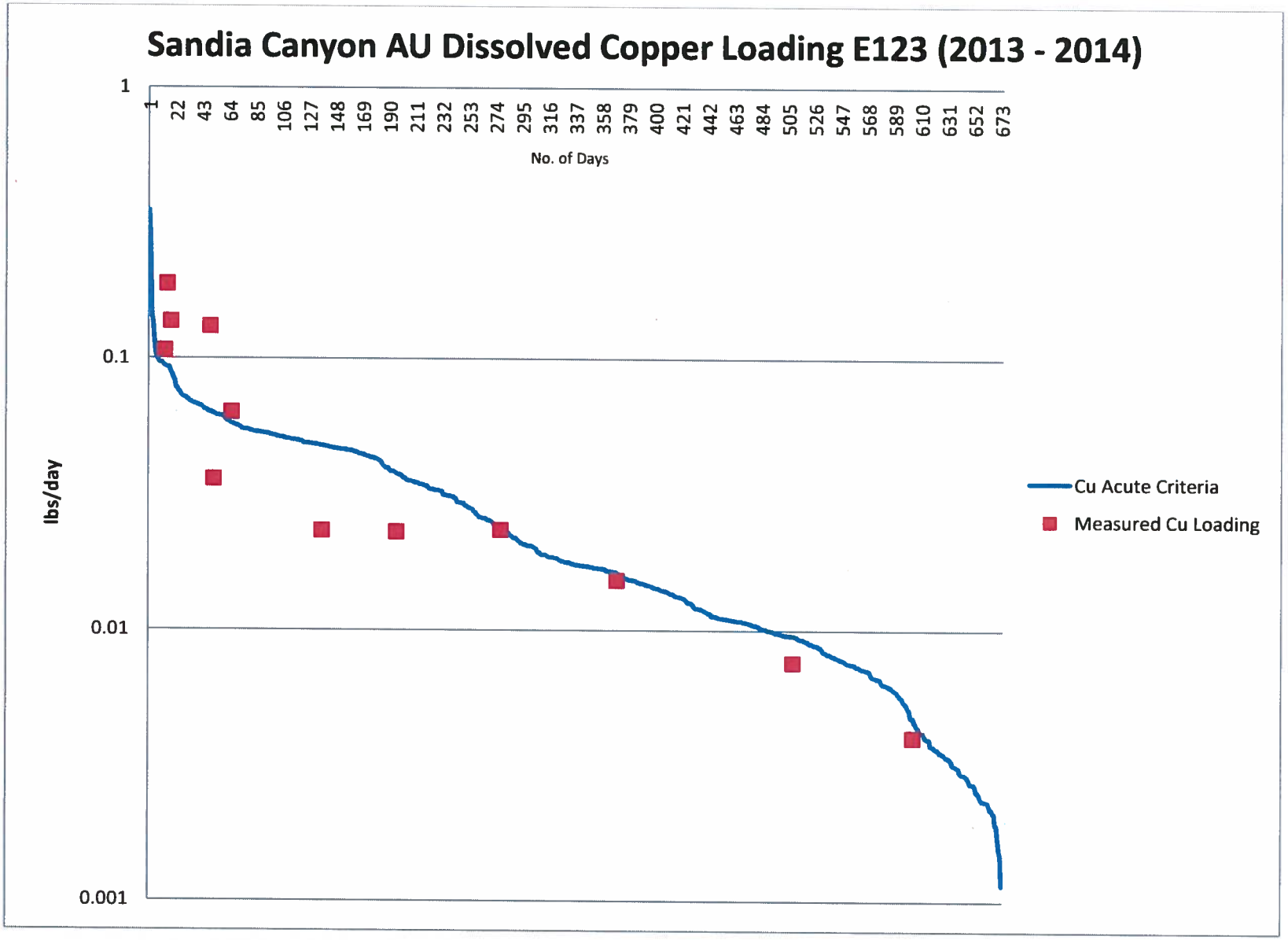
Table 5

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

Facility Name	Outfall/Station #	Sector	Sector Specific Benchmarks[1] for Copper	The Laboratory's Specific Backgound (ug/L)	Results of Copper (ug/L) Monitoring[2,3]	No. of Samples	Status of Current Monitoring
TA-3-38 Metals Fab Shop	3-MFS-1/03-0038W	AA	No	133	42.7	1	monitoring discontinued in 1st quarter 2011 - constituent below permit defined levels
TA-3-22 Power and Steam Plant West	3-PSP-8/03-0022N	O	No	133	53.3	1	monitoring discontinued in 3rd quarter 2011 - constituent below permit defined levels
	3-PSP-5/E121.9	O	No	133	62.4	1	monitoring discontinued in 1st quarter 2011 - constituent below permit defined levels
	3-PSP-1/03-0022S	O	No	133	36.4 - 181	2	monitoring discontinued in 1st quarter 2012 - constituent below permit defined levels
TA-3-66 Sigma Complex	3-Sigma-6/E122.3	F	Yes	133	14 - 28.2	7	monitoring discontinued in 4th quarter 2010 - constituent below permit defined levels
	3-Sigma-8/03-0141E	F	Yes	133	2.71 - 9.71	4	monitoring discontinued in 4th quarter 2012 - constituent below permit defined levels
TA-60-1 Heavy Equipment Yard	60-HEY-2/60-0001	P	No	133	28.4	1	monitoring discontinued in 3rd quarter 2011 - constituent below permit defined levels
TA-60-2 Warehouse	60-WH-1/60-0002E	P	No	133	70.4	1	monitoring discontinued in 1st quarter 2011 - constituent below permit defined levels
TA-60 - Roads and Grounds West	60-RG-3/123.4	P	No	133	11.4	1	monitoring discontinued in 2nd quarter 2011 - constituent below permit defined levels
	60-RG-8/60-00RGE	P	No	133	66.6	1	monitoring discontinued in 3rd quarter 2011 - constituent below permit defined levels
TA-60 Roads & Grounds Clean Fill Yard	60-RG-10 / 60RGDCFYE	P	No	133	6.39	1	monitoring discontinued in 3rd quarter 2013 - constituent below permit defined levels
TA-60 Materials Recycling Facility	60-MRF-1/E122.35	N	Yes	133	21.3 - 569	15	monitoring discontinued in 3rd quarter 2012 - constituent below permit defined levels

