EXHIBIT O

Timothy J. Goering

1+(505) 412-9963 goering@lanl.gov

Summary

Nearly 40 years of experience as a hydrologist, environmental professional, and technical project manager. Experience includes groundwater characterization and remediation, environmental restoration, and surface water quality standards work.

Professional Profile

- Environmental professional and hydrologist
- Excellent communication and interpersonal skills
- Exemplary leadership abilities; strong work ethic

Areas of Expertise

- Hydrology and water resources
- Groundwater characterization and monitoring
- Vadose zone characterization and monitoring
- New Mexico groundwater and surface water regulations
- Clean Water Act
- Other federal environmental regulations including RCRA, CERCLA, NEPA, and UMTRCA
- Site assessment and remediation
- Environmental restoration
- Corrective measures studies
- Landfill cover design and installation

Education

- M.S., Hydrology and Water Resources, University of Arizona, 1988
- B.A., Environmental Science, University of Virginia, 1983

Professional Experience

Environmental Professional: Environmental Protection and Compliance Division, Los Alamos National Laboratory (LANL), Los Alamos, New Mexico; 2020–Present

- Supports Triad's Groundwater and Surface Water Quality Program regulatory activities under New Mexico Environment Department (NMED) Water Quality Control Commission regulations.
- Analyzes data in support of LANL's Use Attainability Analysis for Upper Sandia Canyon. Reviews water- and air-temperature data to identify the most stringent and attainable designated use for Upper Sandia Canyon.
- Analyzes stream flow gage data in perennial, intermittent, and ephemeral reaches within LANL boundaries.
- Provides technical and regulatory support for ground water discharge permits.
- Collaborates with other professionals to begin investigating historical uses of per- and polyfluoroalkyl substances (PFAS) at LANL to meet the requirements of the U.S. Department of Energy (DOE) PFAS Strategic Roadmap.
- Provides technical support to the Pueblos of Cochiti and San Ildefonso regarding groundwater monitoring and protection of springs, respectively.

Field Instrument Deployments and Operations Site Manager: Los Alamos National Laboratory, Los Alamos, New Mexico; 2018–2020

- Site operations manager for the DOE Atmospheric Radiation Measurement (ARM) Mobile Facility One (AMF1), one of the world's premier observatories advancing atmospheric and climate research.

Managed the deployment of atmospheric monitoring instruments and managed field operations at remote locations in Norway and Svalbard for the DOE's Cold-Air Outbreaks in the Marine Boundary Layer Experiment (COMBLE) Campaign; responsibilities included project management, collaborating with international partners, and communicating with onsite technicians and scientists at national laboratories across the U.S.

Timothy J. Goering

Additional Training

- EPA Water Quality Standards Academy
- Public Speaking
- Project management
- RCRA/CERCLA
- Bioremediation
- Technical writing
- Photography

- Managed the deployment of atmospheric monitoring instruments and managed field operations for the DOE's Cloud, Aerosol, and Complex Terrain Interactions (CACTI) Campaign in Argentina, including installation, operation, and shipment of the AMF1 atmospheric observatory. Responsibilities included oversight of onsite technicians, communicating with instrument scientists, preparing contracts, and public outreach.

RDX Remediation Project Lead: Los Alamos National Laboratory, Los Alamos, New Mexico; 2013–2018

- Technical lead on the RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) in groundwater project, working with a diverse group of scientists to assess high explosives (HE) contamination in soil and groundwater at LANL. The RDX team was part of a multidisciplinary group that was awarded a Distinguished Performance Award for their efforts to investigate attenuation and remediation of contaminants in groundwater.
- Developed the "Remedy Completion Report for Corrective Measures Implementation (CMI) at Consolidated Unit 16-021(c)-99." This report was instrumental in closing out the surface CMI for the 260 Outfall, resulting in significant cost savings and allowing efforts to focus on deep groundwater contamination.
- Assisted LANL Compliance Programs personnel with preparation of workplans for land-application of treated groundwater in accordance with the requirements of Discharge Permit 1793. The workplans proposed discharge of treated groundwater from aquifer tests conducted to investigate HE contamination.
- Supported Compliance Programs personnel with preparation of notices of intent to discharge to support aquifer testing operations and tracer tests at Technical Area 16.
- Conducted public outreach for the RDX project, including presenting at Citizen's Advisory Board meetings and leading tours of the study area.

Interim Facility-Wide Groundwater Monitoring Lead: Los Alamos National Laboratory, Los Alamos, New Mexico; 2007–2015

- Served as technical lead for the Interim Facility-Wide Groundwater Monitoring Program from 2007 through 2015. Responsibilities included updating the monitoring plan each year, negotiating with NMED, and collaborating with other organizations at LANL to ensure that LANL met its monitoring requirements.
- Assisted with regulatory interactions, public outreach, development of work plans for hydrologic characterization and well installation, and preparation of annual site environmental reports.

- Collaborated with the Pueblo de San Ildefonso annually to define groundwater monitoring requirements to meet the requirements of the 1996 Memorandum of Understanding among the Bureau of Indian Affairs, the DOE, and the Pueblo de San Ildefonso regarding monitoring.
- Performed project management responsibilities, including developing cost and schedule estimates; preparing baselines; reporting budget, schedule, and status; and managing subcontracts.

Hydrogeologist: GRAM Inc., Albuquerque, New Mexico; 1992–2007

- Worked closely with the NMED, the DOE, the City of Albuquerque, and the public to build a consensus regarding corrective action at Sandia National Laboratory's Mixed Waste Landfill (MWL).
- Provided expert testimony at a three-day NMED public hearing regarding MWL groundwater and cover design.
- Assisted with developing an alternative landfill cover design that used native vegetation to enhance evapotranspiration and minimize infiltration.
- Prepared the first long-term monitoring and maintenance plan for the MWL.
- Prepared groundwater characterization reports, Resource Conservation and Recovery Act facility investigation work plans and reports, and a corrective measures study for the MWL.

Hydrogeologist: Jacobs Engineering, Albuquerque, New Mexico, 1987 to 1992

- Managed hydrogeologic characterization and groundwater monitoring projects at uranium mill tailings sites in Colorado and Idaho.
- Prepared National Environmental Policy Act documents, including environmental impact statements and environmental assessments, for uranium mill tailings sites.
- Modeled groundwater flow and contaminant transport to assess landfill cover performance and disposal cell designs.

Hydrogeologist: Hydro Geo Chem, Inc., Tucson, Arizona; 1987

Using inverse modeling techniques, assisted in a large-scale water resource evaluation of the Little Colorado River Basin in Arizona.

Environmental Scientist: Ecology and Environment, Inc., Denver, Colorado; 1983–1985

Conducted field assessments of hazardous waste sites, sampling surface water, groundwater, soil and air at potential Superfund sites in Colorado, Wyoming, Utah, and Montana.

Selected Publications and Presentations

Stakeholder Outreach Presentations Related to the Sandia Canyon UAA

"Use Attainability Analysis – Aquatic Life Uses for the Perennial Reach of Sandia Canyon." Co-presented by Robert Gallegos (Triad National Security, LLC). Co-authored by Karen Armijo (NNSA) and Robert Gallegos. Presented as follows:

- Accord Technical Exchange Meeting to the Accord Pueblos (Pueblo of Cochiti, Pueblo of Jemez, Pueblo of San Ildefonso, Pueblo of Santa Clara). September 3, 2020; February 23, 2021; February 23, 2022.
- East Jemez Resource Council (EJRC). December 10, 2020.
- Northern New Mexico Citizen's Advisory Board. October 13, 2021.
- Accord Technical Exchange Meeting to the Accord Pueblos. Co-presented by Matthew Segura (LANL). Co-authored by Karen Armijo (NNSA) and Matthew Segura. February 21, 2024.

"Sandia Canyon Use Attainability Analysis (UAA), Revision 1." Presentation at the Accord Technical Exchange Meeting to the Accord Pueblos. Co-presented by Matthew Segura (LANL); co-authored by Karen Armijo (NNSA) and Matthew Segura. June 27, 2024.

"Sandia Canyon Use Attainability Analysis, Revision and the 30-day Public Comment Period." Presentation to the EJRC. Co-presented and co-authored by Matthew Segura (LANL). May 7, 2024.

"Use Attainability Analysis for Upper Sandia Canyon, Los Alamos, New Mexico: A Scientific Study to Provide Evidence for a Change in Water Quality Standards." Presented at the Federal Environmental Symposium. Co-authored by Karen Armijo (NNSA) and Robert Gallegos (Triad). March 29, 2022.

Los Alamos National Laboratory

"Compendium of Technical Reports Related to the Deep Groundwater Investigation of RDX Contaminated Groundwater at Los Alamos National Laboratory." LANL report LA-UR-18-21326. February 2018.

"Remedy Completion Report for Corrective Measures Implementation at Consolidated Unit 16-021(c)-99." LANL report LA-UR-17-27678. August 2017.

"Summary Report for Intermediate Groundwater System Characterization Activities at Consolidated Unit 16-021(c)-99." LANL report LA-UR-17-22550. March 2017.

"Evaluation Report for Surface Corrective Measures Implementation Closure, Consolidated Unit 16-021(c)-99." LANL report LA-UR-16-27153. September 2016.

"Groundwater Investigation Work Plan for Consolidated Unit 16-021(c)-99, Including Drilling Work Plans for Wells R-68 and R-69." LANL report LA-UR-16-26493. August 2016.

"Work Plan for Intermediate Groundwater System Characterization at Consolidated Unit 16-021(c)-99 in Technical Area 16." LANL report LA-UR-15-24545. June 2015.

Timothy J. Goering

"Revised Work Plan for a Tracer Test at Consolidated Unit 16-021(c)-99, Technical Area 16." LANL report LA-UR-15-24089. June 2015.

Interim Facility-Wide Groundwater Monitoring Plans for the 2008 – 2016 Monitoring Years, Los Alamos National Laboratory 2008 – 2016. LANL reports LA-UR-08-03273, LA-UR-09-01340, LA-UR-10-01777, LA-UR-11-06958, LA-UR-12-21331, LA-UR-13-23479, LA-UR-14-23327, LA-UR-15-23276.

"Interim Measures Report for Source-Removal Testing at Well CdV-16-4ip." LANL report LA-UR-14-27065. September 2014.

"Hydrologic Testing Work Plan for Consolidated Unit 16-021(c)-99." LANL report LA-UR-10-00404. February 2010.

Sandia National Laboratories

Ho, Clifford K., Timothy J. Goering, Jerry L. Peace, and Mark L. Miller. January 2007. "Probabilistic Performance-Assessment Modeling of the Mixed Waste Landfill at Sandia National Laboratories (2nd Edition)." SAND2007-0170, Sandia National Laboratories, Albuquerque, NM.

Ho, Clifford K., Timothy J. Goering, Jerry L. Peace, and Mark L. Miller. November 2005. "Probabilistic Performance-Assessment Modeling of the Mixed Waste Landfill at Sandia National Laboratories." SAND2005-6888, Sandia National Laboratories, Albuquerque, NM.

Peace, J. L., T. J. Goering, C. K. Ho, and M. L. Miller. November 2005. "Mixed Waste Landfill Corrective Measures Implementation Plan, Revision 1." Sandia National Laboratories, Albuquerque, NM. https://www.env.nm.gov/wp-content/uploads/sites/12/2019/10/2_MWLCMI_Final_Jan_2010_Rev_1.pdf.

Peace, Jerry L., and Timothy J. Goering. February 2005. "Calculation Set for Design and Optimization of Vegetative Soil Covers, Sandia National Laboratories, Albuquerque, New Mexico." SAND2005-0480, Sandia National Laboratories, Albuquerque, NM.

Peace, Jerry L., and Timothy J. Goering. March 2004. "Mixed Waste Landfill Corrective Measures Study Final Report, Sandia National Laboratories, Albuquerque, New Mexico." SAND2004-0627, Sandia National Laboratories report, Albuquerque, NM.

Peace, Jerry L., Timothy J. Goering, Michael D. McVey, and David J. Borns. June 2003. "Deployment of an Alternative Cover and Final Closure of the Mixed Waste Landfill, Sandia National Laboratories, Albuquerque, New Mexico." SAND2003-0836, Sandia National Laboratories, Albuquerque, NM.

Peace, J. L., T. J. Goering, and M. D. McVey. September 2002. "Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico." SAND2002-2997, Sandia National Laboratories, Albuquerque, NM.

Peace, J., and T. Goering. December 19, 2001. "Mixed Waste Landfill Corrective Measures Study Workplan." Environmental Restoration Project, Sandia National Laboratories, Albuquerque, NM.

Timothy J. Goering

Goering, Timothy J., Michael D. McVey, Warren R. Strong, H. A. Nguyen, and J. L. Peace. February 1996. “Analysis of Instantaneous Profile Test Data from Soils near the Mixed Waste Landfill, Technical Area 3, Sandia National Laboratories/New Mexico.” SAND95-1637, Sandia National Laboratories, Albuquerque, NM.

Goering, T., and J. Peace. March 1993. “Mixed Waste Landfill Phase 2 RCRA Facility Investigation Work Plan.” Prepared at Sandia National Laboratories for the U.S. Department of Energy, Albuquerque, NM.

UMTRA Project and Earlier

Goering, T. J., A. Groffman, and B. Thomson. March 1992. “Denitrification in Groundwater at Uranium Mill Tailings Sites.” in *Waste Management 92 Conference*, Tucson, Arizona [Published].

Goering, T. J., and K. Bostick. April 1991. “Infiltration through a Clay Radon Barrier of a Rock-Covered Disposal Cell in an Arid Environment.” in *Geological Society of America with the Paleontological Society of America, Rocky Mountain Section* 23(4), ISSN 0016-7592, Albuquerque, NM. [Published].

Jacobs Engineering. January 1989. “Moisture Contents and Unsaturated Conditions in UMTRA Project Radon Barriers.” Prepared by T. Goering and K. Bostick for the U.S. Department of Energy, Albuquerque, NM.

EXHIBIT P

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

Date: October 5, 2015
Symbol: ENV-DO-15-0266
LA-UR: 15-27554, 15-27521
Locates Action No.: N/A

Ms. Lynette Guevara
Environmental Scientist
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502

Dear Ms. Guevara:

Subject: **Investigation to Determine if Naturally Occurring Thermal Conditions are Preventing Attainment of Use in the Perennial Reach of Sandia Canyon - Submittal of Air-Water Temperature Correlation Data and Water Temperature Data**

This is to inform you that in July of 2014 the U.S. Department of Energy/Los Alamos National Security (DOE/LANS) initiated an investigation to determine if naturally occurring thermal conditions are preventing the attainment of the coldwater aquatic life use in the perennial reach of Sandia Canyon. The investigation is schedule to run at least through the summer of 2016. The classified Segment 20.6.4.126 (Segment) comprises perennial waters within Los Alamos National Laboratory (LANL) and includes the reach in upper Sandia Canyon between NPDES Outfall 001 and Sigma Canyon. One of the Segment's designated uses is coldwater aquatic life which is subject to the use specific temperature criteria in 20.6.4.900 NMAC: 6T3 temperature 20°C - maximum temperature 24°C. Attached is a summary of the investigation's approach and interim findings.

The perennial portion of the Segment within Sandia Canyon directly corresponds to the Sandia Canyon Assessment Unit (AU) – NM-9000.A_47. The AU is evaluated to determine whether or not the designated uses are being protected. In NMED's 2014-2016 Integrated Report, the Sandia Canyon AU was listed as not meeting the coldwater aquatic life designated use and the listed causes for the impairment are thallium, copper, PCBs and aluminum. Temperature criteria was not assessed. Preliminary data is provided here to assist NMED with evaluation of the temperature criteria.

The investigation will use NMED's correlation model (Air-Water Temperature Correlation, NMED/SWQB August 2011) with continuous water thermograph measurements to evaluate existing conditions. The results will be used to determine is naturally occurring thermal conditions are preventing the attainment of the cold water aquatic life use. If the data support a change in use, then DOE/LANS will seek a review of the Water Quality Standards.

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:MTS:RMG/lm

Enclosures:

1. Temperature Investigation Approach and Interim Findings
2. Air and Water Temperature Data, Graphs and Map 2014 and 2015 (CD)
   a. Air Temperatures May – September 2014
   b. Air Temperatures May – September 2015
   c. Water Temperatures near Outfall 2014 and 2015
   d. Water Temperatures near SERF July 2014 and 2015
   e. Water Temperatures at Wetland July 2014 and 2015
   f. Water Temperatures at E123 July 2014 and 2015

Cy: James Hogan, NMED/SWQB, Santa Fe, NM, (E-File)
Gene E. Turner, LASO-NS-LP, w/o enc., (E-File)
Jordan Arnswald, LASO-NS-PI, (E-File)
Kirsten Laskey, LASO-SUP, w/o enc., (E-File)
Craig S. Leasure, PADOPS, w/o enc., (E-File)
Amy E. De Palma, PADOPS, w/o enc., (E-File)
Michael T. Brandt, ADESH, w/o enc., (E-File)
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ENCLOSURE 1

Temperature Investigation Approach and Interim Findings

ENV-DO-15-0266

LA-UR-15-27554

Date: OCT 0 5 2015

Introduction

The classified Segment 20.6.4.126 (Segment) comprises perennial waters within Los Alamos National Laboratory (LANL) and includes the reach in upper Sandia Canyon between NPDES Outfall 001 and Sigma Canyon. One of the Segment's designated uses is coldwater aquatic life which is subject to the use specific temperature criteria in 20.6.4.900 NMAC: 6T3 temperature 20°C - maximum temperature 24°C (20°C criterion limit is for six or more consecutive hours on more than three consecutive days and a maximum temperature of 24°C).

In July of 2014 the U.S Department of Energy/Los Alamos National Security (DOE/LANS) initiated an investigation to determine if naturally occurring thermal conditions are preventing the attainment of use in the perennial reach of Sandia Canyon. The investigation is schedule to run at least through the summer of 2016. The perennial portion of the Segment within Sandia Canyon directly corresponds to the Sandia Canyon Assessment Unit (AU) – NM-9000.A_47. The AU is evaluated to determine whether or not the designated uses are being protected. In NMED's 2014-2016 Integrated Report, the Sandia Canyon AU was listed as not meeting the coldwater aquatic life designated use and the listed causes for the impairment are thallium, copper, PCBs and aluminum. Temperature criteria was not assessed. Preliminary data is provided here to assist NMED with evaluation the of the temperature criteria.

The investigation will use NMED's correlation model (Air-Water Temperature Correlation, NMED/SWQB August 2011) with continuous water thermograph measurements to evaluate existing conditions. The results of the investigation will be used to determine if naturally occurring thermal conditions are preventing the attainment of the cold water aquatic life use. If the data support a change in use, then DOE/LANS will seek a review of the Water Quality Standards.

The temperature criteria for the Segment was established as follows:

- In the 2005 Triennial Review, the segment was adopted with the designated use of coldwater aquatic life and the segment-specific temperature criteria of 24°C. The decision was based on the 2002 U.S. Fish and Wildlife Service (USFWS) Study that included continuous temperature data. The temperature criterion of 24°C was determined to be sufficient to protect the aquatic community in Sandia Canyon.

- In the 2009 Triennial Review, the segment-specific temperature criteria of 24°C was replaced with the use specific temperature criteria in 20.6.4.900 NMAC (6T3 temperature 20°C, maximum temperature 24°C). The expressed intent for the change was to list segment-specific criteria only if it differs from section 900. The segment-specific temperature criteria of 24°C was established during the 2005 Triennial which, at the time, differed from the (proposed) use specific temperature criteria in section 900. However, no new information was presented to justify the change from 24°C which was based on findings in the 2002 USFWS Study.

Watershed Description

The Segment originates on the Pajarito Plateau in Technical Area 03 at an elevation of approximately 7600 ft. and extends approximately 2.22 miles to the confluence with Sigma Canyon. The entire reach is within lands owned by the DOE. The reach is an effluent dominated stream that receives flows from three NPDES permitted industrial outfalls. The perennial flows are the result of treated effluent from LANL's Sanitary Waste Water Facility and steam plant boilers through NPDES Outfall 001 and additional

releases from cooling of computing facilities at Outfalls 03A027 and 03A199. Data from Water Years 2012 and 2013 indicate the NPDES permitted outfalls contribute approximately 44% of the total surface flow in the AU, with storm water runoff and snowmelt contributing the remainder.

Ecoregions are geographic areas of similar ecosystems characterized by common elevation, air temperature, precipitation, terrain, geology, soils, vegetation and fauna. LANL is contained within Ecoregion 21 (d) and (h) (Foothill Woodlands and Shrublands and Volcanic Mid Elevation Forest). The vegetation consists of Pinon-juniper woodlands, sagebrush and mountain mahogany shrublands, Gambel oak woodlands. The Segment contains benthic macroinvertebrates but no fish populations.

Water Temperature and Aquatic Life Use

New Mexico aquatic life temperature criteria for the Segment are expressed as 6T3 temperature 20°C and maximum temperature (TMAX) 24°C. In this investigation NMED's correlation (Air-Water Temperature Correlation, NMED/SWQB August 2011) model will be used with water thermograph measurements to determine the appropriate temperature criteria for the Sandia reach within classified segment 20.6.4.126 NMAC. Ambient air temperatures were obtained from LANL's meteorological monitoring program.

NMED's correlation finds for surface waters not significantly influenced by groundwater the attainable water maximum weekly average temperature (MWAT) is equal to the July average air temperature (ATEMP). Because New Mexico's temperature criteria are based on 6T3 and TMAX, the MWAT is adjusted as follows:

TMAX = 1.07 * ATEMP + 4.95
6T3 = 1.03 * ATEMP + 1.30

The designated use based on water temperature can be correlated with the July average air temperature as follows:

- high quality and coldwater uses may be attainable if ATEMP is ≤ 18°C;
- marginal coldwater and coolwater uses may be attainable if ATEMP is ≤ 23°C;
- warmwater may be the most restrictive use attainable if ATEMP is > 23°C.

Data Collection and Review (July 2014 and 2015)

LANL maintains a comprehensive tower network installed to measure temperature, wind, humidity, pressure, precipitation and insolation as required for DOE facilities. The current meteorological network consists of seven observation towers. Air temperatures were derived from the TA-6 tower station (see figure 1 below) which is 0.86 miles from the study area. Temperature data is recorded every 15-minutes. May – September monthly average air temperatures for 2014 and 2015 are summarized in Table 1 with a complete set of air temperatures included in the attached data package.

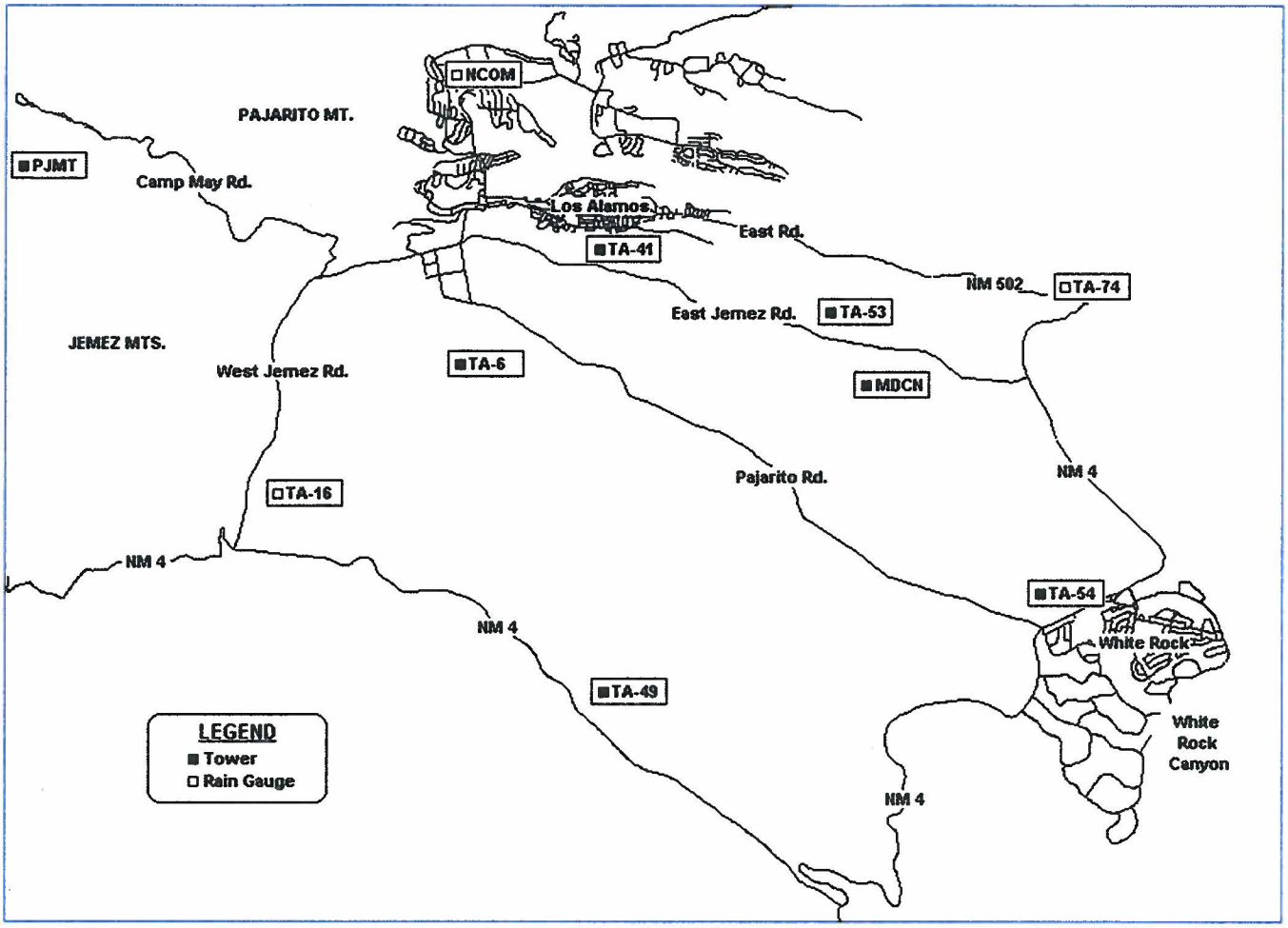


Figure 1

Table 1 - Monthly Average Air Temperatures (^{o}C)

Month	2014	2015
May	13.09	11.44
June	20.23	19.59
July	19.33	18.88
August	18.24	19.68
September	17.23	-

On July 2, 2014 temperature data loggers (Thermographs) were placed at four (4) locations in the Sandia Canyon Assessment Unit (AU):

1. Near NPDES Outfall 001 – Logger placed in a small pool approximately 20 feet below the point of discharge. Logger #15046250 (Outfall Probe in Figure 2).
2. Near Surface Water Effluent Reclamation Facility (SERF) – Logger placed in stream approximately 160 feet below the tunnel. Logger # 10546247 (SERF Probe in Figure 2).
3. Within the wetland – Logger placed in the western reach of the wetland. Logger #546249 (Wetlands Probe in Figure 2).