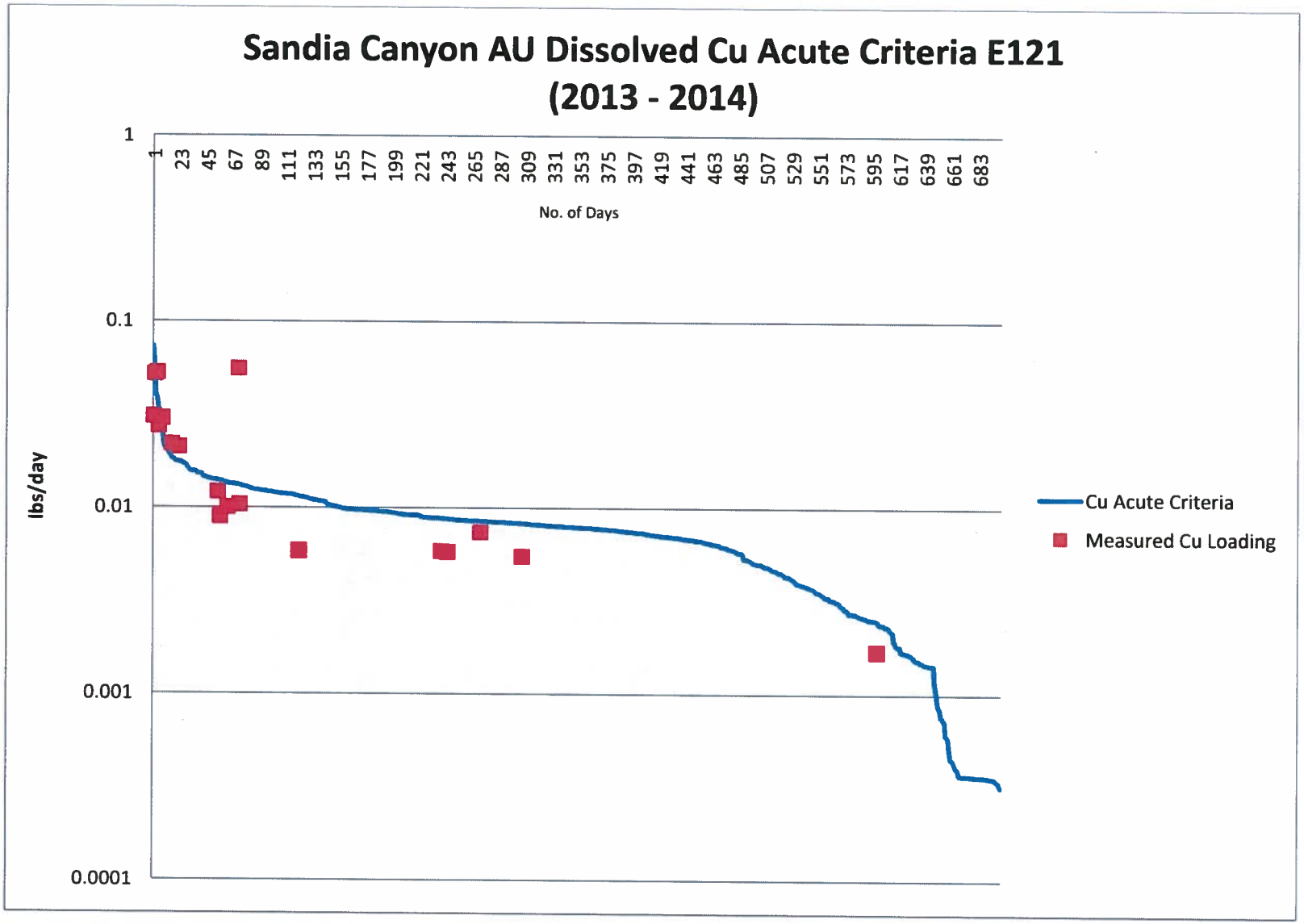
1. Benchmark Levels 15.6 ug/l
2. Monitoring During Permit Period April 2009 – November 2013
3. Total Copper

Figure 1



ENV-DO-15-0201
LA-UR-15-25061

Figure 2



ENV-DO-15-0201
LA-UR-15-25061

2.2 Current Conditions

Data from gages E121, E123 and SCS-2 are summarized in Table 6. The SCS-2 sampler was inactivated in 2011. In 2015 it was re-activated under the 4b Demonstration. A base flow sample was collected on June 9, 2015 and storm water samples were collected on June 16, and July 1, 2015.

In Figures 3-7 hardness-acute aquatic life criteria were calculated using the hardness-dependent equations in 20.6.4.900 NMAC Subsection I. The acute aquatic life criteria were then compared with the measured valued for copper. All available data were used to assess the copper criteria regardless of hydrologic condition. Criteria exceedances are more prevalent in samples collected during storm events.

Table 6
Copper Monitoring Data for Watershed Based Gages Period 2013 - 2014

Monitoring Location	Min (µg/L)	Max (µg/L)	Mean (µg/L)	Median (µg/L)	No. of Samples	Ratio of Storm water Samples	No. of Acute WQC Exceedances
E121 (S-SMA-2) Right Fork at Power Plant	2.49	20.6	4.98	4.22	30	20/25	18
E123 - Sandia Below Wetland	2.42	10.3	5.1	4.73	28	21/25	20
Middle Sandia at WP Terminus (SCS-2)	3.97 [a]	4.44 [a]			2	1/2	0

a. Samples collected on June 9 and 16, 2015

Figure 3

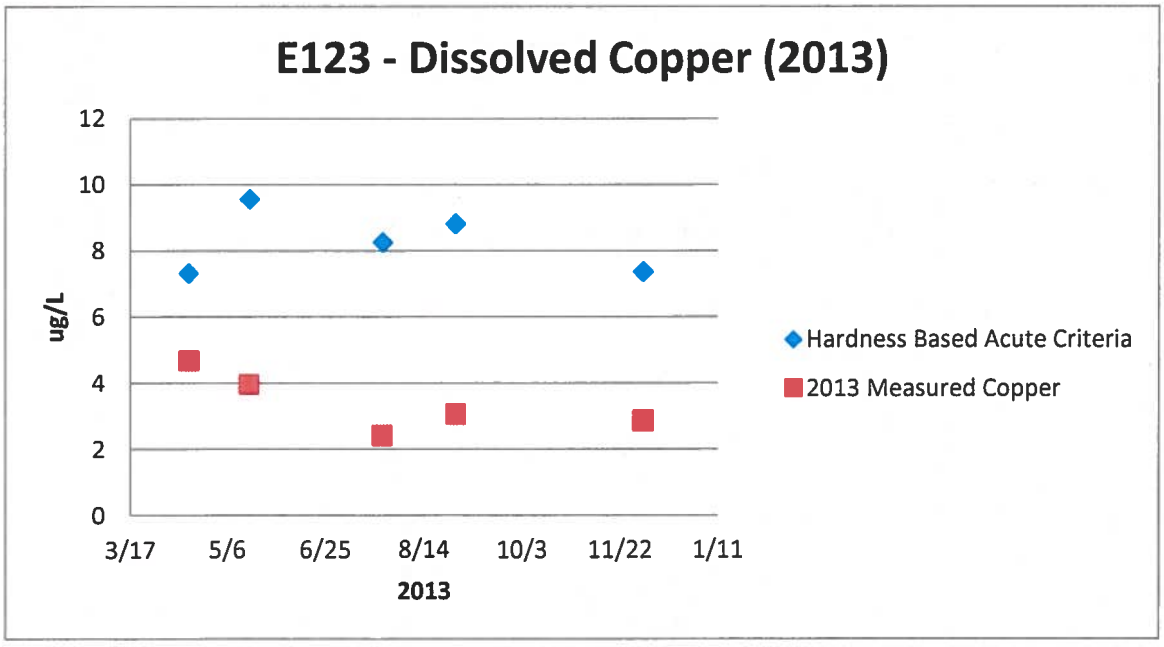


Figure 4

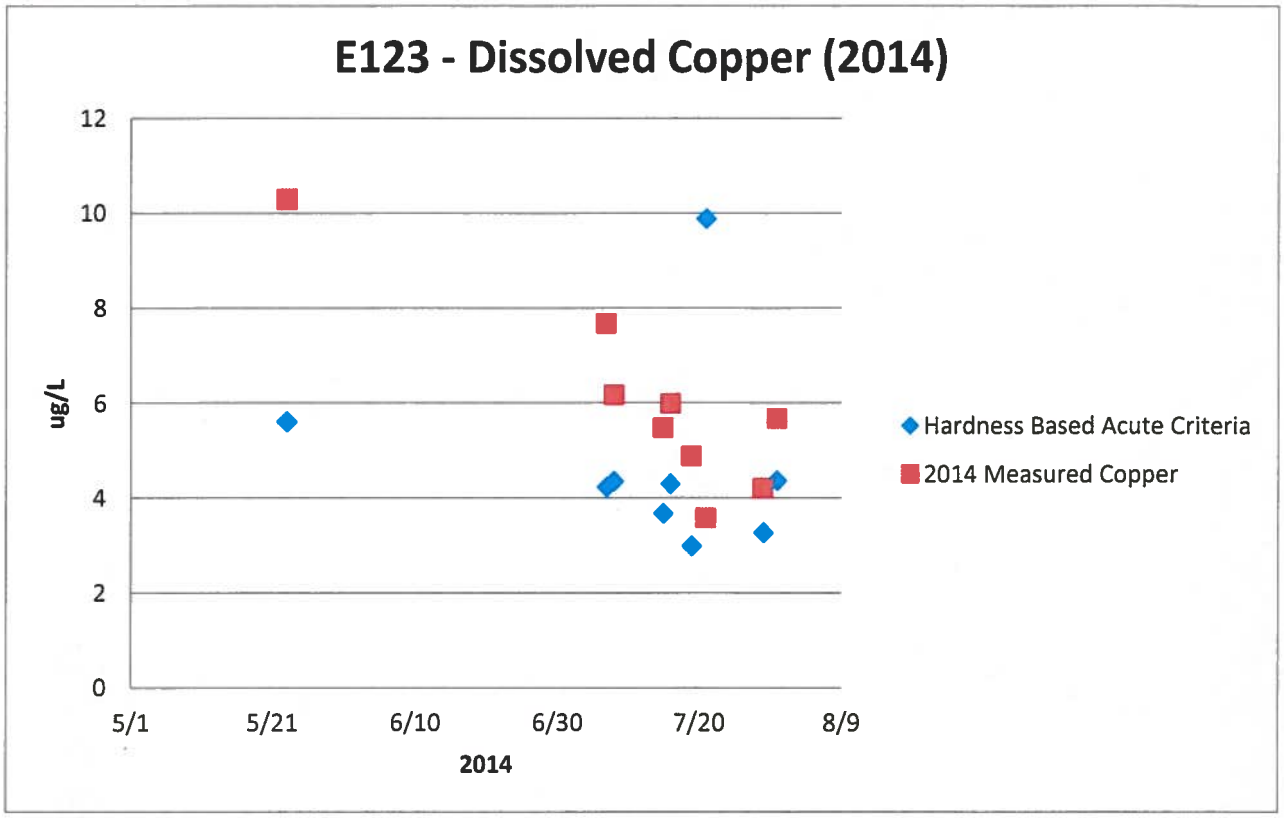
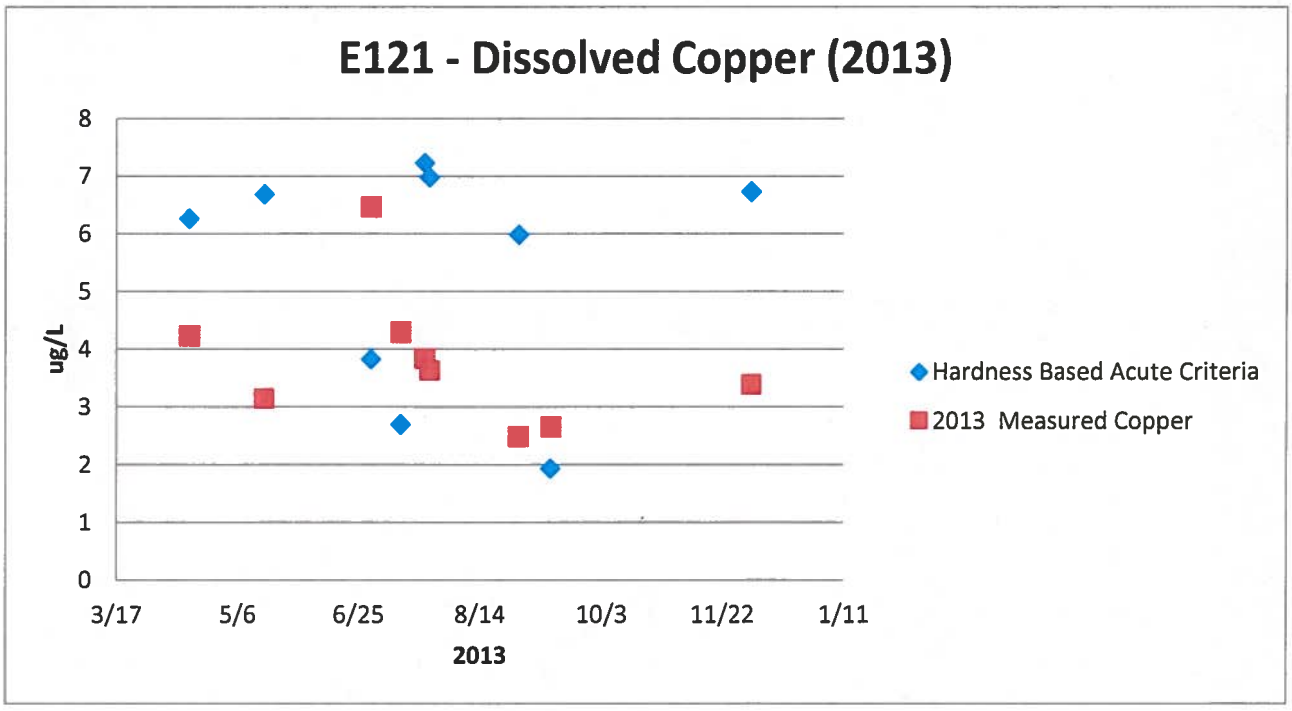