4. Environmental Surveillance Gage E123 – Logger placed below the wetland at the E123 Gage. Logger #10546248 (E123 Probe in Figure 2).

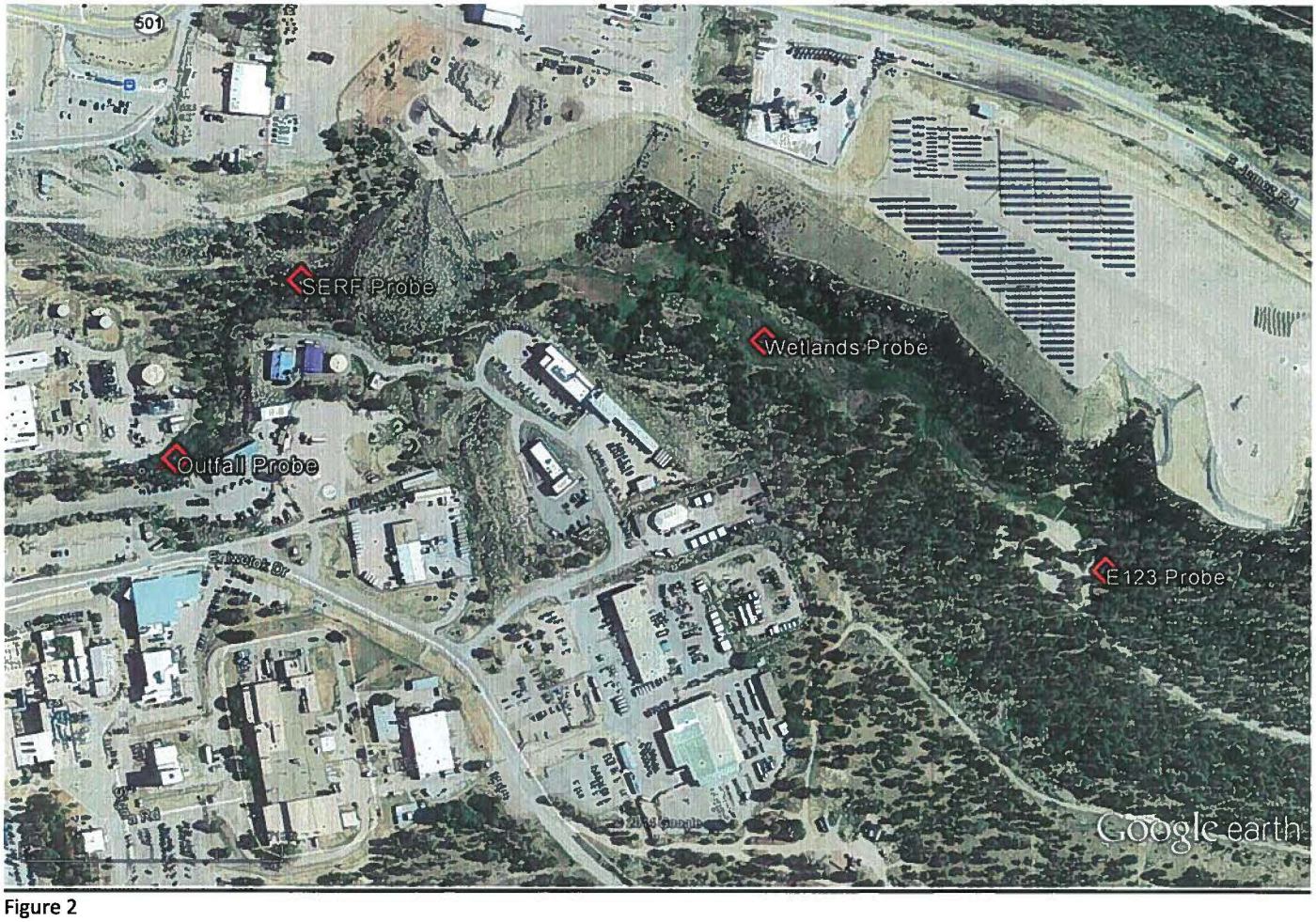


Figure 2

Interim Findings

Table 2 shows the predicted attainable water temperatures based on NMEDs Correlation Model. Water temperature data derived from the thermographs are included in the attached data package.

1. Measured monthly average water temperatures (Wetland and E123) were aligned with the predicted temperature.
2. Measured maximum water temperatures (Wetland and E123) were aligned with the predicted maximum.
3. Water temperatures stabilized in relation to air temperatures with increasing distance from the outfalls (See Figures 1-4 below).
4. The thermographs located in the wetland and at E123 will serve to provide the information to determine naturally attainable water temperatures.

Table 2

Location	Air Temperature[1] (ATEMP) °C Monthly Average	Average Air Temperature (1981 to 2010)[2]	Predicted 6T3 °C	Predicted Maximum (TMAX) °C	Observed[4] Average Water Temperature °C	Observed[4] Maximum Water Temperature °C
Near Outfall	18.8	20.1	20.7[1]/(22.0)[3]	25.15[1]/(26.4)[3]	20.9	23.8
Near SERF					20.1	24.7
Wetland					19.8	25.2
E123					18.2	25.8

1. July 2015 Average Air Temperature – LANL TA-06 Monitoring Station
2. July Average Air Temperature 1981-2010 – LANL TA-06 Monitoring Station
3. Based on July Long-Term Average Air Temperatures (1981-2010)
4. July 2015

5. Water temperatures in the Segment indicate that marginal coldwater or coolwater aquatic life criteria are attainable (Table 3 and 4).
6. Marginal coldwater may best describe conditions in this reach because natural water temperatures resulting from natural ambient air temperatures prevent attainment of coldwater aquatic life use.
7. The data show that the Segment's surface water temperatures are directly related to July average air temperatures as predicted by NMED's correlation model.

Table 3 - Aquatic Life Use Temperature Criteria (°C)

Criterion	Coldwater	Marginal Coldwater	Coolwater	Marginal Warmwater
NM6T3	20	25		-
NMTMAX	24	29	29	32.2

Table 4 - Predicted and Observed 6T3 / TMAX (°C)

Location	Predicted 6T3	Predicted TMAX	Observed 6T3	Observed TMAX
Near Wetland	20.7[1]/(22.0)[3]	25.15[1]/(26.4)[3]	19.8	25.2
E123			18.2	25.8

1. July 2015 Average Air Temperature – LANL TA-06 Monitoring Station
3. Based on July Long-Term Average Air Temperatures (1981-2010)

Figures 3 and 6 show the relationship between outfall, air and water temperatures at the four locations.

Figure 3

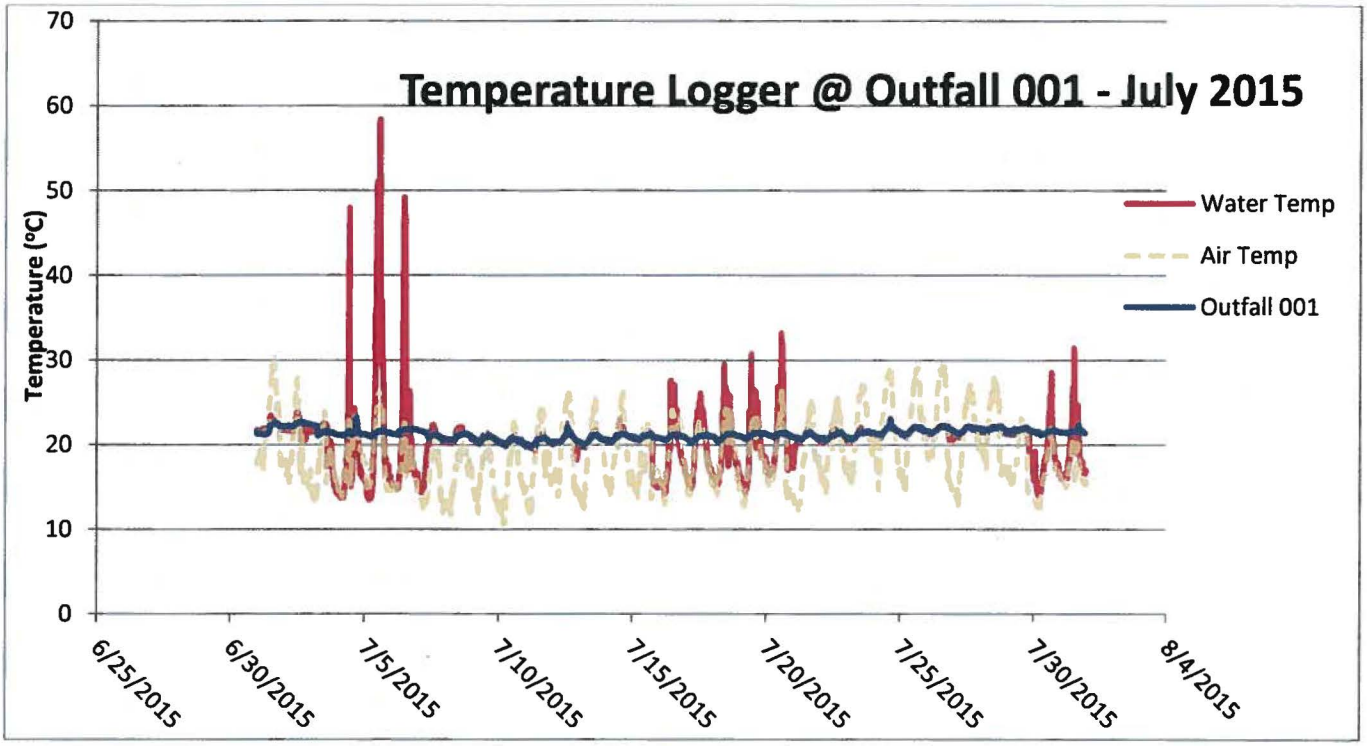


Figure 4

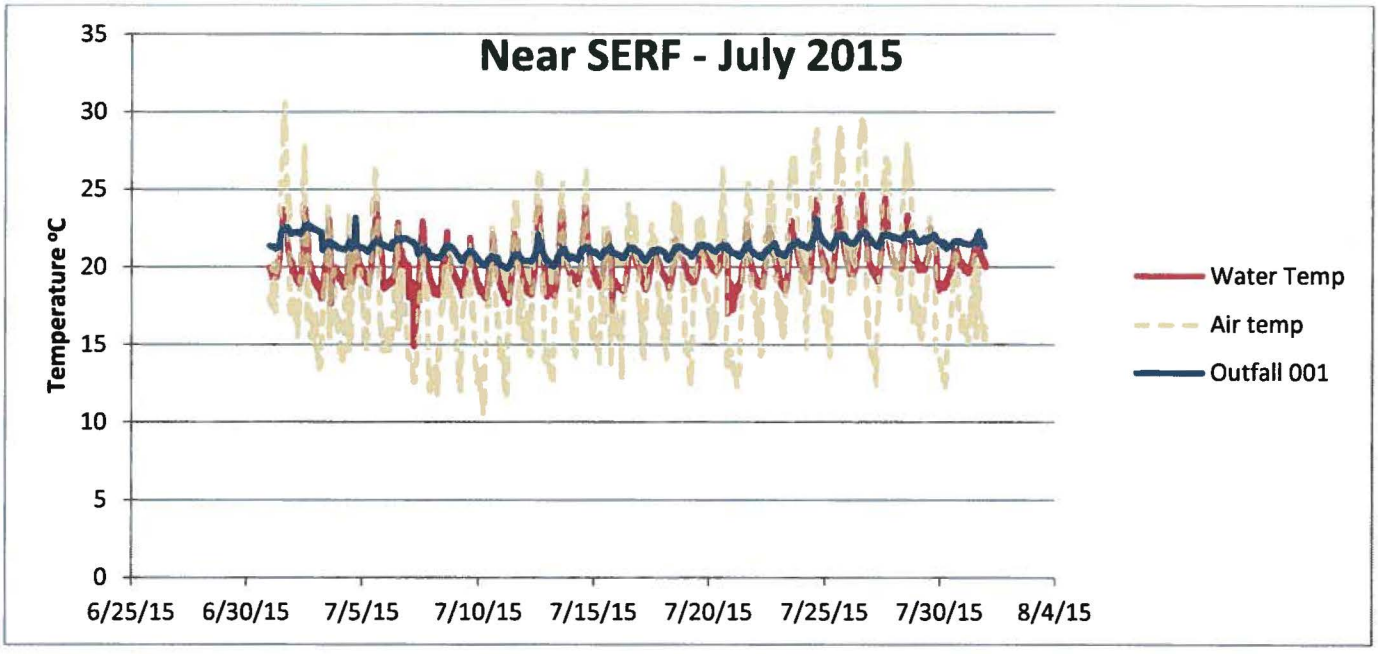


Figure 5

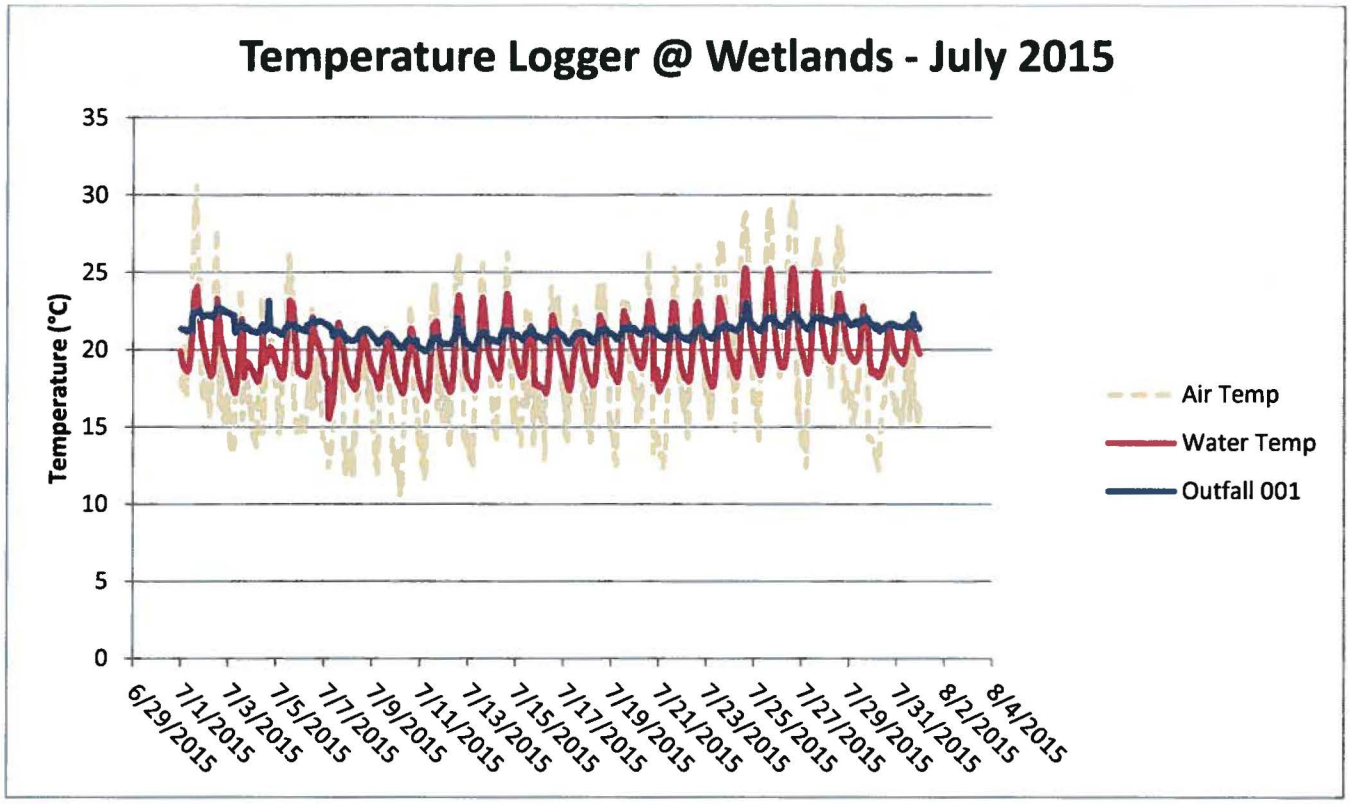
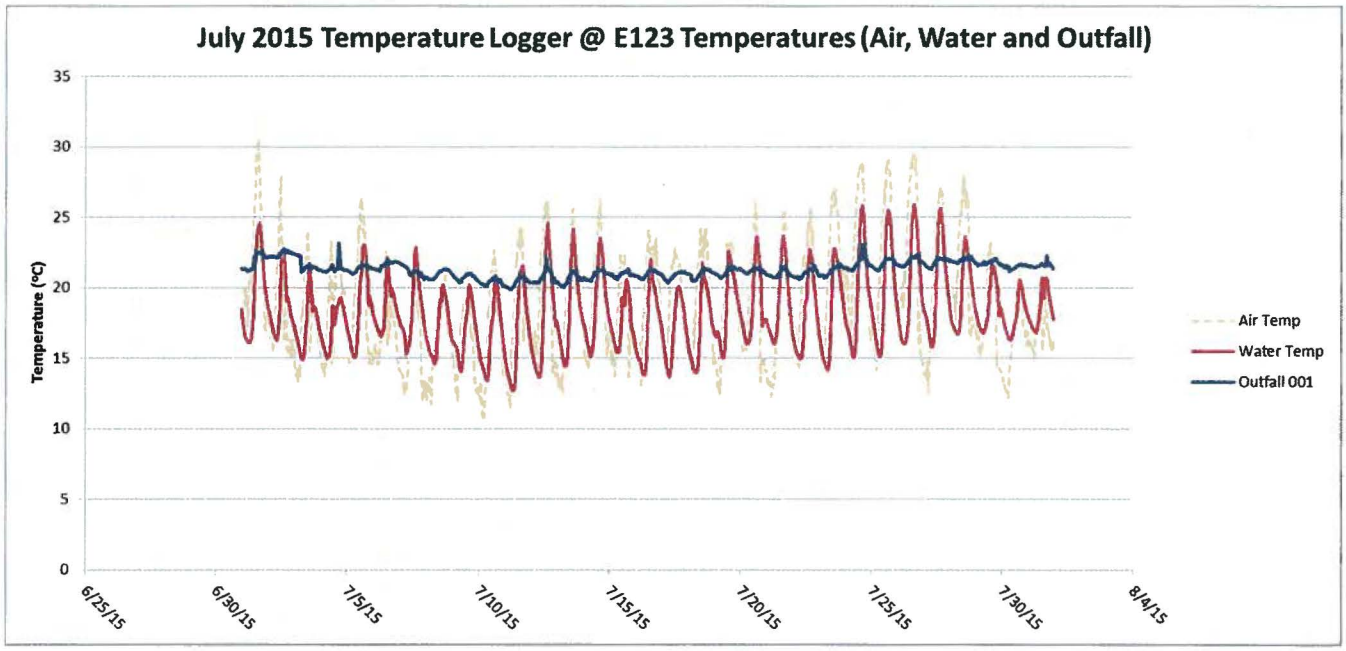


Figure 6



ENCLOSURE 2

Air and Water Temperature Data, Graphs and Map 2014 and 2015 (CD)

a. Air Temperatures May – September 2014
b. Air Temperatures May – September 2015
c. Water Temperatures near Outfall 2014 and 2015
d. Water Temperatures near SERF July 2014 and 2015
e. Water Temperatures at Wetland July 2014 and 2015
f. Water Temperatures at E123 July 2014 and 2015

ENV-DO-15-0266

LA-UR-15-27521

Date: OCT 0 5 2015

EXHIBIT Q

NEW MEXICO
ENVIRONMENT DEPARTMENT

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Governor

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Lieutenant Governor

RYAN FLYNN
Cabinet Secretary

BUTCH TONGATE
Deputy Secretary

March 15, 2015

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PO Box 1663, Mail Stop K490
Los Alamos, NM 87545

RE: Los Alamos National Labs (LANL) Environmental Compliance Program's "*Investigation to Determine if Naturally Occurring Thermal Conditions are Preventing Attainment of Use in the Perennial Reach of Sandia Canyon – Submittal of Air-Water Temperature Correlation Data and Water Temperature Data.*" LANL document ENV-DO-15-0266, October 5, 2015.

Dear Mr. Grieggs:

On October 13, 2015, the New Mexico Environment Department's Surface Water Quality Bureau (Department) received the above referenced document regarding the classified segment 20.6.4.126 NMAC (Segment 126) Segment 126, and specifically the Assessment Unit (AU) in this segment (NM—9000.A_47), is associated with LANL outfall 001 (Sandia Canyon to Sigma Canyon) in the U.S. EPA's National Pollutant Discharge Elimination System (NPDES) permit number NM0028355 The AU is currently assigned a Coldwater (CW) aquatic life use (ALU) with a chronic criterion (6T3 temperature) of 20° C and an acute maximum temperature criterion (T_{MAX}) of 24°C. The segment is currently listed on the Department's 2014-2016 Integrated Report as impaired for thallium, copper, PCBs, and aluminum.

This AU has not recently been assessed for temperature and preliminary data was provided in the above-referenced document to "*assist NMED with evaluation of the temperature criteria*". The document also specifies that the goal of the evaluation is to "*determine if naturally occurring thermal conditions are preventing the attainment of the cold water aquatic life use*", and that if so, DOE/LANS will seek a review of the Water Quality Standards.

The Department has reviewed LANL's preliminary results and temperature data, and discussed this review with LANL staff during a conference call held on February 26, 2016. The Department also provides this letter with general and specific comments presented in Attachment A. While the evaluation in the DOE/LANS document is described as preliminary, a revision to water quality standards which may result in downgrading an aquatic life use or applying less stringent criteria requires a use attainability analysis (UAA) be conducted subject to the

requirements in the water quality standards under 20.6.4.15 NMAC. Also, at a minimum UAAs conducted by outside parties must fulfill the requirements under 20.6.4.15.D NMAC:

> "**D. Use attainability analysis conducted by an entity other than the department.** Any person may submit notice to the department stating the intent to conduct a use attainability analysis. The proponent shall develop a work plan to conduct the use attainability analysis and shall submit the work plan to the department and region 6 EPA for review and comment. The work plan shall identify the scope of data currently available and the scope of data to be gathered, the factors affecting use attainment that will be analyzed and provisions for public notice and consultation with appropriate state and federal agencies. Upon approval of the work plan by the department, the proponent shall conduct the use attainability analysis in accordance with the approved work plan. The cost of such analysis shall be the responsibility of the proponent. Upon completion of the use attainability analysis, the proponent shall submit the data, findings and conclusions to the department. The department or the proponent may petition the commission to modify the designated use if the conclusions of the analysis support such action."