Figure 5



ENV-DO-15-0201
LA-UR-15-25061

Figure 6

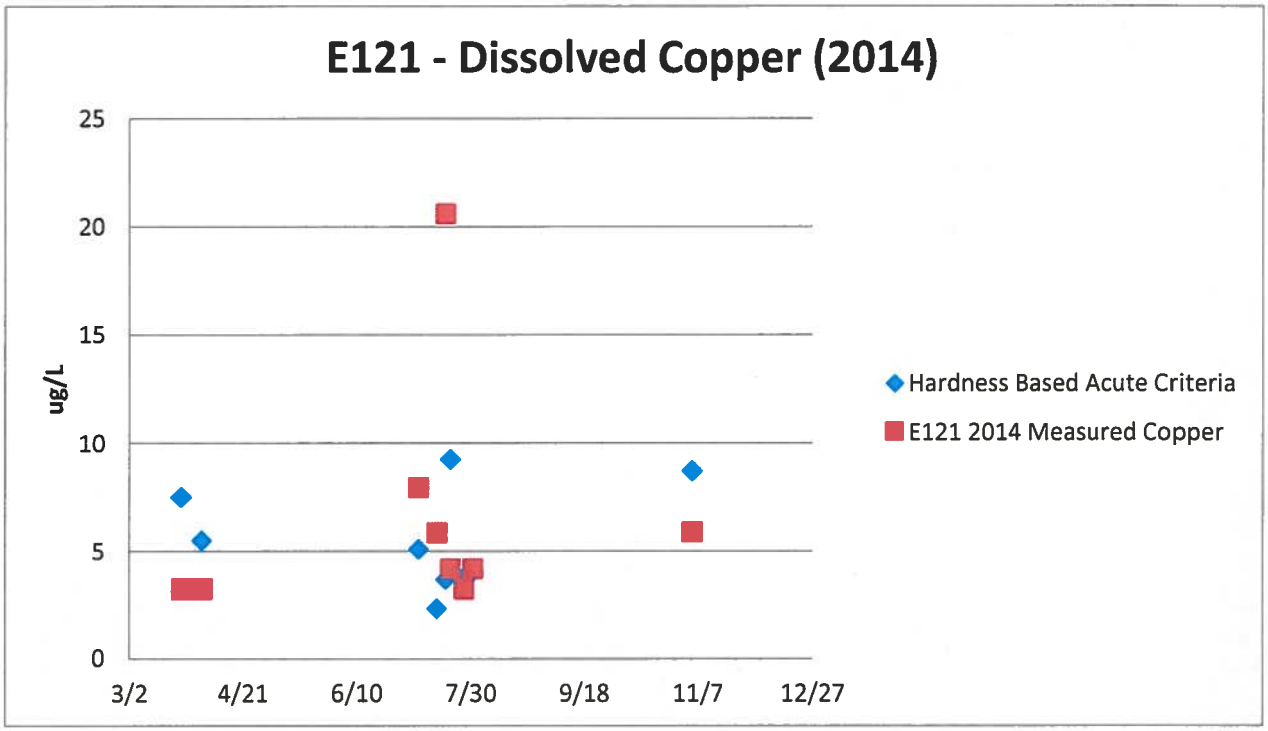
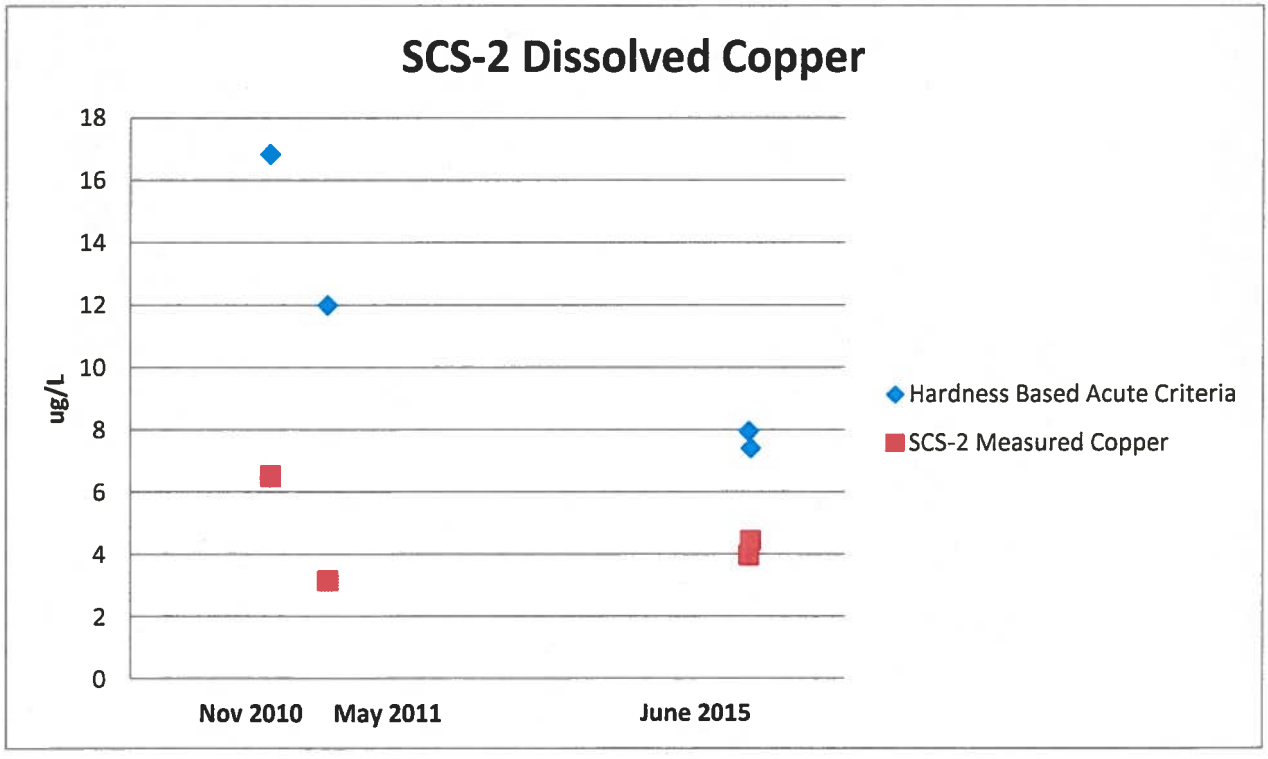


Figure 7



2.2 Necessary Reduction to Meet Target

The Laboratory's environmental surveillance storm water monitoring gages E121, E123 and Middle Sandia at WP Terminus (SCS-2) serve as the location for determining reduction in copper concentration and attainment of water-quality targets for the 4b Demonstration. The locations of the sampling points are shown on the map in Enclosure 3.

The target loading capacity is the greatest amount of pollutant loading that a water can receive without violating the water quality standard. The load duration curve in Figure 1 and 2, generated from flows at E121 and E-123, provides the target loading capacity across a full range of stream flow conditions. The target values for flows in the higher ranges (flows occurring ≤ 40% of time) are provided in Table 7. Exceedances of the water quality criteria correspond to high flow events and generally reflect probable non-point source contributions. Consequently, management of the load, generated during storm events, is the key to attainment of the WQS.

The target loads in Table 7 are derived from (WLA + LA + MOS = Target Load):

LA – the portion of the load capacity attributed from non-point sources (urban/developed and natural background).
WLA – the portion of the loading capacity attributed from point sources (IPSP, MSGP and IP).
MOS - margin of safety (MOS) of 10% is used to account for uncertainties in load allocations and provide additional time to further develop and define our knowledge of sources originating from natural back ground and urban developed areas.

The copper values used to determine outfall loading rates were obtained from operational samples collected in 2013 and 2014 for IPSP Permit # NM0028355. The flow values were developed from the 2014 monthly averages reported in discharge monitoring reports to EPA Region VI.

Table 7 Targert Loads for Dissolved Copper in Upper Sandia AU (E-123)

			High Flow (0-10%)[1]	Mid-Range Flows (10-40%)[1]	Low Flow
Target Loads	**2014 Average Flow[2](mgd)**	**Copper[3] (ug/L)**	**0.0560 lbs/day**	**0.0213 lbs/day**	**-**
Outfall[1] 001	0.157	3.16	0.00413	0.00413	-
Outfall[1] 027	0.027	7.44	0.00166	0.00166	-
Outfall[1] 199	0.025	1.77	0.000361	0.000361	-
S-SMA	-	-	0	0	-
MSGP	-	-	0	0	-
Total Waste Load Allocation (WLA)	-	-	0.00615	0.00615	-
Load Allocation (LA)	-	-	0.0442	0.0442	-
Margin of Safety[5] (MOS)	-	-	0.00560	0.00231	-
Target Loads	-	-	**0.0560**	**0.0213**	-

1. Outfall load is calculated based on flow x copper value x conversion factor 8.34
    a. Outfall 001 - 0.00316 mg/L x 0.157 mgd x 8.34
    b. Outfall 027 - 0.0074 mg/L x 0.0270 mgd x 8.34
    c. Outfall 199 – 0.0017 mg/L x 0.0255 mgd x 8.34
2. 2014 Average Outfall Flow

2014		001	03A027	03A199
Jan	Total (gal)	6,179,900	728,700	615,800
Feb	Total (gal)	5,769,400	751,000	600,700
Mar	Total (gal)	7,175,600	763,800	690,300
Apr	Total (gal)	5,631,200	755,400	725,100
May	Total (gal)	4,366,300	826,700	831,500
Jun	Total (gal)	3,127,800	941,400	949,600
Jul	Total (gal)	3,903,300	923,800	976,000
Aug	Total (gal)	3,734,000	899,700	872,900
Sep	Total (gal)	3,630,000	1,010,900	1,010,900
Oct	Total (gal)	3,756,000	866,900	789,600
Nov	Total (gal)	4,774,000	685,200	620,600
Dec	Total (gal)	5,476,000	732,200	628,700
	Total Gal	57,523,500	9,885,700	9,311,700
	Mgal	57.523	9.8857	9.3117
	mgd	0.157	0.0270	0.0255

3. NPDES NM0028355 Permit Renewal Application Form Copper values used on Form 2C from application renewal

Location ID	Parameter Name	Report Result	Report Units	Detected	Sample Matrix	Sample Purpose	Filtered
NPDES Outfall 01A001	Copper	3.16	ug/L	Y	W	REG	N
NPDES Outfall 03A027	Copper	7.44	ug/L	N	W	REG	N
NPDES Outfall 03A199	Copper	1.77	ug/L	Y	W	REG	Y

4. No TMDL calculations for lower flow because there were no WQS exceedances
5. 10% MOS

The largest contribution to the target load is from non-point sources. The baseline value for copper originating from developed sites at the Laboratory is 34.19 ug/l (Table 3a). Elevated levels of copper are known to be associated with sediments which are positively related to the amount of storm water draining from impervious surfaces to Sandia Canyon. Background levels of copper from natural sources is 3.43 ug/l (Table 3b).