We appreciate the opportunity to review and provide comments on the preliminary work at Sandia Canyon. If you have questions about these comments, or the UAA/standards revision processes, please contact Bryan Dail by telephone (505)-476-3799 or email (bryan.dail@state.nm.us), or me.

Sincerely,

Kristine L. Pintado

Kristine Pintado, Water Quality Standards Coordinator
Monitoring, Assessment and Standards Section
Surface Water Quality Bureau

cc: (via email)
James Hogan, Surface Water Quality Bureau Chief
Shelly Lemon, Monitoring, Assessment and Standards Section Manager
Robert M. Gallegos, LANL Water Quality – Permitting and Compliance
Michael T. Saladen, LANL Water Quality – Permitting and Compliance

Attachment A

Department's Evaluation (Synopsis): The Department's evaluation of LANL's approach includes corroboration of the preliminary data with the PRISM climate model to predict attainable water temperatures in the Sandia Canyon segment. The Department analyzed the modeled temperatures (ATEMP, T_{MAX} and 6T3) provided in the LANL preliminary data and compared them to the 30-year (1981-2010) means from the Department's Air:Water temperature correlation model guidance. The methodological approaches in the draft document were also evaluated along with data and analysis in context of the previous study provided by United States Fish & Wildlife Service (Lusk et al., 2002).

General Comments:

- The Department's predictive modeling of attainable uses using the Air:Water temperature correlation produced general agreement with LANL's modeling findings.
- Modeled acute and chronic temperature criteria for the Sandia Canyon AU suggest the Coldwater use may not be attainable.
- The previously-conducted U.S. Fish & Wildlife study (Lusk et al. 2002) identified waters above the Los Alamos Canyon reservoir as a reference reach. This may be appropriate for chemical parameters known to impair Sandia Canyon and other water bodies on the plateau, but does not appear to be a good reference indicator of attainable aquatic life use due to the differences in geophysical setting of these two reaches. Identification of an appropriate reference reach for purposes of attainable temperatures is strongly encouraged.
- Water temperature data from the Lusk et al. (2002) study of Sandia Canyon demonstrated attainment of the current coldwater T_{MAX} (24°C) during the 1997 sampling season. While the chronic 6T3 criterion was not in place at the time of the study, the Department's re-analysis of the 1997 dataset shows that Sandia Canyon did not attain the chronic 6T3 criterion for the coldwater aquatic life use at that time.
- Lusk et al. (2002) collected temperature data in 1996, but this thermograph record began in December of that year, and therefore was not appropriate for the determination of seasonal high temperatures, and not used in the Department's analysis.
- No data to support the attainable or existing aquatic life (i.e., presence or absence of macroinvertebrates, shellfish, or fish) were included in LANL's preliminary findings. A downgrade of the aquatic life use requires evidence that the current use is not attainable and is not an existing use. The Department encourages use of historical (if available), existing, and new data (where gaps exist) in support of ascertaining appropriate aquatic life use.
- The data in the Lusk et al. (2002) study (Figure 31) indicate that there were incidences of DO below the current criteria. All aquatic life use categories except Limited Aquatic Life assign DO criteria to support aquatic life (see 20.6.4.900.H (1) - (6) NMAC).

Results of the comparison of LANL-determined and independent PRISM ATEMP and Air:Water temperature modeling:

- LANL's ATEMP (Air) was determined from just the one month's record in July 2015 and is slightly different (approximately 0.2°C) than the long term average (PRISM ATEMP). This could be reasonably expected due to inter-annual variation about the long-term mean.
- The Department's ATEMP, using PRISM, predicted non-attainment of the Coldwater ALU for all sites tested.
- LANL predicted 6T3 was slightly higher than that predicted by the Department's PRISM run, however all modeled 6T3 temperatures exceeded the Coldwater ALU.
- Both LANL predicted 6T3 and T_{MAX} indicate Coldwater ALU will not be met.
- Observed T_{MAX} for LANL (2015) indicates attainment for the pool below the outfall (T_{MAX}<24°C) but thermal loading through the 0.66 mile AU prevents attainment of the T_{MAX} for Coldwater ALU at other locations in AU.
- Water temperature data from the 1997 sampling season (Lusk et al. 2002) demonstrated attainment of the T_{MAX} at or near the bottom of the AU (near LANL's E123 station).

Summary of Preliminary Recommendations

- Continue stream temperature monitoring to account for interannual variations and increase validation of predictive modeling.
- Include a survey of existing and historic aquatic life in Sandia Canyon and appropriate literature review of temperature tolerances.
- Work with the Department to ascertain proper placement of thermographs that best represent AU characteristics.
- Work with the Department to determine an appropriate reference reach that best indicates the attainable aquatic life use in Sandia Canyon.

References:

Daly, C., R.P. Neilson and D.L. Phillips, 1994. A statistical-topographic model for mapping climatological precipitation over mountainous terrain. J. Appl. Meteor., 33, 140-158.

Lusk, J.D., R.K. MacRae, D. Chapman and A. Allert. 2002. Water Quality Assessment of Four Intermittent Streams in Los Alamos County, New Mexico. Document prepared by the United States Fish and Wildlife Service.

Smith, G.R. 1981. Late Cenozoic freshwater fishes of North America. Annual Review of Ecological Systematics 12:163-193.

EXHIBIT R

Environmental Protection & Compliance Division
Los Alamos National Laboratory
PO Box 1663, K490
Los Alamos, New Mexico 87545
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Date: JUN 2 7 2018
Symbol: EPC-DO: 18-247
LAUR: *18-23125*
Locates Action No.: *N/A*

Ms. Jennifer Fullam
Standards Coordinator
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502

Subject: **Draft Work Plan – Use Attainability Analysis (UAA) – Determine if Naturally Occurring Thermal Conditions Prevent Attainment of Coldwater Aquatic Life Use in the Perennial Reach of Sandia Canyon – Water Quality Segment 20.6.4.126**

Dear Ms. Fullam:

The attached UAA work plan is being submitted in order to obtain a preliminary review by the New Mexico Environment Department (NMED) prior to formal submission. The work plan provides a framework for development of a UAA to determine if natural thermal conditions are preventing the attainment of cold water aquatic life use in the perennial reach of Sandia Canyon within Segment 20.6.4.126 NMAC.

Please contact Robert Gallegos (505) 665-0450 of the Environmental Compliance Programs (EPC-DO) if you have questions.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

TSVV/MTS/RMG:cmh

Enclosure: 1) Draft Work Plan – Use Attainability Analysis – Determine if Naturally Occurring Thermal Conditions Prevent Attainment of Coldwater Aquatic Life Use in the Perennial Reach of Sandia Canyon – Water Quality Segment 20.6.4.

Copy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
Kris Barrios, NMED/SWQB, Santa Fe, NM, (E-File)
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ENCLOSURE 1

Draft Work Plan – Use Attainability Analysis – Determine if Naturally Occurring Thermal Conditions Prevent Attainment of Coldwater Aquatic Life Use in the Perennial Reach of Sandia Canyon – Water Quality Segment 20.6.4.

EPC-DO: 18-247

LA-UR-18-23125

Date: JUN 27 2018

Work Plan – Use Attainability Analysis – Determine if Naturally Occurring Thermal Conditions Prevent Attainment of Coldwater Aquatic Life Use in the Perennial Reach of Sandia Canyon – Water Quality Segment 20.6.4.126

The purpose of this document is to present a work plan pursuant to the requirements contained in 20.6.4.15.D to determine if natural thermal conditions are preventing the attainment of cold water aquatic life use in the perennial reach of Sandia Canyon within Los Alamos National Laboratory (LANL/Laboratory). Upon approval of this work plan, the Department of Energy and Los Alamos National Security, LLC (DOE/LANS) will complete a study and use the results to prepare a Use Attainability Analysis (UAA). The UAA will evaluate current and existing uses and present factors affecting the attainment use.

The work plan includes the following:

A. Introduction and Problem Statement
B. Factors Affecting Attainment of Use
C. Study Area and Watershed Description
D. *Scope of Data*
    1. *Available Data (Historic)*
        a. *2002 United State Fish and Wildlife Service Use Study and 2007 NMED Use Attainability Analysis*
        b. *Aquatic Life Studies*
        c. *Other Stream Reaches within Ecoregion 21d*
    2. *Scope of Additional Data to be Gathered and Analyzed*
        a. *Measured Temperature 2014 - 2018*
        b. *Temperature Analysis Using PRISM and LANL MET Data*
        c. *Dissolved Oxygen*
        d. *Data Verification and Evaluation*
        e. *2017 Sandia Canyon AU Aquatic Life Survey*
        f. *Evaluate Potential of Groundwater Inflow in Lower Region of AU*
E. Reference Discussion
F. Provisions of public notice and consultation with state and federal agencies

A. Introduction and Problem Statement

The classified Segment 20.6.4.126 NMAC (Segment) comprises perennial waters within the LANL boundary and includes the Sandia Canyon Assessment unit (Sandia Canyon AU) – NM-9000.A_47 in upper Sandia Canyon between NPDES Outfall 001 and Sigma Canyon. In the New Mexico Environment Department's 2016-2018 Integrated Report (IR) (NMED 2016), the AU is listed as not meeting the Coldwater Aquatic Life (ColdWAL) designated use and the listed causes for the impairment include thallium, copper, PCBs and aluminum. The AU is not currently listed for temperature in the IR. In the 2016-2018 IR the AU was assigned a Category of 5B because the temperature criteria is under review and the designated use may not be existing or attainable. Consequently, the water quality criteria may need to be revised. The Segment is currently subject to the use specific temperature criteria in 20.6.4.900 NMAC: 6T3 = 20°C and a maximum temperature 24°C.

In 2005 the Water Quality Control Commission (WQCC) adopted the Segment as a classified water of the State with the designated use of ColdWAL and the segment-specific temperature criteria of 24°C. The decision to adopt the segment-specific temperature criteria was based on the 2002 U.S. Fish and

Wildlife Service (USFWS 2002) study which included continuous temperature recording within Segment during the summer of 1997. At that time the temperature criteria of 20°C for both a high quality and coldwater fishery were exceeded. The temperatures within the AU did not rise above 24°C which is the short-term summer maxima temperatures necessary for survival of juvenile and adult brook trout. Stream temperatures did not exceed the standards for marginal coldwater fishery (USFWS 2002). The study concluded that the aquatic life use category of coldwater fishery was appropriate but a segment specific temperature of 24°C was established by the WQCC (WQCC 20.6.4 NMAC). Following approval of by WQCC, NMED prepared a UAA (NMED 2007) detailing the attainable aquatic life uses for the new Segment and submitted to EPA. EPA approved Segment 20.6.4.126 NMAC in September of 2007.

In 2010, as part of a restructuring of the Water Quality Standards, the WQCC discontinued site specific temperature listings when they did not differ from the use specific temperature criteria contained in 20.6.4.900 NMAC. The Sandia AU's site specific temperature criteria of 24°C established during the 2005 Triennial Review differed from the use specific ColdWAL temperature criteria in 20.6.4.900.H. Despite this, the WQCC amended 20.6.4.126 and adopted the use specific temperature coldwater aquatic life criteria of 24°C as the maximum and incorporated temperature criteria based on 6T3-20°C contained in 20.6.4.900.H.

The Laboratory's National Pollutant Discharge Elimination System Permit (NPDES Permit) became effective on October 1, 2014 and included a State Certification requirement for additional monitoring and temperature limitations, at Outfall 001, to protect the designated use of ColdWAL. Pursuant to a compliance schedule, the new temperature limitations of 6T3 = 20°C, 24°C maximum and monitoring frequency of once per hour becomes effective on September 29, 2019. Operational temperature data collected at Outfall 001 indicate that the 6T3 -20°C criteria is not achieved at certain times during June - August. However, even if the 6T3 -20°C criteria at Outfall 001 is attained, naturally occurring thermal conditions will make attaining the designated use for the Segment not feasible.

B. Factor(s) Affecting Attainment of Use

Section 20.6.4.15 NMAC defines a UAA as a scientific study conducted for the purposes of assessing the factors affecting the attainment of a use. A use is not attainable if attaining the designated use is not feasible due to one of the factors in 40 CFR 131.10(g). States may remove a designated use which is not an existing use, as defined in §131.3(e), or establish sub categories of a use if the State can demonstrate that attaining the designated use is not feasible because:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or Dams, diversions or other types of hydrologic modifications preclude the attainment of the use

and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

4. Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in attainment of the use.
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact

Historic and current information will be examined and the results of the investigation will be used to determine if naturally occurring thermal conditions are preventing the attainment of the ColdWAL use in the AU. A weight of evidence approach will be used to determine if naturally occurring thermal conditions precludes the attainment of designated aquatic life use. If the data support a change in use, then DOE/LANS will request a review of the Water Quality Standards by NMED and WQCC.

In July of 2014 DOE/LANS initiated an investigation to determine if naturally occurring thermal conditions are preventing the attainment of ColdWAL use within the AU. Thermographs were placed at 4 locations within the AU. Interim findings, of data gathered in 2014 and 2015, were provided to NMED on October 5, 2015 (Table 1):

1. Coldwater Aquatic Life criteria is not attainable.
2. Marginal coldwater or coolwater aquatic life criteria are attainable .
3. Marginal coldwater or cool water may best describe conditions in this reach because natural water temperatures resulting from natural ambient air temperatures prevent attainment of ColdWAL aquatic life use.
4. The data show that the AUs measured surface water temperatures correlate to July average air temperatures in support of NMED's model.

Table 1

Location	PRISM - July 2015[1]	Air Temperature[2] (ATEMP) °C Monthly Average	Average Air Temperature (1981 to 2010)[3]	Predicted 6T3 °C	Predicted Maximum (TMAX) °C	Observed[4] Average Water Temperature °C	Observed[4] Maximum Water Temperature °C
Near Outfall	20.5	18.8	20.1	20.7[1]/(22.0)[3]	25.15[1]/(26.4)[3]	20.9	23.8
Near SERF						20.1	24.7
Wetland						19.8	25.2
E123						18.2	25.89

1. July 2015 PRISM Lat: 35.8782, Lon: -106.2880; Elev: 2179m
2. July 2015 Average Air Temperature – LANL TA-06 Monitoring Station
3. July Average Air Temperature 1981-2010 – LANL TA-06 Monitoring Station
4. July 2015

C. Study Area and Watershed Description

LANL is located in northern New Mexico on the Pajarito Plateau, which extends eastward from the Sierra de los Valles, the eastern portion of the Jemez Mountains. Most of the finger-like mesas at the Laboratory are formed from Bandelier Tuff, which is composed of ash fall, ash-fall pumice, and rhyolite tuff. Deposited by major eruptions in the Jemez Mountains volcanic center 1.2 to 1.6 million years ago, the tuff is more than 1000 ft thick in the western part of the plateau and thins to about 260 ft eastward above the Rio Grande.

On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. In the central Pajarito Plateau and near the Rio Grande, the Bandelier Tuff is underlain by the Puye Formation. The Cerros del Rio basalts interfinger with the Puye Formation along the river and extend beneath the Bandelier Tuff to the west. These formations overlie the sediments of the Santa Fe Group, which extend across the basin between the Laboratory and the Sangre de Cristo Mountains and are more than 3300 ft thick (Figure 1).

Figure 1 is a generalize geologic cross-section of the Pajarito Plateau (Los Alamos National Laboratory 2014 Environmental Report)

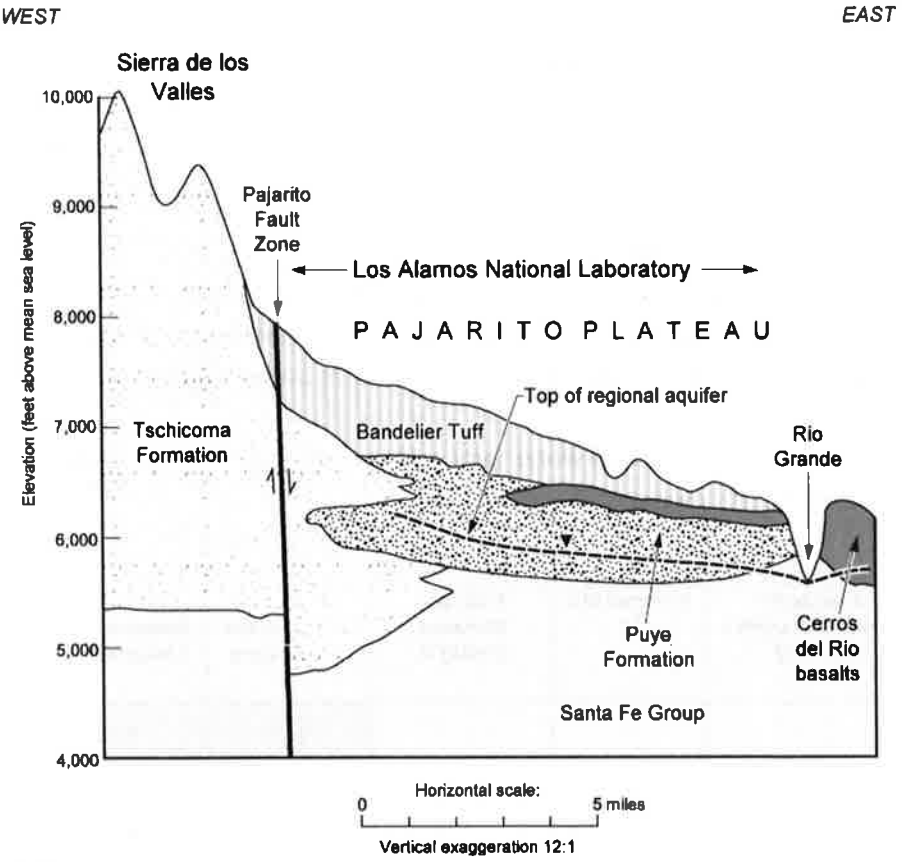

Figure 1

Surface water in the region of the Laboratory occurs primarily as ephemeral or intermittent streams. Perennial springs on the flanks of the Jemez Mountains supply base flow into the upper reaches of some canyons, but the volume is insufficient to maintain surface flow across the Laboratory property before the water is lost to evaporation, transpiration, and infiltration. Los Alamos has a temperate, semiarid

mountain climate. However, the elevation strongly influences the climate, and the topography causes large temperature and precipitation differences in the area. The average annual precipitation recorded from the Technical Area 6 (TA-6) Meteorological (MET) Tower is 18.97 inches (1981-2010). The summer rainy season accounts for 40% of the annual precipitation.

The AU originates at NPDES Outfall 001 in TA-3 at an elevation of approximately 7300 feet. The AU extends approximately 2.22 miles and terminates at the confluence with Sigma Canyon. The entire AU is within the Laboratory on lands owned by the DOE. Approximately 250 acres of lands within the AU is comprised of impervious surfaces located within an urban environment. TA-3 contains most of the Laboratory's administrative buildings and public and corporate access facilities and houses several Laboratory activities such as experimental sciences, special nuclear materials, theoretical/computations, and physical support operations. Remaining areas are comprised of parking lot and native perennial vegetation or landscaping. The watershed discharging to the AU is comprised of approximately 800 acres of Laboratory property and 29 acres of area under the control of Los Alamos County. No springs are located within the AU. The AU is naturally ephemeral and the only spring in Sandia Canyon is located outside the AU in lower Sandia Canyon approximately 0.5 miles from the Rio Grande.

The persistent surface flows to the AU originate from NPDES permitted effluent releases. These releases have occurred since the early 1950's and continue today. The sources for the releases are LANL's treated sanitary wastewater and cooling tower blowdown. Absent these flows, ephemeral conditions exist. Persistent surface flows and saturated alluvial aquifer conditions occur in the upper and middle portions of the AU. A wetland of approximately 7 acres has developed as a result of effluent discharge. Currently, three NPDES permitted outfalls discharge to upper Sandia Canyon in the TA-3 area:

- NPDES Outfall 001 discharges effluent, predominantly from the Laboratory's TA-46 SWWS Plant and the TA-3 Steam Plant boilers. Outfall 001 is the main effluent source of water to Sandia Canyon, discharging up to 0.160 MGD in 2015.
- NPDES Outfall 03A027 and Outfall 03A199 (associated with cooling towers at the SCC and the LDCC, respectively) also discharge to upper Sandia Canyon. These two outfalls contribute a maximum of 0.050 MGD of cooling water blowdown to the canyon in 2015.

Continuous flow data is available from gages located within the AU. E121 is located approximately 670' below Outfall 001 and 027. E122 is located on north fork of Sandia Canyon approximately 1040' below Outfall 199. Data from Water Years 2012 and 2013 indicate the NPDES permitted outfalls contribute approximately 44% of the total surface flow in the AU, with storm water runoff and snowmelt contributing the remainder.

The AU is entirely contained within the Ecoregion 21d. Ecoregions are geographic areas of similar ecosystems characterized by common elevation, air temperature, precipitation, terrain, geology, soils, vegetation and fauna. In New Mexico, 21d is a transition area from the higher elevation forests to drier and lower plains (Ecoregion 26) and plateaus (Ecoregions 20, 22). Within the region, some flora and fauna species on the east side (Great Plains) may differ from those found to the west (Great Basin influence). This semiarid region has rolling to irregular terrain of hills, ridges, and footslopes, with

elevations mostly 6000 to 8500 feet, and a variety of rock and soil types. In New Mexico, pinyon-juniper and oak woodlands are dominant (Griffin 2006).

D. Scope of Data

The UAA investigation will use the following information and a weight-of-evidence approach to determine if the evidence evaluated supports a change in the aquatic life use:

1. Available Data (Historic)
   a) 2002 USFWS Use Study - In 1996 and 1997, the United States Fish and Wildlife Service (USFWS 2002) investigated the biological, chemical, and physical characteristics of four intermittent streams at LANL. Width, depth, substrate, temperature, velocity, cover, and other physical parameters were measured. Surveys for macroinvertebrates were conducted. The findings were the basis for the WQCC decision to adopt Segment 20.6.4.126 (perennial waters within LANL) with a use of cold water aquatic life and a segment specific temperature of 24°C. The data and information contained in the study will be examined and used with more recently derived data to develop UAA findings.
   b) Aquatic Life Studies - Between 1991 and 2009 a number of macroinvertebrate studies were conducted by LANL, NMED and DOE across the Pajartio Plateau including within Segment 20.6.4.126 and the Sandia AU. In general, the studies included evaluations of macroinvertebrate communities' response to site conditions, generation of impact-based assessments of habitat and water quality and evaluation of effects of LANL discharges on aquatic biological communities. Water temperatures were measured. The studies provide important information, over an extended period, about the make-up of aquatic macroinvertebrate communities. The studies will be examined with respect to cold water preferring taxa with comparisons to historical and recent surveys. (Aquatic Life Studies on the Pajarito Plateau).
   c) Other Stream Reaches within Ecoregion 21d - Temperature (PRISM and measured water temperatures) data will be evaluated for stream reaches located within Ecoregion 21d. These reaches share similar geophysical and ecological features with the Sandia AU.
      i. Galisteo Creek (20.6.4.121)/ NM-2118.A_12)
      ii. Tecolote Creek (20.6.4.215)/ NM-2212_10)
      iii. Santa Fe River (Guadalupe to Nichols Reservoir) (20.6.4.137/NM-9000.A_62)
      iv. Rio Frijoles @ Cundiyo (20.6.4.121/NM-2118.A_60)
      v. Rito de los Frijoles (20.6.1.121/NM-2118-A_70 and NM-2118.A_74)
      vi. Gallinas Creek (20.6.4.215/NM-2212_00)

2. Data to be Gathered and Analyzed (Recent)
   a) Measured Temperature Data within AU 2014-2018 - On July 2, 2014 DOE/LANS initiated the investigation by placing temperature loggers (thermographs) at four (4) locations within Sadia Canyon. The thermographs were set to capture data at 15-minute intervals. Thermographs were deployed in accordance with NMED SOP 6.3 (NMED 2015).
      i. Near NPDES Outfall 001 – Thermograph placed in a small pool approximately 20 feet below the point of discharge. Logger #15046250 (Outfall Probe in Figure 2). On June 30, 2015 the thermograph was replaced with Logger #10693868.

ii. Near Surface Water Effluent Reclamation Facility (SERF) – Thermograph placed in stream approximately 160 feet below the tunnel. Logger #10546247 (SERF Probe in Figure 2). On June 30, 2015 the thermograph was replaced with Logger #10887041.
iii. Within the wetland – Logger placed in the western reach of the wetland. Logger #10546249 (Wetlands Probe in Figure 2). On June 2, 2016 use of this thermograph was discontinued based on guidance from NMED.
iv. Environmental Surveillance Gage E123 – Themograph placed below the wetland at the E123 Gage. Logger #10546248 (E123 Probe in Figure 2). On June 30, 2015 the thermograph was replaced with Logger #10887042.