To estimate load allocations from non-point sources originating from developed sites at the head of the Sandia Canyon AU in TA-03, the Technical Release 55 (WinTR-55) model was used to calculate storm water discharge for a 0.5 inch precipitation event. A 0.5 inch event was selected because the frequency and magnitude is common on the Pajarito Plateau. Approximately 77 acres of drainage area from TA-03 were used in the calculations. The 77 acres represents a significant portion of the

developed area at TA-03 and directly correspond to the sampling sites used to determine the Laboratory developed site runoff dissolved copper baseline values contained in Table 3a. Flows at these sites only occur only in response to precipitation events.

WinTR-55 is a single-event rainfall-runoff small watershed hydrologic model that can generate hydrographs from urban areas. The hydrographs are routed downstream through channels and/or reservoirs. Watersheds in WinTR-55 are composed of sub-areas (land areas) and reaches (major flow paths in the watershed). Each sub-area has a hydrograph generated from the land area based on the land use and climate characteristics input into the model. Reaches are designated as channel reaches where hydrographs are routed based on physical reach characteristics. Hydrographs from sub-areas and reaches are combined as needed to accumulate flow as water moves from the upland areas down through the watershed reach network. The accumulation of all runoff from the watershed is represented at the watershed Outlet.

For this application, the runoff from predominantly impervious areas upstream from Sandia Canyon, generated by a 0.5 inch storm event was calculated. The Outlet was the point of discharge into the head of Sandia Canyon. Model input data consisted primarily of land use details, storm data, and reach characteristics. Land use details included identification of the land cover type, size of the land cover (area), hydrologic soil group, and from these inputs the corresponding runoff curve number. Storm data included the rainfall distribution type and the 24-hr rainfall amount. Reach characteristics include flow type (channel, sheet, shallow concentrated), slope, and length of flow path.

The results of the model indicate that the estimated peak discharge from a 0.5 inch event over a 77 acre area in TA-3 (upstream from Sandia Canyon) is 7.25 cfs (4.6 MGD). The instantaneous discharge was used with the urban/developed baseline copper value of 34.1 ug/l to calculate the peak loading rate of 1.32lbs/day.

[4.6 mgd x 0.034 mg/L x 8.34 conversion factor = 1.32 lbs./day]

This is a first attempt to understand load contributions from a developed area at the Laboratory to the AU. The model estimated load was derived using runoff from an area of predominantly impervious surfaces located at the head of Sandia Canyon. Runoff from this area is primarily managed through conventional storm water systems (curb and gutter, drop inlets, culverts, etc.) which collect and concentrate runoff prior to discharge into the canyon. A 0.5 inch storm event falling on these impervious surfaces would be expected to result in a higher peak discharge rate compared with flows measured further downstream beyond the open channel and wetland within Sandia Canyon. The load contribution of 1.32 lbs/day was derived from this point of higher flowrate at the head of the canyon. A dissolved copper baseline value of 34.1 ug/L was established from storm water runoff at urban areas of the Laboratory.

The load duration curve in Figures 1 and 2 show copper measured loads calculated from ambient water samples, the average flow on the date of the sample. Loads plotting above the curve indicate an exceedance of the water quality criterion. High flow conditions are caused by precipitation

events. It is under these conditions that water quality targets are exceeded. Reducing the load from high level flow events, in amounts corresponding to the target load exceedances in Figure 1 and 2, provides a basis for consistent achievement of target loading goals and represent the load reductions necessary to meet water quality standards. To the degree that sediment transport, generated by high flow events, can be further controlled, copper concentrations are likely to improve in storm water

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

Available data indicate the urban/developed landscape Laboratory property is a source of copper in the AU.

2.4 Controls That Will Achieve Water-Quality Standards

Eventual attainment of the WQS is anticipated upon:

- Sandia grade-control structure (Wetland Stabilization Project) and
- Continued application of NPDES permits and regulatory control already in place.
- Storm Water Management Plan (the Storm Water Management Plan has been placed on hold pending a final decision by EPA on the municipal separate storm sewer system (MS4) designation determination).

A review of 2013-2014 analytical data from E121, E123 and SCS-2 show that copper water quality criteria continue to be exceeded. The exceedances are primarily from samples collected during storm flow conditions. Base flow samples do not typically exceed the Water Quality Standard.

It is understood that storm water urban runoff is a significant contributor to copper in the AU. The Background Study is scheduled for update in 2015. And will be used to better understand contributions originating from urban/developed areas for the Laboratory. In FY-14 LABORATORY initiated the review of Laboratory environmental policies, DOE orders, Engineering standards and environmental permits and evaluated the need for a Storm Water Management Plan for Technical Area 3. The Storm Water Management Plan is on hold pending a final MS4 determination by EPA. The Plan was to include a monitoring component to further define direct impacts from urban runoff. In the interim the Laboratory is looking for ways to continue the monitoring effort.

In November 2013 the Sandia Grade Control Project was completed. One of the primary objectives was to better establish an even grade through the wetland to allow additional wetland expansion and further stabilization. The large amount of organic material can serve as a reducing environment which will promote the formation of more stable forms of copper-organic complexes. The wetland also reduces flow rate within the canyon and promotes sediment deposition.

The monitoring performed during the most recent performance period (ending December 2014) indicates the Sandia wetland is stable following the installation of the Grade Control Structure (GCS),

even with declining effluent volumes entering the wetlands. The GCS has effectively arrested headcutting at the terminus of the wetland. Water levels have not dropped below the levels observed in 2013, even in light of reduced effluent volumes, and remain sufficiently high to sustain obligate wetland vegetation. Storm water data indicate the GCS has had a positive impact in terms of contaminant mobility (Sandia Wetland Performance Report Period ending December 2014).