On June 2, 2016 Laboratory and NMED staff met on-site to review and determine the proper placement of thermographs that best represent the Segments characteristics. NMED staff suggested placement of at two additional locations. The logger within the wetland was removed because the temperature information gathered would not be representative of stream conditions.

On June 30, 2016 DOE/LANS deployed two additional thermographs one below E123 (#10546248) and at one at the end of the AU at the confluence with Sigma Canyon (#10887040 and 10887041). Dissolved oxygen recording capability was added at four of the six stations. Figure 2 shows the location of thermograph deployment.

Based on a preliminary review of the thermograph data from 2017, a new thermograph (#10693868) was deployed in an area (approximately) half-way between E123 and the end of AU at Sigma Canyon (Figure 2). Also, on this date, thermographs were re-deployed below E123 (#10693067) and at the end of the AU at Sigma (#10546248). This was done to gain a better understanding of the water temperatures recorded at the end of the AU which indicate temperatures less than what would be expected from correlation model predictions (Figure 5).

Thermographs were deployed and managed following NMED's Standard Operating Procedures for thermographs and sondes:

i. SOP 6.3 Thermographs (2013 and 2016)
ii. SOP 6.4 Long Term Deployment Data Quality Assurance and Upload (NMED 2016)
iii. SOP 6.2 Sonde Deployment (DO)

b) Temperature Analysis Using PRISM and LANL MET Data - In addition to the continuous water temperature data collected in 2014 - 2018, the investigation will use NMED's correlation model (Air-Water Temperature Correlation, NMED/SWQB August 2011) to evaluate existing conditions. This procedure has been used in a number of recent UAA investigations (NMED Galisteo 2012, Tecolote 2017, NMED Santa Fe 2011). NMED developed a correlation model using Parameter-elevation Relationships on Independent Slopes Model (PRISM) (http://www.prism.oregonstate.edu). PRISM provides gridded

temperature data for any location in the United States. July temperatures from PRISM were obtained for the grid 35.8694 Lon: -106.3073 at an elevation of 7149' (Figure 3). The NMED model found a correlation between July average air temperature and MWAT – maximum weekly average temperature and concluded that MWAT = ATEMP (PRISM July Average Air Temperature). The model is based on recorded thermograph data from 293 New Mexico stream locations and assumes that, in streams which do not receive groundwater inputs sufficient to change the water temperature, air temperature has the greatest influence on stream temperature. The data from PRISM is used with air temperatures obtained from LANL's TA-06 (and TA-53) Metrological Tower (Figure 4) to develop an attainable TMAX, 6T3 (Table 2) and ATEMP. ATEMPs will be derived from 30 years of July ambient air temperatures obtained from PRISM and LANL MET stations. Averaging air temperatures over longer time periods is expected to improve the correlation between air and stream temperatures. NMED's model will be used to support site-specific measured data and help identify the appropriate stream classification and attainable aquatic life category.

Table 2 - Aquatic Life Use Temperature Criteria (°C)

Criterion	Coldwater	Marginal Coldwater	Coolwater	Marginal Warmwater
NM6T3	20	25	-	-
NMTMAX	24	29	29	32.2

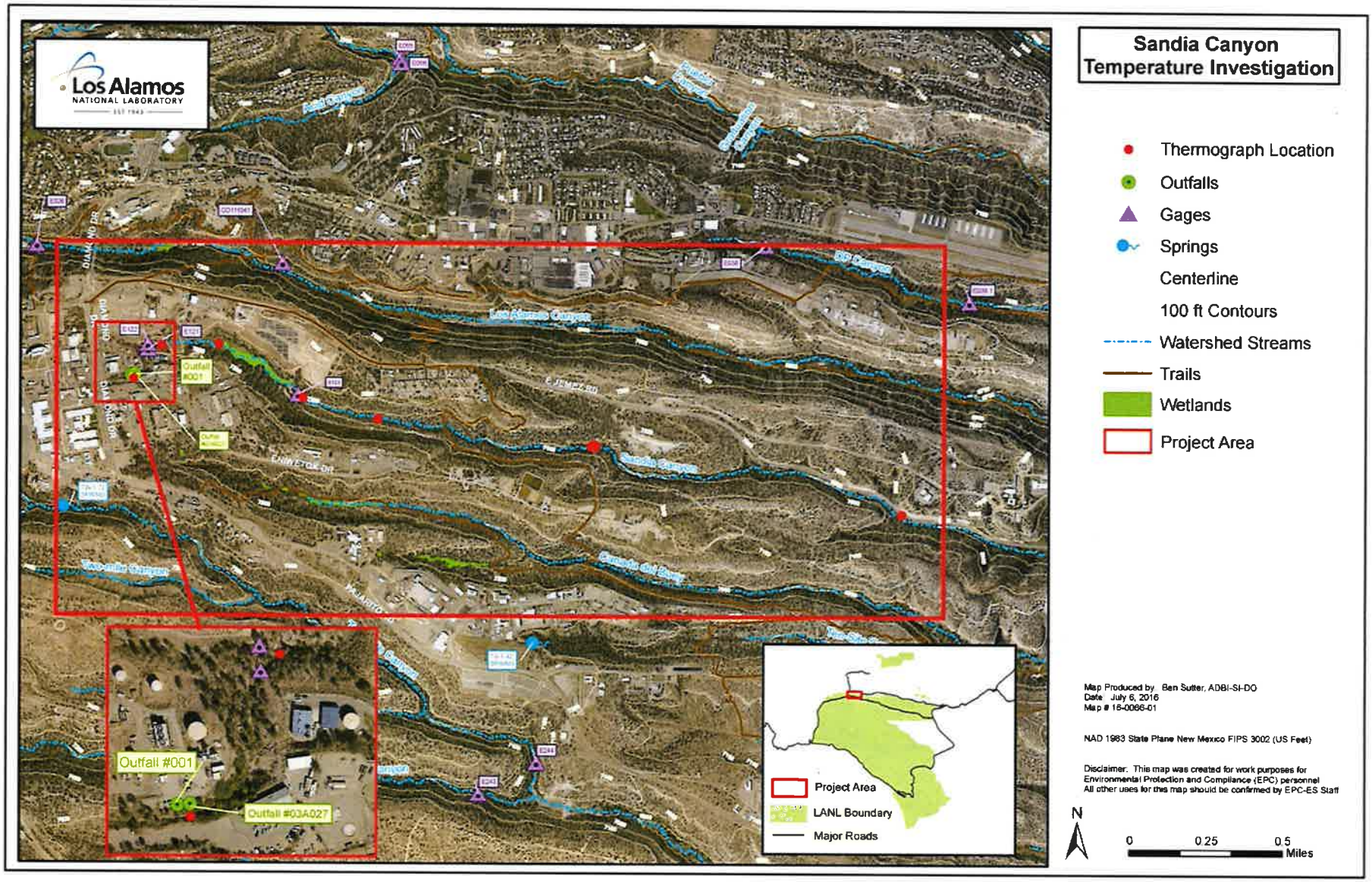

Figure 2

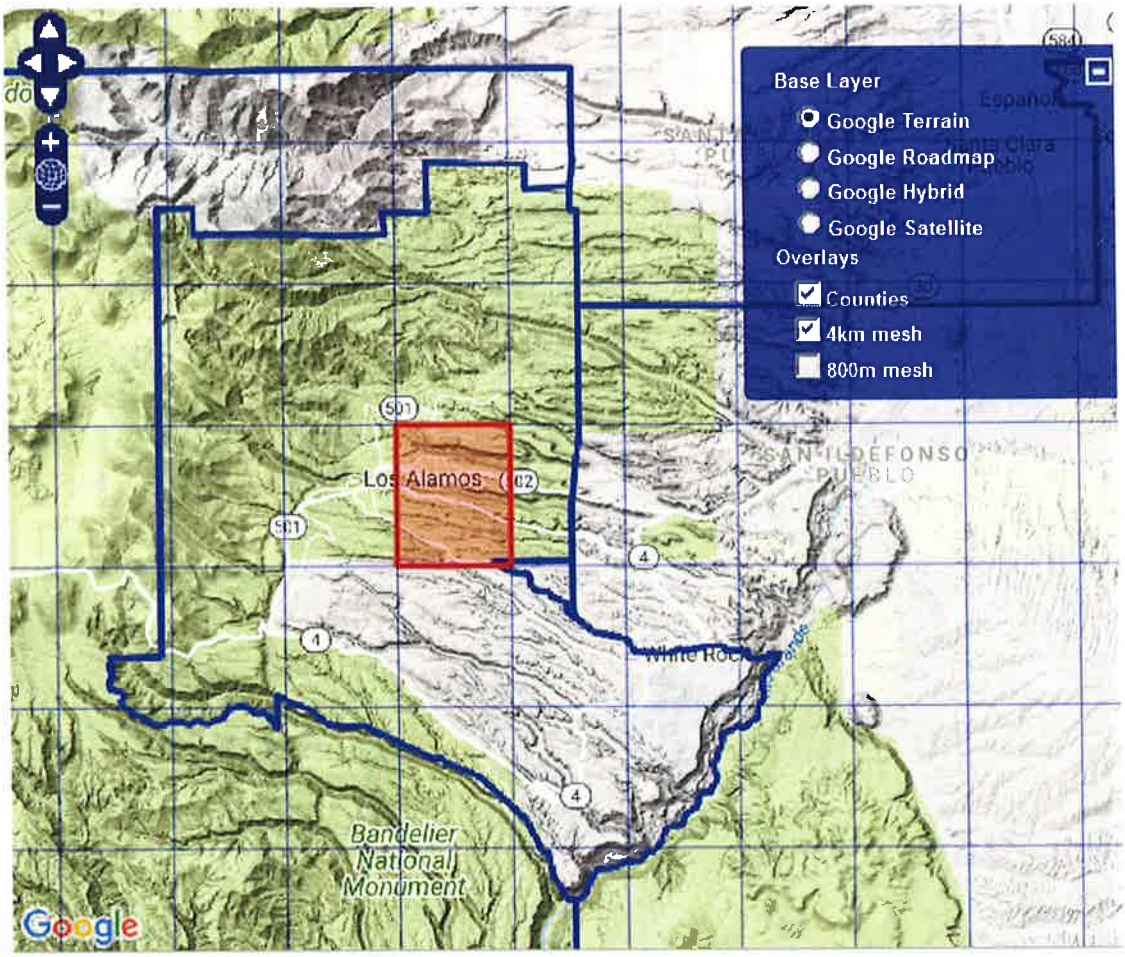

Figure 3 Screen Shot of PRISM

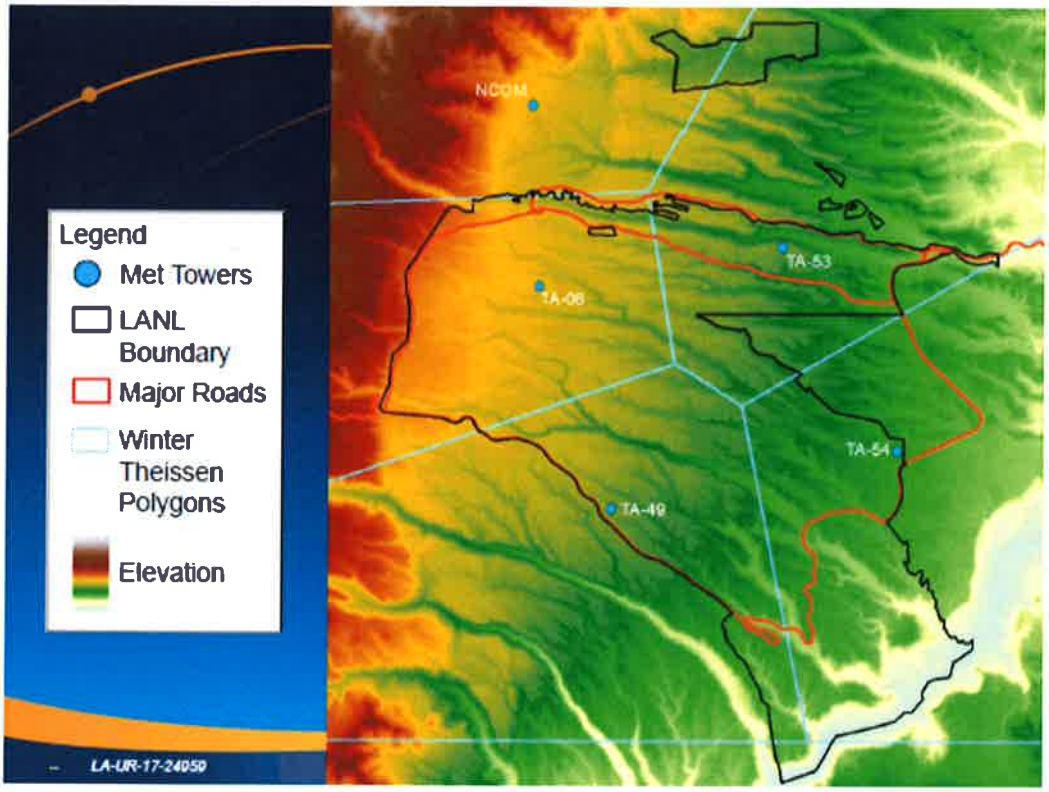

Figure 4 MET Tower Network

A preliminary review of July 2014-2016 average air temperatures, AU average water temperatures and AU maximum water temperatures are included in Table 3. A graphic summary of July 2016 air, outfall and thermograph temperatures is provided in Figure 5 below.

Table 3

Thermograph Location	Observed[a] Average Water Temperature °C	Observed[a] Maximum Water Temperature °C	PRISM[b]			ATEMP[c] °C Monthly Average			Average Air Temperature °C (1981 to 2010)[e]	Predicted 6T3 °C	Predicted Maximum (TMAX) °C
			2014	2015	2016	2014	2015	2016	1991 - 2010		
Below Outfall	21.60	24.20	21.58	20.52	25.15	19.3	18.8	23.74[d]	20.1	25.75[c]/ (22.0)[e]	30.35[c]/ (26.4)[e]
Near SERF	20.65	24.58									
E123	17.67	23.16									
Below E123[f]	18.58	23.49									
At Sigma Canyon[f]	15.46	20.08									

Notes:

a. July 2016
b. PRISM – Lat: 35.8694 Lon: -106.3073 Elev: 7149
c. July Average Air Temperature – LANL TA-06 (and where noted TA-53) Monitoring Station ATEMP
d. LANL TA-53 Monitoring Station July 2016 (Insufficient Temp Data Available for the TA-06 Monitoring Station)
e. July Average Air Temperature 1981-2010 – LANL TA-06 Monitoring Station
f. Location added in 2016

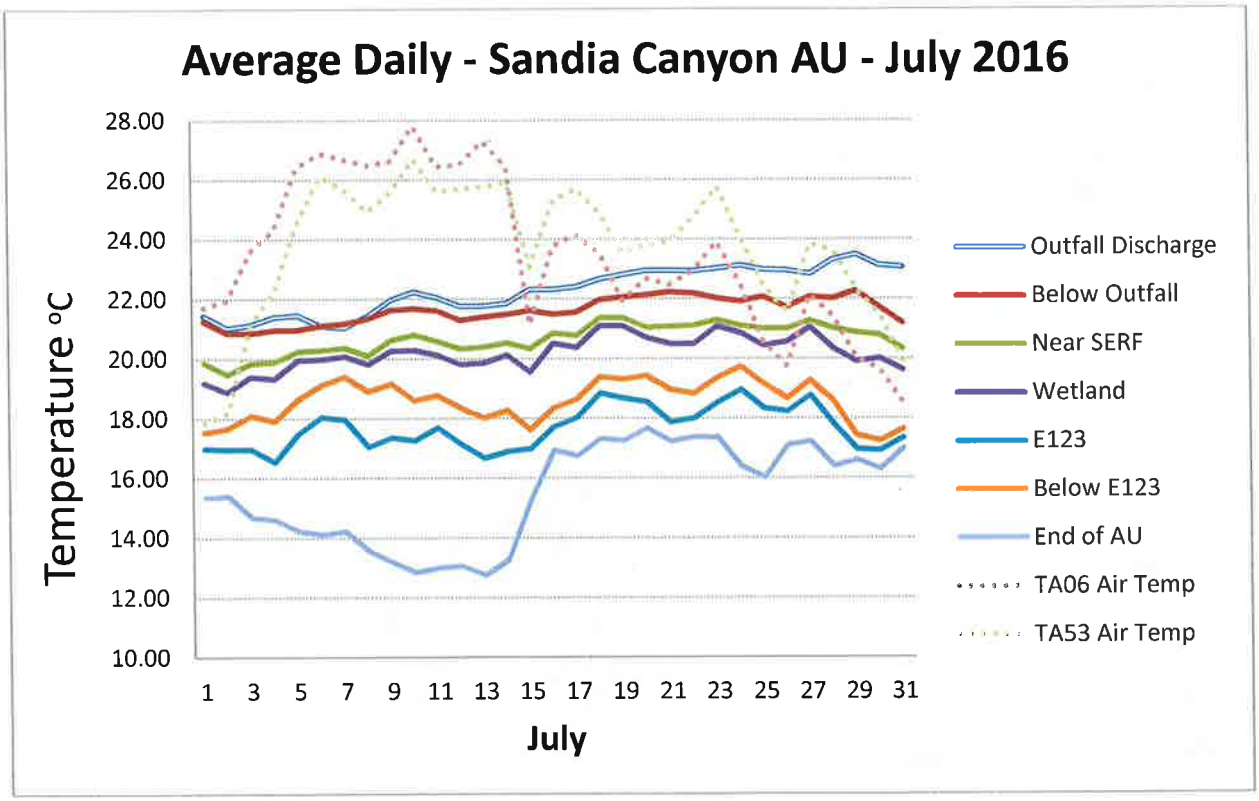

Figure 5

c) Dissolved Oxygen (DO)

During the 2002 USFWS Assessment continuous DO was monitored at one location in Sandia Canyon. The average DO (and range) in Sandia Canyon; 8.6 mg/L (4.3 to 17.6 mg/L). DO levels dropped below 6.0 mg/L repeatedly from May through September 1997, with these <6.0 mg/L DO concentrations lasting for days at a time (2002 USFWS).

Beginning in June of 2016 dissolved oxygen was obtained from 4 locations within the AU. DO levels will be evaluated and used with other lines of evidence to determine the appropriate level for aquatic life use.

- Below Outfall 001 (10546250)
- Below SERF (10546247)
- E123 (10546248)
- Sigma Canyon Confluence (10887041)

d) Data verification and validation of thermograph measurements will be conducted. NMED's SOP 15.0 Data Verification and Validation Procedures (NMED 2016) will serve as guidance for this process. The thermograph measurements will be verified for completeness and correctness. Interim reviews of the data indicate that certain measurements are invalid and

cannot be used because either the thermograph was out of the water, buried or in some cases was not working properly. Rejected data will not be used in development of the UAA.

e) In October of 2017 an aquatic macroinvertebrate survey was conducted at six sites within the AU. The samples have been taxonomically identified and the results will be used, along with historical surveys, to update macroinvertebrate metrics and conduct an evaluation of temperature tolerances. Benthic macroinvertebrates are the preferred indicator fauna because they have either limited migration patterns or a sessile form of life. This makes them well suited for managers to evaluate local environmental conditions. Some macroinvertebrate species only reside in streams with cold temperatures. If these species are present, then one can conclude that the stream likely has consistently cold temperatures (Development of Idaho Macroinvertebrate Temperature Occurrence Models Final Report December 2013). This work was performed per a Sampling and Analysis Plan for Supplemental Environmental Project: Aquatic Life Surveys (LANL 2017).

f) In 2016 the thermograph located at the confluence of Sigma Canyon and Sandia canyons indicate water temperatures less than what would be expected from correlations model predictions (Figure 5). The potential for ground water inflow in this region of the AU will be evaluated. A water-balance investigation conducted in 2005 and 2006 studied water losses through the wetland and reemergence into the channel east of the wetland (LANL 2007). Review of this information may provide insights into observed water temperatures at this location.

E. Reference Site Discussion

The Sandia AU is naturally ephemeral. Persistent surface flows within the AU originate entirely from NPDES permitted effluent outfalls. These releases have occurred since the early 1950'-s and continue today. The AU originates in TA-03 at Outfall 001 at an elevation of approximately 7300 feet and extends approximately 2.22 miles terminating at the confluence with Sigma Canyon. Persistent surface flows typically cease immediately downstream from the confluence with Sigma Canyon. The AU is entirely contained within the Ecoregion 21d.

Stream reaches in Water Quality Segments 20.6.4.98, 20.6.4.121, 20.6.4.128, 20.6.4.137 and 20.6.4.215 will be evaluated to help characterize the natural temperature conditions and aquatic life uses in settings with similar geophysical and ecological settings as the Sandia AU. The Segments are located in whole or in part, within Ecoregion 21d and share key characteristics with the AU (Griffith et al. 2006).

- Galisteo Creek (20.6.4.121/NM-2118.A_12)
- Tecolote Creek (20.6.4.215/NM-2212_10)
- Santa Fe River – Guadalupe St. to Nichols Reservoir (20.6.4.137/NM-9000.A_62)
- Rito de los Frijoles (NM-2118.A_70 and NM-2118.A_74)
- Rio Frijoles – Rio Medio to Pecos Wilderness (NM-2118.A_60)

- Gallinas River - Las Vegas Diversion to headwaters (NM-2212_00)
- DP Canyon – Los Alamos to Grade Control (20.6.4.128/NM-128.A_10)
- Burnt Mesa - (20.6.4.98)
- Water Canyon blw State Road 501 (20.6.4.126/NM-126.A_03)
- Lower Ancho Canyon – (20.6.4.128/NM-9000.A_054)

The Galisteo (21c), Santa Fe (21c), Tecolote 21(f), Gallinas (21f), Rito Frijoles (21h) and Rio Frijoles (21c) originate in headwaters with high quality coldwater and cold water designated uses. The DP Canyon, Lower Ancho and Burnt Mesa sites originate entirely within ecoregion 21d. In May of 2018 a thermograph was placed at the Water Canyon site (21h) directly below State Road 501. This portion of Water Canyon is classified as perennial and transitions to 21d. In New Mexico, 21d is a transition area from the higher elevation forests to drier and lower plains (Ecoregion 26) and plateaus (Ecoregions 20, 22).

In 2003, a thermograph was deployed in the Gallinas River (20.6.4.215) at the USGS gage above the Las Vegas Diversion. Temperatures were recorded from July 16 through September 29, 2003. A preliminary review of the TMDL indicates that ColdWAL criterion was exceeded during this time period (NMED 2005 TMDL for the Pecos Headwaters Watershed).

In the summer of 2015 a thermograph was located in DP Canyon below the grade control structure at E038.1. In years of normal precipitation the channel below the grade control structure can contain persistent water. Currently in Water Quality Segment 20.6.4.128, DP Canyon is located in the Los Alamos Canyon Watershed and receives stormwater flows from the Los Alamos town site. In November of 2016 NMEDs Hydrology Protocol (HP) was applied and received a score of 21.25. Flows to DP Canyon are exclusively stormwater and contain no effluent flows.

An HP evaluation was conducted in May of 2017 in lower Ancho Canyon. The site received a HP score of 29. In May of 2017 a thermograph was located in a transition area between ecoregion 21d and 22h.

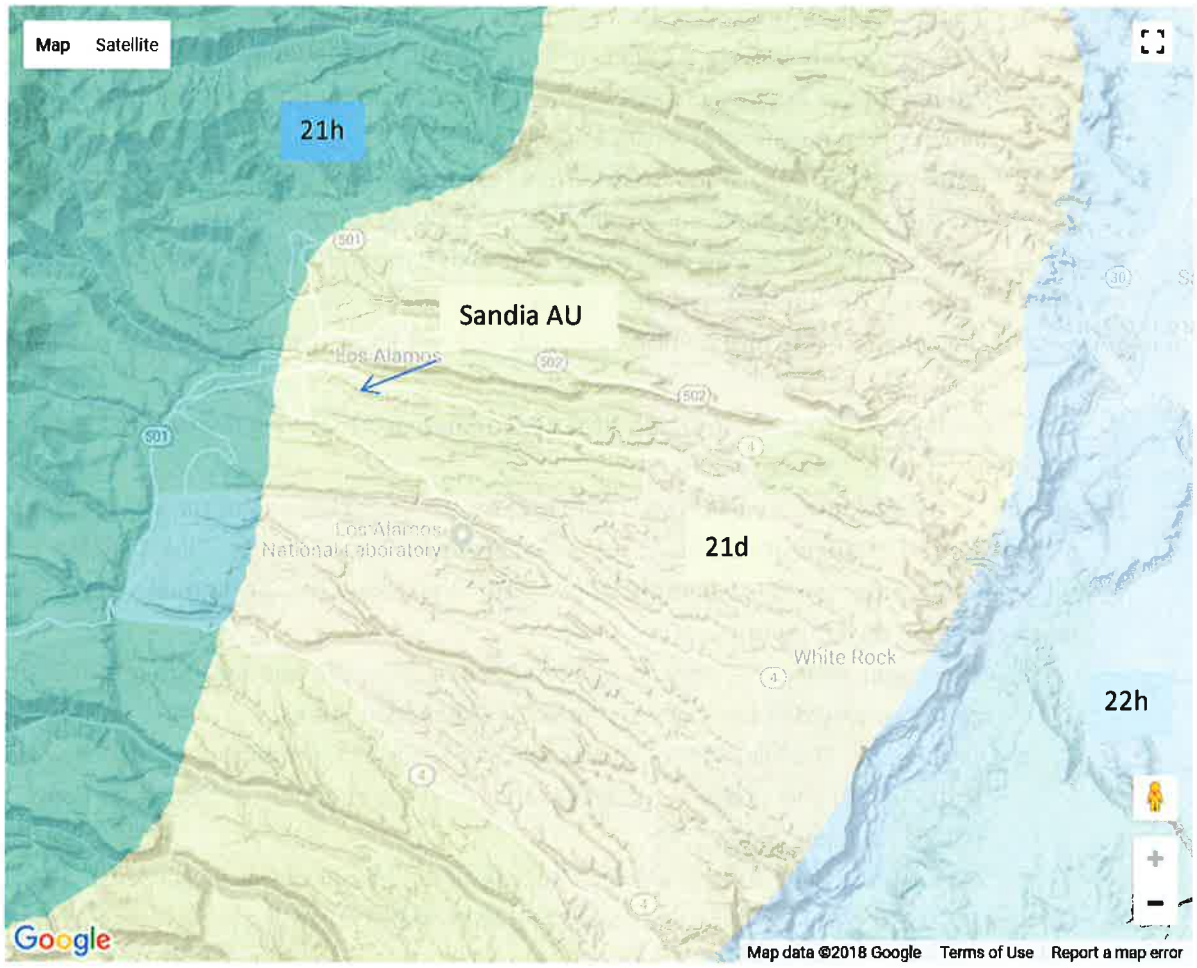

Figure 5 - Ecoregion 21d

F. Provisions for Public Notice and Consultation with State and Federal Agencies

Prior to the development of the work plan, LANS met and consulted with NMED on a number of occasions regarding the approach and path forward for evaluation of the designated use.

1. On April 8, 2014, in response to NMED's State Certification of NPDES NM0028355, LANS met with NMED to discuss the use of the Air-Water Temperature Correlation tool to evaluate naturally limiting conditions within the AU.
2. On July 2, 2014 LANS initiated the investigation by placing thermographs within Sandia Canyon AU. Interim findings, of data gathered in 2014 and 2015, were provided to NMED on October 5, 2015.
3. On March 15, 2016 NMED responded to the interim findings and provided a number of comment and recommendations.
    a. Continue stream temperature monitoring to account for interannual variations and increase validation of predictive modeling.

b. Include a survey of existing and historic (if possible) aquatic life in Sandia Canyon and appropriate literature review of temperature tolerances.
c. Work with the Department to ascertain proper placement of thermographs that best represent AU characteristics.
d. Work with the Department to determine an appropriate reference reach that best indicates the attainable aquatic life use in Sandia Canyon.
e. Collect dissolved oxygen data concurrent with temperature data (communication on February 23rd and February 26th, 2016).
f. Develop data and include historical information to support the attainable or existing use.

4. In the March 15, 2016 communication NMED recommended that they review the location and deployment of thermographs.
5. On June 2, 2016 Laboratory and NMED staff met on-site to review and determine the proper placement of thermographs that best represent the AU's characteristics. NMED staff suggested placement of thermographs at two additional locations. Additional actions were taken based on NMED input:
    a. The logger within the wetland was removed because the temperature information gathered would not be representative of stream conditions.
    b. On June 30, 2016 DOE/LANS deployed two additional thermographs one below E123 (#10546248) and at one at the end of the AU at the confluence with Sigma Canyon (#10887040 and 10887041).
    c. Dissolved oxygen recording capability was added at four of the six stations.
6. On June 12, 2018 LANS technical staff consulted with NMED regarding provisions specified in 20.6.4 NMAC for developing water quality standards by the site specific process or by a UAA.

Submittal of this work plan serves as a notice of intent for LANS to conduct the UAA. The plan must be approved by NMED and submitted to EPA Region 6 for review and comment. Prior to finalizing the UAA, the general public and targeted parties will be notified of the development of the UAA and upon request will be provided with a draft copy of the UAA. A public meeting will be held to explain the provisions of the UAA. If the final UAA findings support a change in the designated use, LANS will petition the WQCC for a change to the water quality criteria. The petition will be subject to the WQCCs rulemaking process including an advanced hearing notice and public hearing. Changes to the water quality criteria by the WQCC must also be approved by the U.S. Environmental Protection Agency before they are effective.

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EXHIBIT S

Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Protection & Compliance Division
Compliance Programs Group
Los Alamos National Laboratory
PO Box 1663, K490
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Symbol: EPC-DO:19-170
LAUR: 19-24784
Date: MAY 2 8 2019

Ms. Jennifer Fullam
Standards Coordinator
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502

Subject: **Work Plan – Use Attainability Analysis – Determine if Naturally Occurring Thermal Conditions Prevent Attainment of Coldwater Aquatic Life Use in the Perennial Reach of Sandia Canyon Assessment Unit (9000.A_047) – Water Quality Segment 20.6.4.126**

Dear Ms. Fullam:

Attached for your review and approval is a work plan prepared pursuant to the requirements contained in 20.6.4.15.D. The purpose of the plan to present the framework that will be used to prepare a Use Attainability Analysis to determine if natural thermal conditions are preventing the attainment of Coldwater Aquatic Life Use in the perennial reach of the Sandia Canyon Assessment Unit (AU) – 9000.A – Water Quality Segment 20.6.4.126.

The work plan identifies the factors affecting use attainment that will be analyzed, the scope of data currently available and the scope of data to be gathered, and provisions for public notice and consultation with appropriate state and federal agencies. The classified segment 20.6.4.126 comprises perennial waters within Los Alamos National Laboratory boundaries and includes the Sandia Canyon AU.

Please contact Robert Gallegos at (505) 665-0450 of the Environmental Compliance Programs Group (EPC-CP) if you have questions.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

TSV/MTS/RMG:jdm

Attachment(s): Attachment 1 Work Plan – Use Attainability Analysis – Determine if Naturally Occurring Thermal Conditions Prevent Attainment of Coldwater Aquatic Life Use in the Perennial Reach of Sandia Canyon – Water Quality Segment 20.6.4.126

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Attachment 1

Work Plan – Use Attainability Analysis – Determine if Naturally Occurring Thermal Conditions Prevent Attainment of Coldwater Aquatic Life Use in the Perennial Reach of Sandia Canyon – Water Quality Segment 20.6.4.126

EPC-DO: 19-170

LA-UR-19-24784

Date: MAY 2 8 2019

Introduction

This document is a work plan for a use attainability analysis (UAA)[1] to determine whether coldwater aquatic life[2] is an attainable designated use for the Sandia Canyon water quality assessment unit NM-9000.A_047 ("Upper Sandia Canyon AU"). The work plan will be implemented by Triad National Security, LLC (Triad) and the U.S. Department of Energy, National Nuclear Security Agency (DOE-NA-LA). Upon approval of this work plan by the New Mexico Environment Department, Surface Water Quality Bureau (NMED-SWQB), Triad/DOE-NA-LA will conduct the UAA in accordance with the approved work plan. Upon completion of the work plan, Triad/DOE-NA-LA will submit the data, findings and conclusions to NMED-SWQB in a draft UAA. The work plan identifies the factors affecting use attainment that will be analyzed, the scope of data currently available and the scope of data to be gathered, and provisions for public notice and consultation with appropriate state and federal agencies. Work is anticipated to commence in 2019 shortly after work plan approval, followed by public notice/consultations; the draft UAA submittal is anticipated within 3-6 months of work plan approval.

The purpose of this document is to present a work plan pursuant to the requirements contained in 20.6.4.15.D NMAC to determine if natural thermal conditions are preventing the attainment of Coldwater Aquatic Life Use in the perennial reach of the Upper Sandia Canyon AU. The Upper Sandia Canyon AU is located in a perennial reach of upper Sandia Canyon between Sigma Canyon and NPDES Outfall 001 (Figure 1). The classified Segment 20.6.4.126 NMAC (Segment) comprises perennial waters within Los Alamos National Laboratory boundaries and includes the Upper Sandia Canyon AU. The persistent surface flows to the Upper Sandia Canyon AU originate from NPDES permitted effluent releases. These releases have occurred since the early 1950's and continue today. The sources for the releases are LANL's treated sanitary wastewater and cooling tower blowdown.

Regulatory History of the Upper Sandia Canyon AU

The Sandia Canyon AU is listed as impaired, in part, due to temperature exceedances. The Upper Sandia Canyon AU is listed as not meeting the coldwater designated use and the listed causes for the impairment include temperature. NMED assigned it to IR Category of 5B indicating the need for review of the water quality standard. Temperature is one of the three most common causes for water quality impairment in New Mexico (NMED 2018).

In 2005, the Water Quality Control Commission (WQCC) adopted the Upper Sandia Canyon AU as a classified water of the State with the designated use of coldwater aquatic life and the segment-specific temperature criteria of 24°C. The decision to adopt the segment-specific temperature criteria was based on the 2002 U.S. Fish and Wildlife Service (USFWS 2002) study that included continuous temperature recording within the Upper Sandia Canyon AU during the summer of 1997. The study

[1] A UAA is a scientific study conducted for the purposes of assessing the factors affecting the attainment of a designated use (§20.6.4.15 NMAC). A UAA shall assess the physical, chemical, biological, economic or other factors affecting the attainment of a use, relying on scientifically defensible methods.

[2] The criteria applicable to the coldwater aquatic life designated use are dissolved oxygen 6.0 mg/L or more, 6T3 temperature 20°C (68°F), maximum temperature 24°C (75°F) and pH within the range of 6.6 to 8.8 (§20.6.4.900.H(2) NMAC).

concluded that the coldwater aquatic life designated use with a site-specific maximum temperature of 24°C was appropriate. NMED prepared a UAA (NMED 2007) detailing the attainable aquatic life uses for the new Segment and submitted it to EPA for approval. EPA approved Segment 20.6.4.126 NMAC in September of 2007.

In 2010, as part of a revision of the New Mexico Water Quality Standards, the WQCC discontinued site-specific temperature listings when they did not differ from the coldwater specific temperature criteria contained in 20.6.4.900.H NMAC. The Upper Sandia Canyon AU's site-specific standard of 24°C was eliminated and replaced with the general coldwater temperature criteria contained in 20.6.4.900.H NMAC, which also specifies a maximum temperature of 24°C. However, in addition to the maximum allowed temperature, the general coldwater criteria also includes the requirement that a temperature of 20°C not be exceeded for six or more consecutive hours in a 24-hour period on more than three consecutive days (6T3). Attainability for the Upper Sandia Canyon AU of the general coldwater criteria, and specifically the 6T3 requirement, has not been previously analyzed. Because naturally occurring conditions may prevent attainment, preparation of a UAA is necessary.

Problem Statement

The Upper Sandia Canyon AU is classified in segment 20.6.4.126 NMAC[3] as the perennial water body that extends from Sigma Canyon upstream to LANL NPDES outfall 001 (Figure 1).[4] Unlike other segment 126 perennial waters, which emanate from springs, the perennial flow in the Upper Sandia Canyon AU originates from continuous flows of treated effluent discharged in accordance with National Pollutant Discharge Elimination System (NPDES) Permit No. NM0028355. This NPDES permit authorizes pollutant discharge to the Upper Sandia Canyon AU through three outfalls.[5,6,7] The water quality in the Upper Sandia Canyon AU water body is listed as impaired due in part to exceedances of the water quality criteria for temperature applicable to the coldwater aquatic life use (NMED 2018). The proposed UAA will evaluate the attainability of this designated use for the Upper Sandia AU.[8]

20.6.4.15.A(1) NMAC provides that the Water Quality Control Commission "may remove a designated use specified in Section 101(a)(2) of the federal Clean Water Act . . . only if a use attainability analysis

[3] Hereafter referred to as "segment 126." Segment 126 was established in New Mexico water quality standards adopted in 2005.

[4] Besides the Upper Sandia AU, Segment 126 includes waters in perennial portions of Cañon de Valle from LANL stream gage E256 upstream to Burning Ground Spring, Pajarito Canyon from Arroyo de La Delfe upstream into Starmers Gulch and Starmers Spring and Water Canyon from Area-A Canyon upstream to State Route 501.

[5] Outfalls 001, 03A027 and 03A199. Only one of these outfalls (001) has numeric effluent limitations for water temperature. According to NPDES Permit No. NM0028355, Outfall 001 discharges LANL power plant waste water from cooling towers, boiler blowdown drains, demineralizer backwash, R/O reject, floor and sink drains, and treated sanitary wastewater.

[6] Storm water discharged to the Upper Sandia Canyon AU is authorized under NPDES Permit No. NMR05GB21 for current industrial activities, and NPDES Permit No. NM0030759 for certain solid waste management units and areas of concern. Storm water also is discharged to the Upper Sandia Canyon AU from LANL and Los Alamos County areas that do not require an NPDES permit.

[7] 6T3-20°C temperature limits at outfall 001 become effective on September 29, 2019.

[8] "Existing use" means a use actually attained in a surface water of the state on or after November 28, 1975, whether or not it is a designated use (§20.6.4.7 NMAC).

demonstrates that attaining the use is not feasible because of a factor listed in 40 CFR 131.10(g)." 20.6.4.15.A NMAC further provides that "[w]henever a use attainability analysis is conducted, it shall be subject to the requirements and limitations set forth in 40 CFR Part 131, Water Quality Standards; specifically, Subsections 131.3(g), 131.10(g), 131.10(h) and 131.10(j) shall be applicable."

40 CFR § 131.10(g) provides that a State may remove a designated use that is not an existing use, as defined in 40 CFR §131.3, if a UAA demonstrates that attaining the use is not feasible because:

1. Naturally occurring pollutant concentrations prevent the attainment of the use;
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met;
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;
4. Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use and is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in attainment of the use;
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact.

If the findings of the proposed UAA establish that the coldwater aquatic life designated use is not attainable in the Upper Sandia Canyon AU, then Triad and DOE-NA-LA will request a change to Water Quality Standards and propose an appropriate attainable designated use.

Factors Affecting Use Attainment That Will Be Analyzed

This UAA will analyze factor 1 – whether naturally occurring pollutant concentrations (temperature) prevent the attainment of the coldwater aquatic life designated use – using NMED's Air-Water Temperature Correlation (AWTC) guidance document (NMED (2011)) as the starting point for the analysis. The UAA will then analyze water temperature and flow data attained obtained from the AU.

With respect to water temperature bearing on attainable aquatic life uses, NMED's AWTC presents the following key parameters:

Attainable aquatic life use subcategories can be related to July average air temperature, as follows:

- *High quality and coldwater uses may be attainable if July average air temperature is ≤18°C.*
- *Marginal coldwater and coolwater uses may be attainable if July average air temperature is ≤23°C.*
- *Uses more restrictive than warmwater are generally not attainable if July average air temperature is >23°C.*

Preliminary data analysis suggests that measured water temperatures in the Upper Sandia Canyon AU are cooler than what might be predicted by the AWTC model and that there may be groundwater inputs or microclimate effects that must be analyzed. Accordingly, the UAA will take into consideration water temperature data collected from six instream monitoring locations in the AU, flow data obtained from five gages located in the AU and NPDES discharge volume data. Collectively, this additional data will assist in validating or partially validating the AWTC model predictions or, alternatively, provide an independent basis upon which to analyze the appropriate designated use for the Upper Sandia Canyon AU.

Lines of Evidence and Areas of Analysis

The UAA will use several lines of evidence to determine whether the coldwater aquatic life designated use is attainable in the Upper Sandia Canyon AU:

1. PRISM (Parameter-elevation Relationships on Independent Slopes Model) AN81m surface air temperature data[9]. This data includes PRISM July monthly mean temperature (t_{mean}) data for the two PRISM grid cells coterminous with the Upper Sandia Canyon AU.[10] PRISM calculates average daily minimum and maximum surface air temperatures on a monthly time step (t_{min} and t_{max}) on a 30-arcsec (~800-m) grid across the contiguous United States.[11] It calculates t_{mean} as $(t_{max} + t_{min})/2$. A detailed description of the AN81m dataset is provided in PRISM Climate Group (2016).

2. Near surface air temperature measurements from the LANL meteorological monitoring network (LANL MET). This includes historical near-surface air temperature measurements collected from LANL MET stations TA-6[12] and TA-53. The TA-6 station is located at an elevation of 7,424' near the head of Two-Mile Canyon, approximately one mile south of and at approximately the same elevation as Outfall 001. The TA-53 station is located at an elevation of 6,990' on the narrow mesa between Sandia and Los Alamos Canyons, approximately a mile east of the lower end of the Upper Sandia Canyon AU. The location of the LANL MET stations and the boundaries of the coterminous PRISM grids cells are shown on Figure 1.

3. Water temperature data collected from four thermographs deployed in the Upper Sandia Canyon AU on July 2, 2014 and two additional thermographs deployed in the Upper Sandia Canyon AU on June 30, 2016 and May 17, 2018 will be analyzed. The locations of these

[9] This is the official surface air temperature data set of the U.S. Department of Agriculture (Daly et al. 2008).
[10] Latitude 35.8755 longitude-1063181 elevation 7582' (Upper Sandia AU – west) and latitude 35.8694 longitude: -106.3073 elevation 7149' (Upper Sandia AU – east)
[11] PRISM calculates a climate – elevation regression for each digital elevation model grid cell. Surface stations used in the analysis numbered nearly 10,000 for temperature. Stations are weighted based on similarity of the station to the grid cell. Factors considered are location, elevation, coastal proximity, topographic facet orientation, vertical atmospheric layer, topographic position and orographic effectiveness of the terrain. For additional details, see Daly et al. (2008).
[12] The LANLMET station located in LANL Technical Area 6 (TA-6) has been the official meteorological station for Los Alamos since August 1990. Climate statistics for the upper Pajarito Plateau are compiled from observations from this station.

thermographs were: (i) below NPDES Outfall 001; (ii) below Surface Water Effluent Reclamation Facility; (iii) the Upper Sandia wetland; (iv) environmental surveillance gage E123; (v) below E123; (vi) Sandia at RAD Line; and (vii) Sandia at Confluence with Sigma Canyon. Prior to deployment, thermographs were checked to ensure temperature accuracy. The thermographs were set to collect temperatures at 15-minute intervals. Field deployment, data uploads and periodic inspection information was recorded on NMED's Thermograph Deployment/Upload/Retrieval Field Sheet. The location of the Upper Sandia AU thermographs are shown on Figure 1.

4. Flow data taken from three permanent and two temporary gage stations (E121, E122 and E123) and two temporary gage stations (E123.6 and E123.8) located within the Upper Sandia Canyon AU. Gage station data includes stage and discharge measurements from the Upper Sandia Canyon AU, directly observed factors that affect the stage/discharge relationship, and weather records. Integrated 5-min records of stage are provided from a data logger or direct readings that were collected and verified on-site. This data will assist in evaluating potential alluvial inflows and microclimate effects. The location of the Upper Sandia Canyon AU gage stations are shown on Figure 1.

5. Upper Sandia Canyon AU NPDES Permit No. NM0028355 discharge volume. NPDES outfall discharge amounts are available from discharge monitoring reports (DMRs) provided monthly to EPA and NMED. Discharges from outfalls can fluctuate causing changes in stream flow that might impact temperatures. The interaction between variations in stream temperatures and variations in stream flow will be considered.

In addition to evaluating PRISM, LANL meteorological data and Upper Sandia Canyon AU water temperature and flow data, and Upper Sandia Canyon AU NPDES Permit No. NM0028355 discharge volume, the following will be considered for possible inclusion into the UAA:

1. Comparison to the DP Canyon AU. DP Canyon AU represents the conditions that might be expected in the Upper Sandia AU, but for its effluent-dominated flow. It falls under 20.6.4.128 NMAC and has these features in common with the Upper Sandia AU:

   - Entirely contained within Level IV Ecoregion 21d
   - Similar size
   - Similar elevation range
   - Similar vegetation
   - Exposed bedrock principally Tshirege Member of the Bandelier Tuff
   - Storm flows originate in urbanized areas

   DP Canyon AU water and air temperature data would be presented and implications for Coldwater Aquatic Life Use attainment in the Upper Sandia Canyon AU discussed.

2. Threatened and Endangered Species and Critical Habitat. Existing documentation of presence or absence of threatened and endangered species and critical habitat in the Upper Sandia Canyon AU would be analyzed LANL's Habitat Management Plan (LANL 2017) and Annual Site Environmental Report[13]. Upper Sandia Canyon AU macroinvertebrate data collected in 2017 and 2018 in accordance with Berryhill and Gaulker (2017) would be reported to document the aquatic taxa found in the Upper Sandia Canyon AU.

Stakeholder Outreach and Public Engagement During and after the preparation of the UAA, and pursuant to 20.6.4.15.D NMAC, Triad and DOE-NA-LA will provide for public notice and consult with appropriate state and federal agencies.

Public Notice

Triad/DOE-NA-LA will deliver a presentation on the UAA process at one or two regularly scheduled Northern New Mexico Citizens Advisory Board ("NNMCAB") bi-monthly meetings. The advisory board is chartered to provide citizen input to the U.S. DOE on issues of environmental monitoring, remediation, waste management, and long-term environmental stewardship at LANL. Attendees of NNMCAB meetings typically include individuals affected by DOE site clean-up activities. The presentation at the first meeting will consist of a description of the Upper Sandia Canyon AU, existing conditions within the Upper Sandia Canyon AU, the scope of the UAA and – if supported by the UAA – the proposed change to the Upper Sandia Canyon AU's designated use, and instructions about how to submit comments on the UAA. A decision about whether to schedule a second meeting will be made by Triad/DOE-NA-LA upon completion of the first meeting.

The same presentation as described above will be provided at one or two regularly scheduled Accord Pueblo meeting. Accord Pueblo meetings include Pueblo de San Ildefonso, Santa Clara Pueblo, Pueblo of Jemez and Pueblo de Cochiti. A decision about whether to schedule a second meeting will be made by Triad/DOE-NA-LA upon completion of the first meeting.

Triad/DOE-NA-LA will post a public comment draft UAA on LANL's Electronic Public Reading Room. A hard copy will be made available in the Public Reading Room in Pojoaque. Comments will be accepted for 30 days at the UAA specific email address or at a physical mailing address. Prior to commencement of the 30-day comment period, Triad/DOE-NA-LA will publish notice in a local newspaper that will provide information regarding the availability of electronic and physical copies of the public comment draft UAA and the process for submission of comments. Persons providing substantial comments will be afforded the opportunity to meet and discuss the issues with Triad/DOE-NA-LA staff.

For the purpose of receiving comments and answering questions, Triad/DOE-NA-LA will, in its presentations, provide an email address specific to this UAA process. This email address will remain active until either a petition to modify the Upper Sandia Canyon AU coldwater aquatic life designated

[13] http://www.lanl.gov/environment /environmental-report.php

use is filed with WQCC, or a decision is made by Triad/DOE-NA-LA that the UAA findings do not warrant filing a petition.

Triad/DOE-NA-LA will evaluate comments and incorporate responses into the final UAA as appropriate. Triad/DOE-NA-LA will prepare a comment and response summary document that will be included with the petition submitted to the WQCC.

Consultation with Appropriate State and Federal Agencies

A request will be made to present the draft UAA to the East Jemez Resource Council. Established in 1996 after the Dome Fire the EJRC is made of land management agencies with the goal of maintaining and enhancing the natural and cultural resources of the East Jemez Mountains. EJRC members include: U.S Forest Service, National Park Service, U.S Geological Survey, U.S. Army Corp of Engineers, DOE, LANL and NMED. EJRC meets twice per year.

USEPA Region 6 will receive this work plan for review and comment and will also receive the related final water quality standard for review and approval, if the UAA results in changes to New Mexico water quality standards adopted by the WQCC.

NMED-SWQB and USEPA Region 6 will receive appropriate notices associated with related WQCC proceedings.

References cited

Berryhill and Gaulker. 2017 Sampling and Analysis Plan for Supplemental Environmental Project: Aquatic Life Surveys.