2.5 Point Source Controls

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

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

The IPSP Discharge Permit is currently the only active NPDES Industrial and Sanitary Outfall Discharge Permit at the Laboratory. A new permit was issued on August 15, 2014 and has an effective date of October 1, 2015 to September 30, 2019. The IPSP Permit includes 11 outfalls, three of which discharge to the AU (Table 1). The locations of these outfalls are shown in the map in Enclosure 1. The permit includes new monitoring requirements and effluent limits for dissolved copper at the three outfalls that discharge to the AU. The effluent limits were added through the State of New Mexico 401 Water Quality Certification and based on the most limiting applicable State WQS numeric criteria for the receiving stream in Segment 20.6.4.126 NMAC.

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

The IP authorizes discharges of storm water associated with industrial activities from specified Solid Waste Management Units (SWMUs) and Areas of Concern (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. Within the AU there are thirteen sites that meet the definition of a SWMU or AOC and included 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); and
3. Potentially impacts surface water. The selection of SWMUs and AOCs for inclusion in the IP was based on storm water, sediment, and soil data available at the time the permit application was submitted.

Site history and soil data collected for Consent Order investigations for the thirteen IP sites indicate that copper is not a significant industrial material at any of the sites in the AU. However, copper

remains of concern at a number of IP sites because of TAL exceedences. Table 4 provides a summary of exceedances and IP status for each of the thirteen sites.

On March 27, 2014 and February 10, 2015 the Laboratory submitted the application for permit renewal and supplemental information for the permit renewal to EPA Region VI. The specific changes proposed in the draft permit include substantive changes to reflect new information from investigations and analysis conducted under the Compliance Order on Consent and Individual Permit storm water collection.

2.5.3 Storm Water Multi-Sector General Permit Controls

The NPDES MSGP regulates storm water discharges from identified industrial activities and their associated facilities. Table 5 lists the MSGP facilities and frequency and number of monitoring samples for outfalls discharging storm water to the AU and the maps in Enclosure 3 show the location of these MSGP facilities. MSGP regulated activities within the AU include metal fabrication; vehicle and equipment maintenance; recycling activities; electricity generation; and warehousing activities. The new MSGP permit was issued on June 4, 2015.

The MSGP requirements include the implementation of control measures, development of facility-specific Storm Water Pollution Prevention Plans (SWWPPs), 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, 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.

Monitoring under the new permit is not schedule to begin until November 2015. Benchmark monitoring concentrations were modified in the new permit to reflect the New Mexico Water Quality Standards. This includes a new benchmark value for copper. Monitoring under the new permit is not schedule to begin until November 2015. In addition, the Laboratory must determine the hardness value of the receiving waters. Storm water monitoring under the 2008 MSGP was initiated in April 2009. Monitoring results for copper since this time have been below either the MSGP sector-specific benchmarks or the Laboratory's specific background value for storm water. In accordance with the MSGP requirements, monitoring for copper has been eliminated at all the MSGP facility outfalls that have had storm water discharges to the AU. This reduction in sampling has been achieved by

eliminating processes and pollutant sources, and by documenting that pollutants are below benchmark or background levels.

2.6 Non - Point Source Controls

A number of non-point source controls have been established in the AU. Of particular importance to non-point source mitigation, is the newly completed Sandia Grade Control Structure.

2.6.1 Sandia Wetland Stabilization Project

Completed in November of 2013 the GCS has effectively arrested headcutting at the terminus of the wetland. Water levels have not dropped below the levels observed in 2013, even in light of reduced effluent volumes, and remain sufficiently high to sustain obligate wetland vegetation. Storm water data indicate the GCS has had a positive impact in terms of contaminant mobility (Sandia Wetland Performance Report Period ending December 2014).

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 nonchannelized 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. Baseflow sampling will occur quarterly.
- Storm water samples will be collected in response to storm events 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 annual geomorphic changes

This data will be reported to NMED annually.

The project was permitted under Section 404 of the Clean Water Act - the U.S. Army Corp of Engineers (ACOE) Nation-Wide Permit #38 for Cleanup of Hazardous and Toxic Waste. The ACOE required compensatory mitigation and accepted DOE/LANS performance standards and monitoring plan to measure performance. Performance standards include:

- Vegetation in wetland disturbed area recovers to ≥60% native species absolute cover
- Extent of wetland facultative and obligate vegetation west of grade control structure does not decrease below current wetland size (2.97 acres)
- Percent relative cover of wetland facultative and obligate vegetation within delineated wetland boundaries does not decline more than 15% from baseline in years following installation of grade control structure

Monitoring requirements include:

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

An annual report of the monitoring results will be prepared using the U.S. Army Corps of Engineers format and will be delivered by November 30 of each year. Reporting will continue for 5-years or until the Laboratory is notified by the ACOE that reporting is no longer required.

2.6.2 Storm water Controls/Management from Developed Laboratory Areas

Controls within the Laboratory area primarily consist of several small detention ponds, riprap structures at various discharge locations, and a grade control structure 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 the Laboratory'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 Laboratory 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.

Additional controls to address non-point sources are also forthcoming. Several landscaping projects are planned for locations within the Laboratory area of the Sandia Canyon watershed. These projects will incorporate Low Impact Development features to minimize on-site runoff and downstream erosion potential. Implementation of these projects will further enhance existing non-point source control.

Storm water urban runoff is a significant contributor to copper in the AU. In FY-14 the Laboratory initiated the review of Laboratory environmental policies, DOE orders, Engineering standards and environmental permits and evaluated the need for a Storm Water Management Plan for Technical Area 3 (TA-03). TA-03 is highly developed area at the Laboratory and located in the headwaters to the AU. The development and execution of an urban storm water management plan for the Laboratory is viewed as a key to addressing non-point source contamination and eventual attainment of water quality standards in the AU. On March 6, 2015 EPA issued their preliminary determination that discharges of storm water from municipal separate storm water sewer system 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. The preliminary designation applies to MS4s within the Laboratory, including the Department of Energy and Los Alamos National Security, LLC located within Los Alamos County.

EPA Region 6 has determined that discharges of storm water from MS4s on Laboratory property and urban portions of Los Alamos County has the potential to cause or contribute to violations of one or more New Mexico water quality standards. Runoff from urban areas in Los Alamos County and from developed areas of the Laboratory contain pollutants for which the state of New Mexico has listed receiving waters as impaired in the State's CWA §303(d) list of impaired waters not fully supporting their designated beneficial uses. As a result of EPAs preliminary determination, the Laboratory has suspended development of the Storm Water Management Plan until a final determination is made. The Laboratory's Storm Water Management Plan and the MS4 share key objectives. An MS4 can complement the Laboratory's existing NPDES permit coverage by directly addressing storm water runoff from urbanized areas at the Laboratory.