Daly C, Halbleib M, Smith JI, Gibson WP, Doggett MK, Taylor GH, Curtis J, Pasteris PP. 2008. Physiographically sensitive mapping of climatological temperature and precipitation across the conterminous United States. Int J Climatol 28(15):2031-2064. International Journal of Climatology

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NMED. 2018. 2018-2020 state of New Mexico clean water act section 303(d)/section 305(b) integrated report. New Mexico Environmental Department. Surface Water Quality Bureau, Santa Fe, NM. Clean Water Act 303(d)/305(b) Integrated Report

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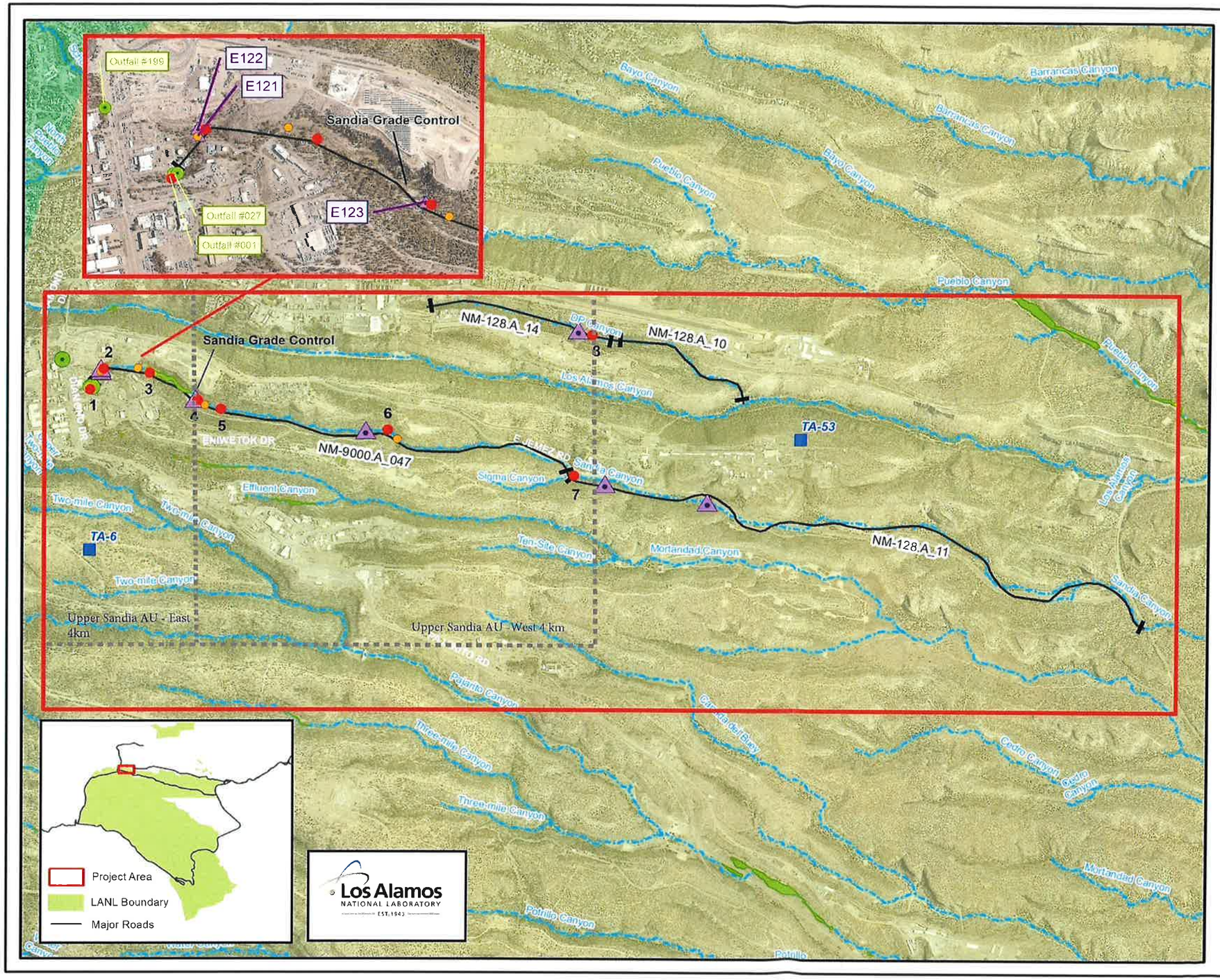
USFWS 2002 - Water Quality Assessment for Four Intermittent Streams in Los Alamos County, New Mexico USFWS July 2002



Sandia Canyon Temperature Investigation

Figure 1

- Thermograph Locations
  1. Below Outfall 001
  2. Below SERF
  3. Upper Wetland
  4. At E123
  5. Below E123
  6. At RAD Line
  7. At Sigma
  8. Below DP Grade Control
- Weather Stations
- Gages
- Outfalls
- Macroinvertebrate Sampling Locations 2017-2018
- Assessment Units
- Watershed Streams
- Foothill Shrubland Ecoregion
- Volcanic Mid-Elevation Forest Ecoregion
- Wetlands
- Project Area
- PRISM Grid Cell

Map Produced by: Ben Sutter, IFPROG
Date: May 28, 2019
Map # 18-0066-01b

NAD 1983 State Plane New Mexico FIPS 3002 (US Feet)

Disclaimer: This map was created for work purposes for Environmental Protection and Compliance (EPC) personnel. All other uses for this map should be confirmed by EPC-ES Staff.

N

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EXHIBIT T

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April 9, 2020

Taunia S. Van Valkenburg, Group Leader
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Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy
karen.armijo@nnsa.doe.gov

Subject: Work Plan Approval: Use Attainability Analysis for the determination of appropriate aquatic life designated uses for Sandia Canyon

Dear Ms. Valkenburg and Armijo:

The New Mexico Environment Department ("NMED") Surface Water Quality Bureau ("SWQB") received a revised work plan for the above-mentioned Use Attainability Analysis ("UAA") on February 10, 2020. Prior, the SWQB and US Environmental Protection Agency ("EPA") Region 6 reviewed and provided comment on several drafts of this plan as submitted on June 27, 2018 and May 28, 2019.

An approval of a UAA work plan by NMED is required in accordance with 20.6.4.15(D) NMAC prior to development of a UAA. This letter constitutes approval of the work plan, as submitted to the SWQB on February 10, 2020, for the Sandia Canyon Use Attainability Analysis. Please note, that although this work plan was provided to the US Environmental Protection Agency ("EPA") Region 6 for review, this approval does not reflect any additional comments that EPA may have.

If you have any questions or need additional information, please contact SWQB's Water Quality Standards Coordinator, Jennifer Fullam, at Jennifer.fullam@state.nm.us or 505.827.2637.

Sincerely,

Shelly Lemon Digitally signed by Shelly Lemon
Date: 2020.04.09 16:10:40 -06'00'

Shelly Lemon,
Bureau Chief
Surface Water Quality Bureau

cc: Russell Nelson, Water Quality Division, United States Environmental Protection Agency (via email nelson.russell@epa.gov)
Karen E. Armijo, LASO-MA-LS (via email karen.armijo@nnsa.doe.gov)

Michael W. Hazen, ALDESHQSS (via email mhazen@lanl.gov)
Enrique Torres, EPC-DO (via email etorres@lanl.gov)
Jennifer E. Payne, EPC-DO (via email jpayne@lanl.gov)
Michael T. Saladen, LANL, EPC-CP (via email saladen@lanl.gov)
Robert M. Gallegos, LANL, EPC-CP (via email rgallegos@lanl.gov)
Kris Barrios, Program Manager, Monitoring Assessment and Standards Section, SWQB (via email Kristopher.Barrios@state.nm.us)
Jennifer Fullam, Standards, Planning and Reporting Team Supervisor, SWQB (via email Jennifer.Fullam@state.nm.us)
Sarah Holcomb, Program Manager, Point Source Regulation Section, SWQB (via email Sarah.Holcomb@state.nm.us)
Jennifer Foote, Industrial Team Supervisor, SWQB (via email Jennifer.Foote@state.nm.us)
Erin Trujillo, Environmental Scientist Specialist-O, SWQB (via email Erin.Trujillo@state.nm.us)

EXHIBIT U

Matthew V. Segura

1 (505) 479-0080 msegura@lanl.gov

Summary

Experienced professional leading complex environmental compliance programs, hydrologic monitoring, and environmental assessments. Specialized in diverse environmental initiatives and hazardous waste management. Served as a graduate assistant, focusing on the long-term impacts of wildfire on community source watersheds.

Professional Profile

Resourceful, dedicated, and driven scientist with a deep passion for environmental protection. Possesses a keen interest in understanding the complexities of the natural world, using daily challenges as a stimulus for progress. Strong, nontraditional education with career interests in hydrology, community planning and natural resource conservation.

Education

- **Master of Water Resources/Community and Regional Planning**, University of New Mexico, May 2019.
- **B.S., Biology** (with double minor in Chemistry & Art Studio), *cum laude*; University of New Mexico, 2013.

Professional Experience

Environmental Professional: Triad National Security, LLC, Los Alamos National Laboratory (LANL); February 2022 to Present

- Environmental compliance program lead, including NPDES permitting compliance.
- Hydrologist and data manager, overseeing field water quality monitoring.
- Upper Sandia Use Attainability Analysis primary scientist and author, evaluating instream water chemistry, best management practices, and beneficial uses of effluent water.
- Floodplain modeling project manager.

Hydrologist (GS11): U.S. Army Corps of Engineers (USACE); Albuquerque, NM; July 2018 to February 2022

- Specialized in long-term water quality monitoring upstream and downstream of USACE reservoirs. Managed large datasets, ensuring quality through rigorous QA/QC analysis.
- Provided support for diverse civil works projects including groundwater gaging, reservoir dredging, and environmental remediation.
- Led initiatives focused on strategic solutions for hazardous waste management.
- Provided biological assessments for endangered species during a high-impact project in American Samoa, working with tribal leaders, contractors, and EPA to remediate soils from oil contamination.

Matthew V. Segura

Areas of Expertise

- Over 8 years of experience in surface water quality testing using YSI EXO sondes, Hoboware data loggers, and associated data collection programs, including device calibration, deployment, and field operations.
- Proficient in water quality data management using AQUARIUS, Microsoft Excel, ArcGIS, and DPlot software.
- Competent with groundwater gaging and sampling.
- Strong knowledge of federal, state (New Mexico), and local water policies and regulations.
- Highly skilled in public speaking and community outreach to engage diverse audiences.
- In-depth understanding of wildfire impacts on U.S. fluvial networks and their ecological implications.
- Six years of advanced geospatial mapping and analysis using the ArcGIS suite.
- Proficient in Python programming for environmental and geospatial applications.
- Experienced in erosion and elevation modeling using the Water Erosion Prediction Project (WEPP), Soil and Water Assessment Tool (SWAT), and ArcGIS.

Graduate Assistant, Water Resources: University Of New Mexico (Principal investigator: Dr. David Van Horn, PhD., UNM Biology department); December 2016 to July 2018

- Aided in technical analysis and collection of sonde water quality data along the Rio Grande and various watersheds within New Mexico, with a focus on wildfire disturbance to aquatic systems.
- Used geospatial mapping to assess temporal and spatial water quality trends and long term wildfire effects on source watersheds for human consumptive use.

Publications

- Van Horn, David & Reale, Justin & Segura, Matt. (2023). FINAL TECHNICAL REPORT Assessing Temporal and Spatial Continuous Water Quality Trends in the Upper Rio Grande, Rio Chama, and Middle Rio Grande (Water Years 2015 -2019). 10.13140/RG.2.2.35254.06722.
- Schmitt, Jonathan & Gadek, Chauncey & Obispo, Emil & Segura, Matthew & Witt, Christopher. (2023). Primer registro del Negrito Austral (Lessonia rufa) para el Perú [First record of Austral Negrito (Lessonia rufa) for Peru]. 18. 51–53.
- Segura, Matthew V. (2019). "Water Security and Wildfire in Municipal Source Watersheds of the Western United States." https://digitalrepository.unm.edu/wr_sp/174

Research Presentations

- June 27, 2024: Presentation at the Accord Technical Exchange Meeting to the Accord Pueblos on the "Sandia Canyon Use Attainability Analysis (UAA), Revision 1."
- May 7, 2024: Presentation to the EJRC on the updated "Sandia Canyon Use Attainability Analysis, Revision" and the 30-day Public Comment Period.
- February 21, 2024: Presentation at the Accord Technical Exchange Meeting to the Accord Pueblos on the "Use Attainability Analysis – Aquatic Life Uses for the Perennial Reach of Sandia Canyon."
- May 29, 2021: Presentation to Tribal Leaders of American Samoa and USEPA (American Samoa) "Aua groundwater and surface water cleanup, following removal of WWII-era buried Navy fuel tanks."
- May 2019: Defense thesis to committee and public. "Water Security and Wildfire in Municipal Source Watersheds of the Western United States."

EXHIBIT V

STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF:

THE PETITION TO AMEND 20.6.4.126 NMAC AND 20.6.4.141 NMAC TO ESTABLISH A SEGMENT-SPECIFIC TEMPERATURE CRITERION FOR A PORTION OF THE UPPER SANDIA CANYON ASSESSMENT UNIT

WQCC NO. 24-65(R)

Triad National Security, LLC, and U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Field Office

Petitioners.

DIRECT TESTIMONY OF TIMOTHY J. GOERING ON BEHALF OF TRIAD NATIONAL SECURITY, LLC AND THE U.S. DEPARTMENT OF ENERGY, NATIONAL NUCLEAR SECURITY ADMINISTRATION, LOS ALAMOS FIELD OFFICE

April 14, 2025

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Timothy J. Goering. My office is located in Technical Area (TA) 59, Building 0096, at Los Alamos National Laboratory (LANL or Laboratory).

Q. ON WHOSE BEHALF ARE YOU SUBMITTING DIRECT TESTIMONY?

A. I am submitting this direct testimony on behalf of Petitioners Triad National Security, LLC (Triad), the management and operating contractor for LANL and the U.S. Department of Energy (DOE) National Nuclear Security Administration (NNSA), Los Alamos Field Office.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am employed by Triad as an environmental professional in LANL's Environmental Protection and Compliance Division (EPC).

Q. PLEASE SUMMARIZE YOUR RELEVANT EDUCATIONAL AND PROFESSIONAL EXPERIENCE.

A. I have a Bachelor of Arts in Environmental Science from the University of Virginia and a Master of Science in Hydrology and Water Resources from the University of Arizona. My curriculum vitae is included as Petitioners' **Exhibit O** (LANL UAA_0267-0273).

I have worked for nearly 40 years in the environmental field, with most of my work experience in hydrology and in environmental characterization and remediation. I began my career in 1983, working for the environmental consulting firm Ecology and Environment Inc., conducting field assessments of hazardous waste sites. After receiving my master's degree in Hydrology and Water Resources at the University of Arizona, I worked for Jacobs Engineering as a site hydrologist for the DOE's Uranium Mill Tailings

Remedial Action Program from 1987 to 1992. From 1992 to 2007, I worked at Sandia National Laboratories as a subcontractor providing hydrogeological technical support for characterization and corrective action at Sandia's Mixed Waste Landfill. I helped design an innovative evapotranspiration cover to protect the buried wastes at the landfill. In 2005, I provided expert testimony at a New Mexico Environment Department (NMED) Public Hearing regarding the landfill cover design and corrective action.

I have worked at LANL since 2007 on a variety of projects, with much of my work related to groundwater and surface water characterization and monitoring. I served as the technical lead for the Interim Facility-Wide Groundwater Monitoring Program from 2007 to 2015 and was responsible for preparing annual updates to the interim facility-wide groundwater monitoring plan during this period. From 2013 to 2018, I was the technical lead for the Royal Demolition Explosive (RDX) Remediation Project, leading a team of scientists to assess high-explosives contamination in surface water and groundwater. From 2018 to 2020, I worked for LANL's Earth Systems Observation Group as a Site operations manager for the Atmospheric Radiation Measurement Mobile Facility One, which is a DOE atmospheric observatory. Our team deployed this observatory, which comprised nearly 60 atmospheric monitoring instruments and radars, at remote locations in Argentina and Norway. I joined LANL's Environmental Protection and Compliance group as an environmental professional in January 2020.

Q. WHAT ARE YOUR RESPONSIBILITIES AS AN ENVIRONMENTAL PROFESSIONAL AT LOS ALAMOS NATIONAL LABORATORY?

A. I support the Laboratory's water quality program on a variety of activities. My responsibilities have included providing technical support for development of LANL's

final "Use Attainability Analysis for Upper Sandia Canyon" (Final UAA), provided as Petitioners' **Exhibit B** (LANL UAA_0022-0070), participation in stakeholder involvement and outreach activities, field deployment of instrumentation to measure temperature and other water quality parameters, and technical support for our Water Quality Permitting/ Compliance Team.

Q. PLEASE DESCRIBE YOUR EXPERIENCE WITH DATA ANALYSIS AND REPORTING FOR SURFACE WATER QUALITY AND REGULATORY COMPLIANCE AT LANL.

A. I served as the technical lead for the Laboratory's Interim Facility-Wide Groundwater Monitoring Program for eight years, from 2007 to 2015. We conducted monitoring to meet the requirements of the Compliance Order on Consent with the DOE (Consent Order), which included monitoring of surface water, springs, and groundwater locations within and outside of Laboratory boundaries. In addition, I was responsible for updating the interim facility-wide groundwater monitoring plan annually based on LANL programmatic needs, negotiated priorities between the NMED Hazardous Waste Bureau and DOE, and comparison of collected data with applicable standards. I also have experience with data analysis and reporting for surface water quality from my time as the technical lead for the RDX Remediation Project.

In my current role, since 2020, I have been providing technical support to the Surface Water Quality Program with development of LANL's UAA for Upper Sandia Canyon for over five years. I coauthored the update of the UAA to address public, NMED, and U.S. Environmental Protection Agency (EPA) comments on the initial version of the Sandia Canyon UAA (prepared by a Seattle-based environmental and

engineering firm, Windward Environmental, LLC), and met with the NMED to discuss our proposed revisions in response to the comments received. The Final UAA was submitted to the NMED on February 16, 2024.

I have been working with our Water Quality Standards team at LANL to collect temperature, specific conductance, and water quality data at select locations in perennial reaches on the Pajarito Plateau. This work is part of our effort to evaluate characteristics of perennial reaches at the Laboratory to ensure that the most protective aquatic life standards are implemented.

Q. PLEASE DESCRIBE YOUR EXPERIENCE WITH STREAM FLOW GAGE DATA GATHERING AND ANALYSIS AT LANL.

A. Thirty-seven (37) streamflow gaging stations, in multiple watersheds within the LANL boundary, are maintained across the Laboratory to support environmental monitoring and surveillance activities (Gage Network). The LANL Gage Network is maintained and operated by the DOE Office of Environmental Management (DOE-EM) Los Alamos Leacy Cleanup Contractor, Newport News Nuclear BWXT-Los Alamos (N3B). These Gage Network data can be used to evaluate persistence of flow and to inform decisions regarding hydrology and use attainability.

The Gage Network data provide valuable information regarding the flow within the various water segments and can be used to support decisions when distinguishing among perennial, intermittent, and ephemeral stream reaches. These data also aid in our understanding the flow regime in our surface water reaches. My colleague, Matthew Segura, will discuss the Gage Network data associated with Sandia Canyon. These data

were reviewed as part of our evaluation of downstream effects of our proposed standards changes.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN STATE OR FEDERAL REGULATORY PROCEEDINGS ON SURFACE WATER QUALITY-RELATED ISSUES?

A. Yes. I testified regarding surface water characteristics on the Pajarito Plateau during the 2020 Triennial Review, in July 2021, which was proceeding WQCC 20-51(R).

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. Throughout my testimony I reference technical and regulatory information presented in the "Use Attainability Analysis for Upper Sandia Canyon" (Final UAA), which is Petitioners' Exh. B.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to provide the background to explain why a use attainability analysis (UAA) was conducted at Sandia Canyon. I will discuss perennial flow in the Sandia Canyon Assessment Unit (AU) NM-9000.A_47 (Upper Sandia Canyon AU), one of several segments described by 20.6.4.126 NMAC (New Mexico Administrative Code; NMED 2022). I will provide a brief history of water classification standards for the AU. I will also discuss the temperature study initiated for upper Sandia Canyon in 2014 and the work plan for the Sandia Canyon UAA, including the technical approach and the lines of evidence evaluated. Finally, I will summarize collaboration with NMED throughout this process and the stakeholder outreach and public engagement process during development of the Final UAA.

III. INITIATION OF THE USE ATTAINABILITY ANALYSIS

Q. PLEASE DESCRIBE THE KEY PHYSICAL CHARACTERISTICS OF THE UPPER SANDIA CANYON ASSESSMENT UNIT.

A. Sandia Canyon headwaters are located on the Pajarito Plateau in Technical Area 03 (TA-03). TA-03 is in the northern portion of the LANL site, on South Mesa between Los Alamos Canyon on the north and Two Mile Canyon on the south. Sandia and Mortandad Canyons head on the east margin of TA-03, forming steep cliffs at the top of canyon walls. TA-03 is designated as a Core Area for purposes of Laboratory operations and planning and activities, and most of the area is comprised of impervious surfaces located within an urban environment. TA-03 is considered the heart of the Laboratory. It contains most of the key administrative functions and personnel from the three directorates: Science, Technology and Engineering; Operations, and Weapons. This area contains the majority of the Laboratory's population, buildings, and infrastructure and is also the primary gateway into the site and represents the "public face" of the Laboratory.

The watershed that discharges to the Upper Sandia Canyon AU comprises approximately 800 acres of Laboratory property and 29 acres of area under the control of Los Alamos County. The entire AU is located within federal lands managed by the DOE. The AU is naturally ephemeral. Persistent surface flows within the Upper Sandia Canyon AU originate entirely from flows emitted from National Pollutant Discharge Elimination System (NPDES)-permitted effluent outfalls. These releases have occurred since the early 1950s and continue today.

Discharge from the Laboratory's outfalls support a 3.65-acre wetland (Exh. B, LANL UAA_ 0034, citing Stanek et al. 2020) near the upper end of the AU, just

downstream of the outfalls (see **Figure A**, appended to this testimony and updated from Final UAA Figure 1). The AU originates in the South Fork at Outfall 001 in TA-03 at an elevation of approximately 7,300 feet. The Upper Sandia Canyon AU extends approximately 2.22 miles and terminates at the confluence with Sigma Canyon. Persistent surface flows typically cease immediately downstream from the confluence with Sigma Canyon. Fish populations are not present.

Q. WHAT ARE THE DESIGNATED AQUATIC LIFE USES OF THE SEGMENT DEFINED IN 20.6.4.126 NMAC?

A. Section 20.6.4.126 NMAC currently designates coldwater aquatic life use (ALU) for the Upper Sandia Canyon AU.

Q. WHAT TEMPERATURE CRITERIA APPLY IN THIS SEGMENT?

A. The coldwater ALU temperature criteria are a 6T3 of 20°C (68°F; a chronic exposure metric) and a TMAX (maximum water temperature) of 24°C (75.2°F). The 6T3 temperature is the temperature not to be exceeded for 6 or more consecutive hours in a 24-hour period, on more than 3 consecutive days. The TMAX is the maximum water temperature, also known as the instantaneous temperature, not to be exceeded at any time.

Q. HOW WAS A COLDWATER AQUATIC LIFE USE ASSIGNED IN UPPER SANDIA CANYON?

A. In 2005, the Water Quality Control Commission (WQCC) adopted the Upper Sandia Canyon AU as a classified water of the State of New Mexico, with the designated use of coldwater aquatic life and the segment-specific temperature criteria of 24°C. The decision to adopt the segment-specific temperature criteria was based on a 2002 U.S. Fish and

Wildlife Service (Lusk et al. 2002) study that included continuous temperature recording within the Upper Sandia Canyon AU during the summer of 1997. The study concluded that a coldwater aquatic life designated use, defined by a site-specific maximum temperature of 24°C, was appropriate.

NMED's Surface Water Quality Bureau (SWQB) prepared a UAA (NMED 2007) that details the attainable ALUs for the new segment and submitted it to the EPA for approval. EPA approved Segment 20.6.4.126 NMAC in September 2007.

Q. WHAT IS THE NEW MEXICO CLEAN WATER ACT 303(D)/305(B) INTEGRATED REPORT?

A. New Mexico's Clean Water Act (CWA) Section 303(d)/305(b) Integrated Report (IR; also known as NMED 2022) is designed to satisfy the statutory requirements of Section 303(d) and the reporting requirements of Sections 305(b) and 314 of the federal Water Pollution Control Act (33 United States Code § 1251), commonly known as the Clean Water Act. The IR serves as a source of basic information on water quality and water pollution control programs in New Mexico.

The regulations that implement CWA Section 303(d) require states to develop lists of waterbodies that do not meet water quality standards (WQSs) and to submit updated lists to the EPA every 2 years. WQSs, as defined in the Code of Federal Regulations (CFR), include beneficial uses, water quality objectives (narrative and numerical), and antidegradation requirements.

The regulations that implement CWA Section 305(b) require states to develop an inventory of the water quality of all waterbodies in the state and to submit an updated

report to the EPA every 2 years. This process was established as a means for the EPA and the U.S. Congress to determine the status of the nation's waters.

Q. IS UPPER SANDIA CANYON LISTED AS IMPAIRED IN NEW MEXICO'S INTEGRATED REPORT?

A. In NMED's 2018–2020 IR (NMED 2018) and in subsequent IRs, including 2020–2022 (NMED 2021), 2022–2024 (NMED 2022), and 2024–2026 (NMED 2024), the Upper Sandia Canyon AU is listed as impaired for temperature (*i.e.*, not meeting the coldwater aquatic life designated use).

Temperature is one of the most common causes of water quality impairment for streams in New Mexico (NMED 2024). IR Category 5/5B indicates that the reach is impaired for one or more designated or existing uses because the designated use could be inappropriate, and that a review of the WQS must be conducted, followed by a UAA or development of a total maximum daily load (NMED 2024).[1]

Q. WHAT IS A USE ATTAINABILITY ANALYSIS?

A. A UAA is a structured scientific assessment of the factors that affect the attainment of uses specified in Section 101(a)(2) of the CWA. *See* Title 40 CFR § 131.3. The factors to be considered in such an analysis include the physical, chemical, biological, and economic criteria described in the EPA's WQS regulations at 40 CFR §§ 131.10(g)(1)-(6).

[1] Upper Sandia Canyon is also listed as impaired for the coldwater ALU for polychlorinated biphenyls (PCBs; under Category 5/5C) and total recoverable aluminum (under Category 4B). Upper Sandia Canyon has been impaired for PCBs since 2006 under Category 5/5C, which requires that additional data be collected before a total maximum daily load (TMDL) is scheduled. Upper Sandia Canyon has been impaired for total recoverable aluminum since 2018 under Category 4B.Category 4/4B does not require development of a TMDL because other pollution control requirements are reasonably expected to result in attainment of the WQS in the near future.

Q. WHY DID PETITIONERS INITIATE A USE ATTAINABILITY ANALYSIS FOR UPPER SANDIA CANYON?

A. As described above, in 2005, the WQCC adopted the Upper Sandia Canyon AU as a classified water of the State of New Mexico with the designated use of coldwater aquatic life and the segment-specific temperature criterion of 24°C, based on a 2002 U.S. Fish and Wildlife Service study. EPA approved Segment 20.6.4.126 NMAC in 2007.

However, in 2010, as part of a revision of the New Mexico WQSs, the WQCC eliminated the Upper Sandia Canyon AU's site-specific maximum temperature standard of 24ºC and replaced it with the general coldwater temperature criteria contained in 20.6.4.900.H NMAC. The general criteria specify a TMAX of 24ºC but also include the criterion that a temperature of 20ºC not be exceeded for 6 or more consecutive hours in a 24-hour period on more than 3 consecutive days (6T3).

In October 2015, the Laboratory notified NMED that it had initiated an investigation to determine if naturally occurring thermal conditions were preventing attainment of the coldwater ALU in the perennial reach of Sandia Canyon. Petitioners' **Exhibit P** (LANL UAA_0274-0286). Attainability for the Upper Sandia Canyon AU of the general coldwater criteria—and specifically the 6T3 requirement—had not been previously analyzed. Because naturally occurring conditions (particularly in June, July, and August air temperatures) might prevent attainment, NMED determined that preparation of a UAA was necessary. *See* Petitioners' **Exhibit Q** (LANL UAA_0287-0291). Furthermore, although no chronic 6T3 criterion was in place at the time of the 2002 U.S. Fish and Wildlife Service study (Lusk et al. 2002), in 2015 and 2016, the NMED SWQB reanalyzed the 1997 dataset from the study and determined that Sandia

Canyon did not attain the chronic 6T3 criterion for the coldwater ALU at that time (*see* NMED 2016; Exh. Q.) Nonattainment for temperature and possible mis-designation of the AU were further established by the impairment categorization established in NMED's 2018–2020 IR (NMED 2018).

Q. DO FEDERAL AND STATE WATER QUALITY REGULATIONS PROVIDE GUIDANCE CONCERNING CONDUCT OF USE ATTAINABILITY ANALYSES?

A. Yes. Both the federal CWA and the New Mexico Water Quality Act (NMWQA) provide guidance on how to conduct a UAA.[2] Under federal CWA regulations, states may remove a designated use if the state can demonstrate that the designated use is not an existing use and that attaining the designated use is not feasible for any one of six different reasons, including whether naturally occurring pollutant concentrations prevent the attainment of the use. *See* 40 CFR §131.10(g)(1). (Note that in this context, temperature is considered a naturally occurring pollutant.)

In New Mexico, the rules governing use attainability analyses are established in 20.6.4.15 NMAC, which cite to the federal rules and allow the WQCC to amend designated uses when a UAA demonstrates that the designated use is not attainable. Section 20.6.4.15 NMAC also establishes the process and requirements for a UAA conducted by entities other than NMED and establishes the minimum requirements for UAA work plans. *See* 20.6.4.15(E) NMAC.

[2] The federal CWA Guidance is available in the EPA's "Policy, Guidance, and Reference Library" located online at https://www.epa.gov/wqs-tech.Additional guidance is available on the EPA's "Use Attainability Analysis" webpage at https://www.epa.gov/wqs-tech/use-attainability-analysis-uaa. The NMWQA also provides guidance on conducting a UAA on their "Use Attainability Analysis Website" at https://www.env.nm.gov/surface-water-quality/uaa/.

Q. DID PETITIONERS NOTIFY NMED OF THEIR INTENT TO CONDUCT A USE ATTAINABILITY ANALYSIS ALONG WITH A WORK PLAN TO NMED AND EPA REGION 6, IN ACCORDANCE WITH 20.6.4.15(E) NMAC?

A. Yes. LANL notified NMED of its intent to conduct a UAA and submitted draft UAA work plans to NMED SWQB on June 27, 2018, and May 28, 2019. Petitioners' **Exhibit R** (LANL UAA_0292-0314), and **Exhibit S** (LANL UAA_0315-0326). The work plans provide a framework for development of a UAA to determine if natural thermal conditions are preventing the attainment of coldwater ALU in the perennial reach of Sandia Canyon within Segment 20.6.4.126 NMAC. The SWQB and EPA Region 6 reviewed and provided comment on these drafts. The comments received from SWQB on September 14, 2018, included a request that a revised work plan be submitted before proceeding with the UAA.

Q. DID PETITIONERS REVISE THE WORK PLAN BASED ON REVIEW AND COMMENT FROM NMED AND EPA REGION 6?

A. Yes. Petitioners revised the work plan based on the comments received from NMED and EPA and resubmitted the revised "Sandia Canyon Use Attainability Analysis Work Plan" (Approved Work Plan), Petitioners' **Exhibit A** (LANL UAA_0001-0021), to NMED on February 10, 2020.

Q. WAS PETITIONERS' FINAL WORK PLAN APPROVED BY NMED?

A. Yes. NMED approved the revised work plan on April 9, 2020. Petitioners' **Exhibit T** (LANL UAA_0327-0329).

Q. PLEASE DESCRIBE THE LINES OF EVIDENCE AND AREAS OF ANALYSIS SET OUT IN THE FINAL WORK PLAN.

A. The following Lines of Evidence and Areas of Analysis were proposed by the Petitioners in the Approved Work Plan, Exh. A.

- NMED's air-water temperature correlation (AWTC) guidance document and model;
- PRISM (Parameter-Evaluation Relationships on Independent Slopes Model) surface air temperature data for the two PRISM grid cells coterminous with the Upper Sandia Canyon AU;
- Near-surface air temperature measurements from the LANL meteorological monitoring network;
- Data from thermographs deployed throughout the Upper Sandia Canyon AU;
- Flow data from three permanent (E121, E122, and E123) and two temporary (E123.6 and E123.8) gage stations in the Upper Sandia Canyon AU;
- Reported NPDES Permit No. NM0028355 discharge volumes;
- Potential impact of any proposed water quality changes on listed threatened or endangered species found within the Upper Sandia Canyon AU;
- Report and summary of aquatic life surveys, including an update of unique taxa populations identified within the Upper Sandia Canyon AU;
- Consideration of the identification of the Upper Sandia Canyon ecoregion regarding measured and predicted temperatures;
- Consideration of dissolved oxygen and pH measurements from within the Upper Sandia Canyon AU; and

- Application of the Stream Segment Temperature Model as a contingency method for determining the highest attainable designated use.

Q. WHAT WAS YOUR ROLE IN PREPARING PETITIONERS' USE ATTAINABILITY ANALYSIS REPORT?

A. The Laboratory hired Windward Environmental LLC to prepare the first draft of the Sandia Canyon UAA, working closely with my colleague, Robert M. Gallegos (not to be confused with Robert A. Gallegos, Program Manager for the NNSA) who is now retired from LANL. I provided technical support to Robert M. Gallegos during final development of the draft UAA, checking calculations, researching environmental reports about Sandia Canyon, and reviewing the draft Sandia Canyon UAA before submittal to NMED. I also assisted with the concurrent stakeholder outreach and public engagement process during this period.

Once comments on the draft UAA were received from NMED, EPA, and the public, my colleague, Matthew Segura, and I responded to the comments and updated the UAA to address the comments. During this time, Matthew and I participated in the stakeholder outreach and public engagement process, giving presentations regarding the Final UAA to Pueblo Accord Technical Exchange Meetings, to several East Jemez Resources Council (EJRC) meetings, to the Northern New Mexico Citizen's Advisory Board (NNMCAB), and to the Federal Environmental Symposium in 2022.

Q. PLEASE SUMMARIZE HOW PETITIONERS' UAA PROCESS FOLLOWED THE FINAL WORK PLAN.

A. As described above, the Approved Work Plan for Water Quality Segment 20.6.4.126 NMAC proposed evaluation of multiple lines of evidence and areas of analysis to

determine whether naturally occurring pollutant concentrations (temperature) prevent attainment of the coldwater aquatic life designed use. The lines of evidence to determine whether coldwater aquatic life designated use is attainable are summarized in my previous testimony here. Thermographs were deployed at multiple locations in Sandia Canyon from 2014 through 2018 to collect actual stream temperature data. Locations were selected based on input from NMED.

In addition to reviewing these multiple lines of evidence, an active stakeholder outreach and public engagement process was implemented to ensure that stakeholders were informed, and that the public was informed and involved in the process. In addition, consultation with appropriate state and federal agencies was conducted, and input from both NMED and the EPA was used to develop the final Sandia Canyon UAA document.

IV. OUTREACH

Q. PLEASE DESCRIBE PETITIONERS' OUTREACH TO INFORM STAKEHOLDERS AND MEMBERS OF THE PUBLIC OF THE PROPOSED CHANGE.

A. In accordance with the requirements of the Approved Work Plan, Triad and DOE conducted an extensive stakeholder outreach and public engagement process during the development of the Sandia Canyon UAAs (Draft and Final). This process included presentations to NNMCAB, to the Accord Pueblos (including Pueblo de San Ildefonso, Santa Clara Pueblo, Pueblo of Jemez, and Pueblo de Cochiti), and to the EJRC. EJRC members include the U.S. Forest Service, U.S. National Park Service, U.S. Geological Survey, U.S. Army Corps of Engineers, DOE, LANL, and NMED.

The following table summarizes these meetings, including the dates, the engagement, and the participants.

Date	Engagement	Participants
12/5/2018	Presentation to Santa Clara Pueblo	Santa Clara Pueblo, Triad, DOE
2/7/2019	Presentation to San Ildefonso Pueblo	Pueblo de San Ildefonso, Triad, DOE
4/25/2019	Presentation to Jemez Pueblo	Jemez Pueblo, Triad, DOE
11/13/2019	Presentation on Surface Water Monitoring to the Northern New Mexico Citizens' Advisory Board (NNMCAB)	NNMCAB, Triad, DOE, N3B
11/14/2019	Presentation to the East Jemez Resource Council (EJRC)	East Jemez Resource Council (U.S Forest Service, National Park Service, U.S Geological Survey, U.S. Army Corps of Engineers, DOE, LANL, NMED)
9/3/2020	Presentation to the Accord Technical Exchange Meeting (ATEM) on the Los Alamos National Laboratory - Sandia Canyon Use Attainability Analysis	Accord Pueblos (Pueblo de San Ildefonso, Santa Clara Pueblo, Pueblo of Jemez, and Pueblo de Cochiti), Triad, DOE, N3B
12/10/2020	Presentation to the EJRC regarding Sandia Canyon Assessment Unit Temperature Study and Use Attainability Analysis and notification of initial 45-day public comment period	EJRC
2/23/2021	Presentation to the Accord Technical Exchange Meeting on the Use Attainability Analysis - Aquatic Life Uses for Perennial Reach of Sandia Canyon	Accord Pueblos, Triad, DOE, N3B
10/13/2021	Presentation to the NNMCAB on the Use Attainability Analysis - Aquatic Life Use Designation for Upper Sandia Canyon	NNMCAB, Triad, DOE, N3B
2/23/2022	Presentation to the Accord Pueblos at the ATEM regarding the Sandia Canyon UAA	Accord Pueblos, Triad, DOE (NA-LA), DOE (EM-LA), N3B
3/29/2022	Presentation of the UAA to the Federal Environmental Symposium	Federal Environmental Symposium
2/21/2024	Presentation to the Accord Pueblos at the ATEM on the Upper Sandia Canyon Use Attainability Analysis (Revision 1)	Accord Pueblos, Triad, DOE (NA-LA), DOE (EM-LA), N3B

Date	Engagement	Participants
5/7/2024	Presentation to the EJRC on the updated Sandia Canyon Use Attainability Analysis and notification of 30-day public comment period	EJRC
6/27/2024	Presentation to the Accord Pueblos at the ATEM, updating the status of the Sandia Canyon UAA Study	Accord Pueblos, Triad, DOE (NA-LA), DOE (EM-LA), N3B

Q. IN DEVELOPING A FINAL RECOMMENDATION FOR AMENDING NEW MEXICO'S WATER QUALITY STANDARDS, DID PETITIONERS CONSIDER AND RESPOND TO INPUT PROVIDED BY STAKEHOLDERS, PUEBLOS, AND THE GENERAL PUBLIC?

A. Yes, all input from the stakeholders, the Pueblos, and the general public was carefully considered and addressed before filing the Petition. Both versions of the Sandia Canyon UAA were made available to the stakeholders, the Pueblos, and general public for comment. The public comment periods were as follows:

- Draft UAA 45-Day Public Comment Period with 30-Day Extension: December 20, 2021, through February 3, 2022 (45 days)
- At NMED's request, the draft UAA public comment period was extended for 30 days, through March 7, 2022
- Final UAA 30-Day Public Comment Period: May 13, 2024, to June 12, 2024

Petitioners received comments from NMED regarding the draft UAA on March 4, 2022, which also included comments from EPA, dated February 14, 2022 Petitioners' **Exhibit F** (LANL UAA_0122-0129). On March 7, 2022, Petitioners received combined public comments from Communities for Clean Water, Amigos Bravos, Tewa Women

United, New Mexico Acequia Association, Concerned Citizens for Nuclear Safety, Breath of My Heart Birthplace, and Partnership for Earth Spirituality. Petitioners' **Exhibit G** (LANL UAA_0130-0133).

From spring of 2022 through fall of 2023, Petitioners revised the UAA and modified recommended amendments to 20.6.4.126 NMAC based on public comments and ongoing discussion with NMED staff. Petitioners provided responses to EPA and NMED comments on November 6, 2023. Petitioners' **Exhibit H** (LANL UAA_0134-0175). Petitioners provided responses to the combined prior public comments on March 15, 2024. Petitioners' **Exhibit J** (LANL UAA_0178-0190).

Petitioners received no public comments on the Final UAA.

Q. PLEASE SUMMARIZE PETITIONERS' ENGAGEMENT WITH NMED AND EPA DURING DEVELOPMENT OF THE PROPOSED REGULATORY AMENDMENT.

A. The following table summarizes meetings, reporting, and responses to comments among the Petitioners, NMED, and EPA.

Date	Engagement	Participants
10/05/2015	DOE/LANS notify NMED of investigation intitiated in July 2014 to determine if natural thermal conditions are preventing attainment of coldwater ALU; submit AWTC data and water temperature data to NMED	Submitted to NMED
03/15/2015	NMED responds to DOE/LANS 10/05/2015 letter with recommendations based on the AWTC and water temperature data, including request for continuation of stream temperature monitoring, working closely with NMED to determine proper placement of thermographs at representative locations	Comments provided to DOE/LANS

Date	Engagement	Participants
10/30/2017	DOE/LANS meet with NMED to discuss water quality standards and Sandia Canyon temperature investigation	Meeting with NMED
06/27/2018	DOE/Triad submit draft UAA workplan to determine if naturally occurring thermal conditions prevent attainment of coldwater ALU in the perennial reach of Sandia Canyon	Submitted to NMED
09/14/2018	NMED completes their review of the workplan submitted 6/27/18; provides comments on the draft UAA workplan to LANL; copy to EPA	Submitted to LANL; copy to EPA Region 6
2019	DOE/Triad submit draft UAA workplan to NMED	Submitted to NMED
02/10/2020	DOE/Triad submit final UAA workplan to determine if naturally occurring thermal conditions prevent attainment of coldwater ALU in the perennial reach of Sandia Canyon; Sandia UAA workplan was provided to EPA by NMED for review	Submitted to NMED; NMED provided workplan to EPA Region 6
04/09/20	NMED provides written approval of the workplan; copy to EPA	Submitted to LANL; copy to EPA Region 6
10/25/2021	DOE/Triad submit Final Draft UAA to NMED	Submitted to NMED
01/13/2022	NMED sends DOE/Triad request for extension of time for Upper Sandia Canyon UAA public comment period	Submitted to LANL; copy to EPA Region 6
03/04/2022	DOE/Triad receive comments from NMED; included comments from EPA dated 2/14/2022	Comments provided to DOE/Triad from NMED and EPA
03/07/2022	DOE/Triad receive combined public comments from Communities for Clean Water, Amigos Bravos, Tewa Women United, New Mexico Acequia Association, Concerned Citizens for Nuclear Safety, Breath of My Heart Birthplace, and Partnership for Earth Spirituality	Combined comments provided to DOE/Triad from Communities for Clean Water, Amigos Bravos, Tewa Women United, New Mexico Acequia Association, Concerned Citizens for Nuclear Safety, Breath of My Heart Birthplace, and Partnership for Earth Spirituality
Spring 2022 to Fall 2023	LANL updates Sandia Canyon UAA based on comments from NMED, EPA, and the public	DOE/Triad address comments from NMED, EPA, the public

Date	Engagement	Participants
04/25/2023	Meeting with NMED to discuss Sandia Canyon UAA comment response, modifications to UAA	Meeting with NMED
11/06/2023	DOE/Triad submit responses to EPA and NMED comments to NMED	DOE/Triad provide comment responses to NMED
02/21/2024	DOE/Triad provide Final UAA to NMED for review and discussion	Submitted to NMED; NMED provides UAA to EPA Region 6
05/28/2024	DOE/Triad meet with NMED to discuss Sandia UAA and WQS Program	Meeting with NMED

Q. DID PETITIONERS CONSIDER AND RESPOND TO INPUT PROVIDED BY NMED AND EPA?

A. Yes. Petitioners considered all comments from NMED, EPA, and the Public and revised the UAA to address the issues raised in the comments. The Final UAA incorporates changes made based on the input provided by NMED and EPA.

Petitioners also met with NMED on April 25, 2023, to discuss the NMED and EPA comments and to discuss recommended changes to the UAA (and proposed ALU) based on the comments.

Changes incorporated in the Final UAA based on the input provided are presented in Petitioners' Exhibit H and summarized as follows:

- Petitioners revised the UAA to place less emphasis on modeled results and included additional requested data points.
- Petitioners revised the recommended amendments to 20.6.4.126 NMAC and included a new recommendation to split the Upper Sandia Canyon AU such that a coldwater designated use could be retained in the eastern portion of the Upper Sandia Canyon AU.

- Petitioners provided their interpretation of data that show that changing the designated use temperature criterion in the western portion of the Upper Sandia Canyon AU will not negatively impact water quality downstream, primarily because of limited continuity of flows and the dominant effects of air temperature on in-stream water temperatures.
- Petitioners provided additional information about existing best management practices, current controls (such as cooling at the outfall), and the limitations of these interventions on attainability of the current coldwater designated ALU, especially in the western portion of the Upper Sandia Canyon AU.

V. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Q. PLEASE SUMMARIZE THE FINDINGS OF PETITIONERS' USE ATTAINABILITY ANALYSIS REPORT.

A. Multiple lines of evidence were reviewed in the draft and Final UAA, in accordance with the NMED-approved workplan. Five years of thermograph data from multiple locations within the stream show that the current designated use for Upper Sandia Canyon (coldwater ALU) is not supported by the water temperature data for the stream. Additionally, air temperature data from LANL meteorological stations and from the U.S. Department of Agriculture's PRISM dataset were evaluated using the NMED's AWTC. These data clearly show that naturally occurring air temperatures within the canyon preclude the coldwater ALU from being attained. This conclusion is also supported by the additional lines of evidence evaluated under the workplan.

However, the coldwater ALU is attained in perennial flow in the downstream portion of the reach, which reflects natural conditions in this part of the canyon, where a

bedrock-incised stream and steeper canyon slopes offer more shade. These data confirm that the coldwater ALU is appropriate for the downstream portion of the reach and that the effluent-dominated warmer waters in the upper part of the canyon do not negatively affect the coldwater designated use in the downstream part of the canyon.

Q. PLEASE SUMMARIZE THE RECOMMENDATIONS PROVIDED IN PETITIONERS' USE ATTAINABILITY ANALYSIS REPORT.

A. Because of the differing water temperature dynamics in Upper Sandia Canyon—with warmer temperatures in the upstream, more exposed western part of the canyon and cooler water temperatures in the deeply incised, eastern part of the canyon—Petitioners have recommend splitting the reach into a coolwater ALU segment for upper Sandia Canyon, from Sandia Canyon at Bedrock Road to Sandia Canyon below Outfall 001, with a segment-specific criterion for a 6T3 of 25°C. The lower segment will retain the coldwater ALU from Sandia Canyon at Sigma Canyon to Sandia Canyon at Bedrock Road. I agree with this recommendation.

VI. CONCLUSION

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

Figure A. Upper Sandia Canyon Assessment Unit, (Updated version of Final UAA Figure 1, LANL UAA_0206.)

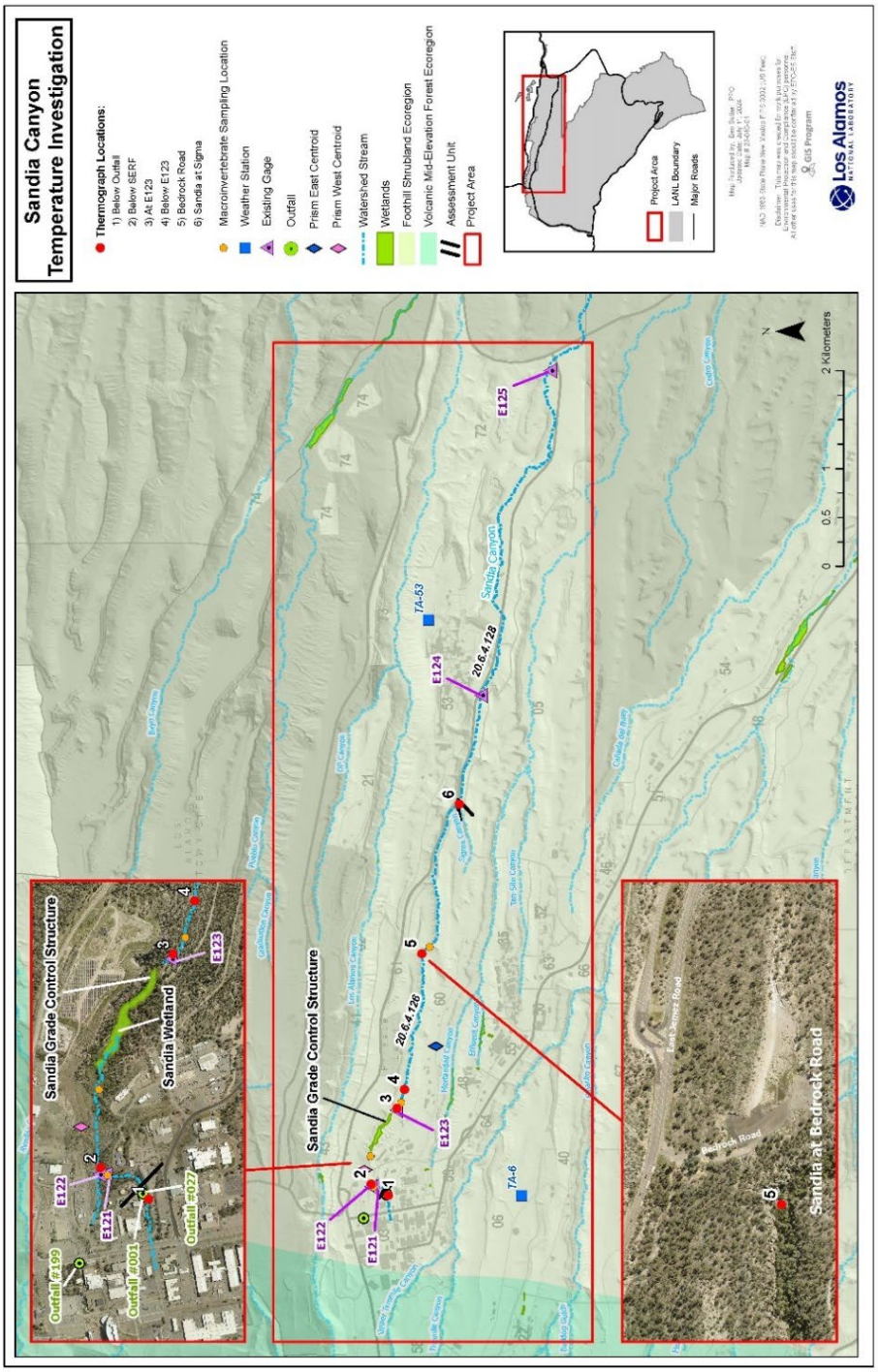


EXHIBIT W

STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF:

THE PETITION TO AMEND 20.6.4.126 NMAC AND 20.6.4.141 NMAC TO ESTABLISH A SEGMENT-SPECIFIC TEMPERATURE CRITERION FOR A PORTION OF THE UPPER SANDIA CANYON ASSESSMENT UNIT

WQCC NO. 24-65(R)

Triad National Security, LLC, and U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Field Office

Petitioners.