2.6.3 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 completed work to subdivide the current single drainage area on the east end into two basins, resulting in two new discharge locations. New riprap channels 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. The landfill is owned by Los Alamos County and is now closed and operating under a NMED approved closure plan. A leachate collection system is not in place. The Laboratory is not aware of any reports or documentation indicating leachate from the landfill is impacting the AU.

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 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.

2.7 Description of Requirements under Which Pollution Controls Will Be Implemented

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 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.

3.0 ESTIMATE OR PROJECTION OF TIME WHEN WQS WILL BE MET

For copper, where a Laboratory source is identified, the controls in place are estimated to achieve WQS within two assessment cycles (4 years). The time frame will allow implementation of control measures and confirmation monitoring against water-quality criteria. The time frame will also facilitate 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.

The development and execution of an urban storm water management plan for the Laboratory was viewed as a key to addressing non-point source contamination and eventual attainment of water quality standards in the AU. On March 6, 2015 EPA issued their preliminary determination that discharges of storm water from municipal separate storm water sewer system 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. The preliminary designation applies to MS4s within the Laboratory, including the Department of Energy and Los Alamos National Security, LLC located within Los Alamos County.

As a result of EPAs preliminary determination, the Laboratory has suspended development of the Storm Water Management Plan until a final determination is made. The Laboratory's Storm Water Management Plan and MS4 share key objectives. An MS4 at can complement the Laboratory's existing NPDES permit coverage by addressing directly storm water runoff from urbanized areas at the Laboratory.

4. SCHEDULE FOR IMPLEMENTING POLLUTION CONTROLS

The schedule for implementation of pollution controls is set by the NPDES permits or regulatory requirements. Each permit or regulatory requirement imposes some combination of effluent limits, compliance schedules, monitoring requirements, enforcement provisions and compliance time frames. The current schedule for these programs is as follows:

1. NPDES Industrial Outfall Permit (IPSP)	Effective 2014–2019
2. NPDES Storm Water Individual Permit (IP)	Effective 2010–2014
a. Reapplication Submitted	March 27, 2014
3. NPDES Storm Water MSGP	Effective June 4, 2015 - 2020
4. Sandia Wetland Stabilization Project	Complete in November 2013
a. ACOE Monitoring Requirements	Annually from November 2014 to 2019
b. Consent Order Monitoring and Reporting	Annual Reporting
5. Consent Order Corrective Action	2005–2015
6. NPDES – Construction General Permit	Effective 2012–2018

7. Clean Water Act 404 Permits — Effective 2012–2017
8. The Laboratory Storm Water Management Plan Development — On Hold pending MS4 Designation
9. MS4 Determination — Anticipated in 2016

5.0 MONITORING PLAN TO TRACK EFFECTIVENESS OF POLLUTION CONTROLS

To track the effectiveness of the 4b Demonstration, the watershed-based gage stations E121, E123 and SCS-2 will continued to be monitored under the Laboratory's environmental surveillance activities during both baseline conditions and storm events.

Monitoring occurs at these gages pursuant to the Interim Facility-Wide Groundwater Monitoring Plan and in response to storm events as follows:

Gage	Flow	Metals (including dissolved copper)	General Inorganics[1]	TSS/SSC[1]
E-121 (S-SMA-2) Sandia Right Fork @ Power Plant (above wetland)	Continuous	Quarterly and in response to storm events	Quarterly and in response to storm events	Quarterly and in response to storm events
E-123 Sandia Below Wetlands	Continuous	Quarterly and in response to storm events	Quarterly and in response to storm events	Quarterly and in response to storm events
S-SCS-2 Middle Sandia Canyon @ Terminus of Persistent Base Flow		To date only copper and hardness samples have been collected		

These gages are part of the Laboratory's Environmental Surveillance Program (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.
In addition to the ongoing surveillance activities, information specific to the pollutants causing impairment will be collected and analyzed. These data will be continuously analyzed and used to evaluate the effectiveness of the 4b Demonstration and support listing decisions for the development of the Integrated List.

Additionally, the permits and regulatory controls in place provide specific time frames and regulatory deadlines to ensure permit milestones are achieved.

Surface water monitoring and assessments at the Laboratory occur at several levels.

1. The annual Interim Facility-Wide Groundwater Monitoring Plan (IFGMP or Interim Plan) 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 regulated 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 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 locations used in the 4b Demonstration are available to the public. 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/.
The annual Environmental Surveillance Report is prepared pursuant to DOE Order 450.1. The report summarizes environmental data that are used to determine compliance with applicable federal, state and local environmental laws and regulations, executive orders, and departmental policies. Additional data, beyond the minimum required, are also gathered and reported as part of the Laboratory's efforts to ensure public safety and to monitor environmental quality at and near the Laboratory. A summary of 4b measures and effectiveness will be included in the Watershed chapter. The most recent report, issued in September 2013, is for the 2012 calendar year. The report can be accessed at http://www.lanl.gov/community-environment/environmental-stewardship/environmental-report.php.

6.0 COMMITMENT TO REVISE POLLUTION CONTROLS, AS NECESSARY

DOE/LANS will comply with permit conditions and limitations. In the event that progress towards meeting water-quality targets is not being achieved, changes in permit and regulatory requirements may be sought. 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. Permit limits and conditions may be changed by EPA. Under section 401 of the CWA, NMED certifies that permitted activities will comply with New Mexico WQS. The development and execution of an urban storm water management plan for the Laboratory was viewed as a key to addressing non-point source contamination and eventual attainment of water quality standards in the AU. On March 6, 2015 EPA issued their preliminary determination that discharges of storm water from municipal separate storm water sewer system 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

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ENCLOSURE 2

Category 4B 2015 Progress Report – Data Set and Graphs (CD)

ENV-DO-15-0201

LA-UR-15-25088

Date: JUL 10 2015

ENCLOSURE 3

Category 4B 2015 Progress Report – Map of Sandia Canyon Assessment Units

ENV-DO-15-0201

LA-UR-15-25061

Date: JUL 1 0 2015