DIRECT TESTIMONY OF MATTHEW V. SEGURA ON BEHALF OF TRIAD NATIONAL SECURITY, LLC AND THE U.S. DEPARTMENT OF ENERGY, NATIONAL NUCLEAR SECURITY ADMINISTRATION, LOS ALAMOS FIELD OFFICE

April 14, 2025

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Matthew V. Segura. My office is in Technical Area (TA) 59, Building 0096, at Los Alamos National Laboratory (LANL or Laboratory).

Q. ON WHOSE BEHALF ARE YOU SUBMITTING DIRECT TESTIMONY?

A. I am submitting this direct testimony on behalf of Petitioners Triad National Security, LLC (Triad), the management and operating contractor for LANL and the United States Department of Energy (DOE) National Nuclear Security Administration (NNSA), Los Alamos Field Office.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am employed by Triad as an environmental professional in the Environmental Protection and Compliance Division (EPC).

Q. PLEASE SUMMARIZE YOUR RELEVANT EDUCATIONAL AND PROFESSIONAL EXPERIENCE.

A. I received a Bachelor of Science degree in Biology with a double minor in Chemistry and Studio Art from the University of New Mexico in 2013. I hold a dual Master of Science degree in Water Resources and Community and Regional Planning from the University of New Mexico. My graduate research examined long-term impacts of wildfire and water security of municipal watersheds in the western United States. My curriculum vitae is included as Petitioners' **Exhibit U** (LANL UAA_0330-0332).

I have worked as an environmental professional and hydrologist for about 10 years, with a focus on water quality monitoring, hydrologic analysis, environmental compliance, and regulatory policy. I have worked with federal agencies and national

laboratories, performing complex environmental compliance and hydrologic assessments. At the U.S. Army Corps of Engineers, I specialized in long-term water quality monitoring, hazardous waste management, and civil works initiatives. I also conducted biological assessments for endangered species and led remediation efforts in high-impact environmental projects. At the Laboratory, I have helped to ensure compliance with National Pollutant Discharge Elimination System (NPDES) permits and federal and state water quality standards.

Q. WHAT ARE YOUR RESPONSIBILITIES AS AN ENVIRONMENTAL PROFESSIONAL?

A. At the Laboratory, I work within the Environmental Protection and Compliance Division, in the Compliance Programs Group (EPC-CP). Our group supports compliance with federal and state water quality regulations, including Clean Water Act standards and NPDES permits. As an environmental professional, my responsibilities include water quality monitoring, regulatory compliance, hydrologic data analysis, and environmental management. I oversee field water quality monitoring, managing hydrologic datasets and stream measurements to assess aquatic system health and regulatory thresholds. My role includes collaborating with DOE stakeholders, regulatory agencies, and scientific teams to develop and implement best management practices for environmental sustainability and compliance. Additionally, I analyze and interpret complex hydrologic and water quality datasets, applying geographic information system (GIS) mapping, modeling, and statistical evaluations to support floodplain modeling, environmental impact assessments, and watershed management initiatives. I was a lead scientist and one of the primary

authors of the final "Use Attainability Analysis for Upper Sandia Canyon" (Final UAA), provided as Petitioners' **Exhibit B** (LANL UAA_0022-0070).

Q. PLEASE DESCRIBE YOUR EXPERIENCE WITH DATA ANALYSIS, REPORTING, AND REGULATORY COMPLIANCE FOR SURFACE WATER QUALITY AND STREAM FLOW MONITORING AT LANL.

A. My work at the Laboratory involves extensive data analysis, reporting, and regulatory compliance monitoring for surface water quality. I oversee hydrologic data collection from thermographs, water quality sondes, and stream gages (maintained and operated by DOE's environmental management contractor, Newport News Nuclear BWXT-Los Alamos (N3B)), ensuring that measurements are accurately recorded and maintained. I integrate streamflow and water quality data to assess temperature-flow relationships and hydrologic connectivity, particularly in response to storm events, effluent discharges, and seasonal variability. My work also includes floodplain modeling and statistical evaluations of water quality exceedances using GIS-based hydrologic tools, Microsoft Excel, DPlot, and Python for data management. I ensure quality assurance/quality control protocols, maintain data integrity, and synthesize findings into regulatory reports, compliance assessments, and environmental impact statements for DOE and environmental regulators.

Q. WHAT WAS YOUR ROLE IN DEVELOPING THE FINAL USE ATTAINABILITY ANALYSIS REPORT?

A. I began working at the Laboratory in early 2022, during the 2020 Triennial Review. While I was not involved in the early iterations of the UAA and work plan, I reviewed collected data for accuracy, updating tables and graphs, and performed long-term water

temperature, water chemistry, and effluent temperature assessments to determine the highest attainable aquatic life use (ALU) for Upper Sandia Canyon. We received initial comments from New Mexico Environment Department (NMED), U.S. Environmental Protection Agency (EPA), and the public in early 2022. Tim Goering and I completed responses to comments in April 2023. Based on this feedback, we revised the UAA, including our recommended amendments to New Mexico water quality standards, and completed the Final UAA in February 2024. We conducted a second round of meetings with Tribes and external stakeholders during the spring and summer of 2024. The second comment period ran from May 13 to June 12, 2024. We received no public comments.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN STATE OR FEDERAL REGULATORY PROCEEDINGS ON SURFACE WATER QUALITY-RELATED ISSUES?

A. No.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes, throughout my testimony, I reference technical and regulatory information presented in the "Use Attainability Analysis for Upper Sandia Canyon" (Final UAA) provided as Petitioners' **Exhibit B** (LANL UAA_0022-0070).

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present a comprehensive, science-based evaluation of whether naturally occurring thermal conditions prevent the attainment of coldwater ALU designation in the Upper Sandia Canyon Assessment Unit (AU). My testimony is

informed by 5 years of temperature monitoring data, hydrologic assessments, modeling, biological surveys, and regulatory evaluations conducted as part of the UAA.

Through this testimony, I will:

- Demonstrate that the current coldwater ALU designation is not supported by field data. Temperature monitoring consistently shows exceedances of coldwater criteria, and hydrologic conditions do not support the presence of coldwater aquatic life.
- Explain the scientific and regulatory basis for the proposed reclassification, incorporating thermograph data, air-water temperature correlation (AWTC) modeling, historical trends, and macroinvertebrate surveys to determine the highest attainable use for the upper AU.
- Explain how Petitioners' process has aligned with EPA's Title 40 Code of Federal Regulations (CFR) 131.10(g), which allows for state-designated use reclassification when natural conditions prevent attainment. The recommendation to designate the upper reach as coolwater ALU while maintaining coldwater protections downstream ensures compliance with federal and state water quality standards.

III. USE ATTAINABILITY ANALYSIS FINDINGS

1. WATER AND AIR TEMPERATURE DATA AND MODELING

Q. PLEASE DESCRIBE THE FINAL UAA'S FINDINGS FROM THERMOGRAPHS DEPLOYED IN UPPER SANDIA CANYON.

A. The Final UAA incorporated thermograph data as a primary line of evidence to assess long-term water temperature trends in Upper Sandia Canyon. Between 2014 and 2018, five thermographs were deployed at strategic locations to capture variations in water temperature. In 2018, a sixth thermograph was added at Bedrock Road to enhance spatial

coverage. The thermographs used were HOBO Water Temp Pro (U22-001) loggers, which have a precision of ±0.21°C and a resolution of 0.021°C at 25°C. Data were recorded at 15-minute intervals over the summer seasons. Those data were taken from the sensor and downloaded as .CSV files. The data were analyzed using NMED's Long-Term Data Management Spreadsheet for 15-Minute Data. Using this calculation method, TMAX (maximum daily temperature), 6T3 (chronic water temperature measurement not to be exceeded for 6 or more consecutive hours in a 24-hour period on more than 3 consecutive days), and any statistical outliers were determined. Rolling 7-day averages were calculated to determine Maximum Weekly Average Temperatures (MWAT). To ensure accuracy, the dataset was carefully reviewed to identify and remove erroneous readings. Specifically, thermographs were occasionally exposed to air during storm events or low-flow conditions, leading to artificially high temperatures. These periods were excluded from analyses to prevent misinterpretation of exceedance calculations. The refined dataset was then used to assess compliance with coldwater and coolwater ALU criteria.

Q. WHAT DOES THERMOGRAPH DATA INDICATE ABOUT ATTAINABILITY OF THE COLDWATER ALU DESIGNATION IN THE UPPER SANDIA CANYON ASSESSMENT UNIT?

A. For reference, the following table shows New Mexico's Temperature Criteria for Aquatic Life Designated Uses, derived from Final UAA Table 2.

Designated ALU	DO (mg/L)	4T3 (°C)	6T3 (°C)	TMAX (°C)	pH
High-Quality Coldwater	6.0	20	NA	23	6.6–8.8
Coldwater	6.0	NA	20	24	6.6–8.8
Marginal Coldwater	6.0	NA	25	29	6.6–9.0
Coolwater	5.0	NA	NA	29	6.6–9.0

Warmwater	5	NA	NA	32.2	6.6−9.0
Marginal Warmwater	5	NA	NA	32.2	6.6−9.0
Limited Aquatic Life	NA	NA	NA	NA	NA

The thermograph data show that the current coldwater ALU designation is unattainable in the Upper Sandia Canyon AU. The Final UAA thermograph data indicate that 6T3 temperatures frequently exceeded the 20°C (68°F) coldwater criterion at most monitoring locations. TMAX values surpassed the 24°C (75.2°F) coldwater threshold at multiple sites. The exceedance frequency was most pronounced in the reach from Bedrock Road to Outfall 001, whereas downstream locations such as Sigma Canyon remained within coldwater criteria. (These data are provided in **Figure A1**, and **Table A1**, appended to this testimony.)

Q. PLEASE DESCRIBE THE AIR-WATER TEMPERATURE CORRELATION (AWTC) MODEL AND HOW IT WAS USED IN THE FINAL USE ATTAINABILITY ANALYSIS.

A. As required in the Approved Work Plan, the Final UAA model predicted water temperatures in the Upper Sandia Canyon AU using air temperature data inputs. The AWTC model is an empirical method used by NMED to estimate attainable water temperatures based on air temperature data. The model is founded on a statistically derived correlation between July air temperatures and water temperatures, which allows for predictions of stream temperatures in non-groundwater-influenced reaches. The Final UAA applied the AWTC model using historical air temperature data from PRISM (Parameter-Elevation Regressions on Independent Slopes Model) and LANL meteorological stations (MET) to calculate the following:

6T3 estimates, using the equation:

$$6T3 = 1.0346 \times ATEMP + 1.3029$$

TMAX estimates, using the equation:

$$TMAX = 1.0661 \times ATEMP + 4.9547$$

By inputting average July air temperatures from multiple sources, the model provided predictions of whether coldwater or coolwater use could be attained in Upper Sandia Canyon. These results were compared against field thermograph data to validate findings.

Q. PLEASE DESCRIBE THE PRISM AIR TEMPERATURE MODEL AND EXPLAIN HOW PRISM DATA WERE USED IN THE FINAL UAA.

A. PRISM is a spatially distributed climate model that estimates temperature based on topography, meteorological station data, and other climatological inputs. The Final UAA used PRISM air temperature data to supplement LANL MET records and to provide an independent estimate of July air temperatures. Two PRISM grid cells—Upper Sandia AU-West and Upper Sandia AU-East—were used to estimate air temperature trends for the study area. These data were compared with LANL MET station readings to refine air temperature estimates for the AWTC modeling. Although PRISM data are generally reliable, the model has systematic biases related to topoclimatic effects, particularly in steep and shaded canyons like some reaches in Sandia Canyon.

Q. WHAT DO AWTC MODELING RESULTS SUGGEST ABOUT ATTAINABILITY OF THE COLDWATER ALU DESIGNATION IN THE UPPER SANDIA CANYON ASSESSMENT UNIT?

A. AWTC modeling results indicate that the coldwater ALU is unattainable in Upper Sandia Canyon because air-temperature-based water-temperature predictions exceed coldwater criteria in most years. (*See* Final UAA Table 7, LANL UAA_0053). The results showed that coolwater use is likely attainable under typical conditions. Warmwater use was projected in some years, particularly 2016 and 2018, although coolwater was the more frequently predicted designation. Note that the AWTC model, while a useful tool, overestimated temperatures in Lower Sandia Canyon due to possible microclimate effects, reinforcing the importance of direct thermograph data.

Q. PLEASE DESCRIBE THE MAXIMUM WEEKLY AVERAGE TEMPERATURE MODEL (MWAT) AND HOW IT WAS USED IN THE FINAL UAA.

A. The MWAT model was used to assess the highest sustainable ALU in Upper Sandia Canyon. The model calculates a rolling 7-day average of thermograph readings to determine whether chronic temperature thresholds for ALU are exceeded. For this UAA, MWAT values were derived from 15-minute thermograph readings, averaged over each day, then smoothed using a 7-day moving average window.

The MWAT equations are as follows:

6T3 Calculation:

$$6T3 = 1.0346 \times MWAT + 1.3029$$

TMAX Calculation:

$$TMAX = 1.0661 \times MWAT + 4.9547$$

These values were compared with coldwater (6T3 ≤ 20°C [68°F], TMAX ≤ 24°C [75.2°F]) and coolwater (TMAX ≤ 29°C [84.2°F]) criteria to determine whether a coolwater designation was feasible.

Q. WHAT DO MWAT MODEL RESULTS INDICATE ABOUT WATER TEMPERATURES IN THE UPPER SANDIA CANYON ASSESSMENT UNIT?

A. The MWAT analysis reinforces the conclusion that coldwater use is not attainable in the easternmost portion of Upper Sandia Canyon. The model results as documented in Table 4 of the Final UAA, (appended to this testimony as **Table B1**), indicate that water temperatures in the Upper Sandia Canyon AU consistently exceed the 6T3 coldwater ALU criterion of 20°C but remain within the coolwater ALU threshold of 29°C. MWAT values, derived from thermograph data collected between 2014 and 2018, ranged from 16.64°C at Sigma Canyon (2017) to 22.35°C below Outfall 001 (2016), demonstrating that coldwater conditions are not attainable in parts of this reach under natural conditions. These results align with AWTC model projections, reinforcing the conclusion that air temperature is the primary driver of instream water temperatures.

Q. PLEASE SUMMARIZE HOURLY TEMPERATURE DATA FROM OUTFALL 001 AND EXPLAIN WHAT THE DATA INDICATE ABOUT WATER TEMPERATURES IN UPPER SANDIA CANYON.

A. Hourly data from Outfall 001 (*see* Final UAA Table 5, LANL UAA_0045) indicate the following:

- Coldwater criteria were exceeded every year at Outfall 001.
- Coolwater criteria were met, supporting the proposed coolwater ALU redesignation.

- Artificial cooling of effluent might not significantly lower downstream temperatures, reinforcing the conclusion that a coldwater ALU is not feasible for the upper reach.

Even though the coldwater criteria were not met at Outfall 001, effluent temperatures were less variable than natural stream temperatures. Outfall 001 discharge did not exceed the coolwater TMAX criterion (29°C) but frequently exceeded the coldwater 6T3 (20°C) and TMAX (24°C) criteria. Despite effluent temperatures meeting only coolwater criteria, Sandia at Sigma Canyon consistently maintained coldwater ALU. This information indicates that effluent temperatures from the outfall have minimal effect on downstream temperatures and that air temperature is the primary driver of instream water temperatures in Sandia Canyon. As a result, actively cooling the effluent would have minimal impact on water temperatures beyond Outfall 001.

Q. PLEASE EXPLAIN SSTEMP RESULTS AND WHAT THEY INDICATE ABOUT WATER TEMPERATURE IN SANDIA CANYON.

A. The Stream Segment Temperature (SSTEMP) model was applied to simulate stream temperatures in Upper Sandia Canyon, evaluating the influence of air temperature and groundwater inflows on water temperature variability. The results confirm that coldwater aquatic life criteria are not attainable; as predicted, mean temperatures exceeded 20°C across all segments.

Q. PLEASE SUMMARIZE ANY UNCERTAINTIES IN THE FINAL UAA DATA AND MODELING AND EXPLAIN WHETHER THESE UNCERTAINTIES AFFECTED PETITIONERS' PROPOSED ALU DESIGNATION.

A. The Final UAA integrates multiple independent data sources and modeling approaches to ensure a robust and scientifically defensible assessment of water temperatures in Upper Sandia Canyon. Although thermograph data, AWTC modeling, MWAT calculations, and SSTEMP modeling provide consistent evidence that coldwater ALU is unattainable, each method carries inherent uncertainties. Thermograph data are subject to sensor exposure, biofouling, and data gaps; we carefully applied quality control practices to remove erroneous readings. AWTC and PRISM models can overestimate temperatures due to limited incorporation of microclimate effects, and MWAT's smoothing process can underrepresent short-term temperature fluctuations. SSTEMP assumes steady-state conditions, limiting its ability to capture transient cooling effects from localized shading or storm events. Despite these uncertainties, the strong alignment across all data sources enhances confidence in the conclusion that coldwater ALU is not attainable and that a coolwater designation is the most scientifically supported classification for Upper Sandia Canyon.

The reliability of these findings is supported by the strength of multiple independent lines of evidence. Long-term temperature monitoring (2014–2018) provides a robust dataset, reducing the risk of short-term anomalies' skewing results. AWTC model predictions match field thermograph data, confirming the role of air temperature as a primary driver of stream temperature. As I discuss later in this testimony, biological data corroborate thermal trends, with macroinvertebrate assemblages reflecting

coolwater—rather than coldwater—habitat conditions. Historical studies validate the findings, showing that coldwater temperature exceedances are not new but have been documented for years via the New Mexico CWA §303(d)/305(b) Integrated Report.

Although all scientific analyses have inherent uncertainties, the convergence of multiple data sources reinforces the conclusion that coldwater ALU is not attainable in this reach under natural conditions.

2. OTHER FACTORS THAT AFFECT AQUATIC LIFE

Q. PLEASE DESCRIBE HOW THE FINAL UAA EVALUATED DISSOLVED OXYGEN LEVELS WITHIN THE UPPER SANDIA CANYON STUDY AREA.

A. As described in the Approved Work Plan, the Final UAA evaluated dissolved oxygen (DO) levels in the Upper Sandia Canyon study area (LANL UAA_0048) using data collected from LANL's environmental surveillance gages (E121, E122, and E123) between 2016 and 2019. These data were obtained from LANL's interim facility-wide groundwater monitoring plan and the Intellus New Mexico database, with measurements analyzed to determine compliance with the coldwater ALU criterion of DO ≥ 6.0 mg/L. The results showed DO concentrations ranging from 6.26 to 11.23 mg/L, consistently exceeding the minimum required threshold. Seasonal variations were observed, with higher DO levels recorded in winter due to increased oxygen solubility in colder water. DO concentrations remained well within regulatory limits; therefore, the analysis confirmed that DO is not a limiting factor for the attainment of coldwater ALU in Upper Sandia Canyon.

Q. PLEASE DESCRIBE HOW THE FINAL UAA EVALUATED pH MEASUREMENTS WITHIN THE UPPER SANDIA CANYON STUDY AREA.

A. As described in the Approved Work Plan, the Final UAA assessed pH levels in the Upper Sandia Canyon study area (LANL UAA_0048-0049) using data from LANL's environmental surveillance gages (E121, E122, and E123) collected between 2016 and 2019. These measurements were sourced from LANL's interim facility-wide groundwater monitoring plan and the Intellus New Mexico database and analyzed against the coldwater ALU criterion, which requires pH levels to remain between 6.6 and 8.8. The results showed pH values that ranged from 7.43 to 8.80, consistently within the regulatory limits. The analysis also noted slightly lower pH levels at E123 compared with E121 and E122, but all readings remained compliant. pH values met the required standards throughout the study period; therefore, the Final UAA concluded that pH is not a limiting factor in the attainment of coldwater ALU in Upper Sandia Canyon.

3. <u>THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT</u>

Q. PLEASE DESCRIBE HOW THE FINAL UAA EVALUATED THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT WITHIN THE UPPER SANDIA CANYON STUDY AREA.

A. The Final UAA addressed threatened and endangered species and aquatic life, (at LANL UAA_0047), to assess what species are present and whether they could be affected by changes to water quality standards in the area.

Threatened and Endangered Species Assessment

LANL's Habitat Management Plan (HMP) is a comprehensive plan that guides how the Laboratory can operate while ensuring protection of the habitats of threatened and endangered species. The HMP identifies three federally listed species at LANL:

- Mexican spotted owl (*Strix occidentalis lucida*), whose habitat overlaps with Upper Sandia Canyon;
- Jemez Mountains salamander (*Plethodon neomexicanus*); and
- Southwestern willow flycatcher (*Empidonax traillii extimus*).

As described in the Final UAA, the recommended changes to temperature criteria would not require additional consultation with the United States Fish and Wildlife Service under the HMP and would not be anticipated to negatively impact the listed species.

Aquatic Life Findings

No fish were observed in Upper Sandia Canyon, confirming that fish populations are not impacted by the reclassification. Benthic invertebrate diversity remains stable, with 86 taxa observed in 2017. No aquatic species listed as threatened or endangered by the New Mexico Department of Game and Fish (NMDGF) or USFWS were found within the study region of Sandia Canyon.

4. PETITIONERS' PROPOSED REGULATORY CHANGES

Q. WHY DO PETITIONERS RECOMMEND SPLITTING THE CURRENT AU INTO TWO SEGMENTS?

A. The petitioners recommend splitting the current AU because environmental data demonstrate two distinct thermal regimes within Sandia Canyon. Splitting the AU ensures that each segment is designated according to its highest attainable use, aligning regulatory classifications with observed conditions. Final UAA Figure 2 (appended to this testimony as **Figure B1**) illustrates the current and proposed ALU designations for the Upper Sandia Canyon AU.

Water temperatures consistently exceed coldwater criteria but remain within coolwater thresholds (TMAX ≤ 29°C). Air temperature seems to be the dominant factor in water temperature regulation, and coldwater aquatic life cannot be sustained in this segment. Based on feedback from NMED, EPA, and the public, as well as consultation with NMED on April 25, 2023, petitioners have proactively incorporated a 6T3 standard of 25°C as a conservative stewardship measure. Although coolwater ALU designations typically lack a chronic temperature criterion, this 6T3 criterion provides additional protection for aquatic life in the cooler, downstream portion of the reach.

For Lower Sandia Canyon (Sigma Canyon to Bedrock Road), data show that coldwater criteria are met consistently. Natural shading and narrowing of the canyon enhance cooling, allowing this reach to support coldwater aquatic life.

Q. DO THE PROPOSED REGULATORY CHANGES ENSURE DOWNSTREAM USES ARE MAINTAINED AND PROTECTED?

A. Yes. The proposed regulatory changes maintain and protect downstream uses by accurately defining each reach's attainable use; the proposal safeguards downstream aquatic life while ensuring scientifically justified regulatory designations.

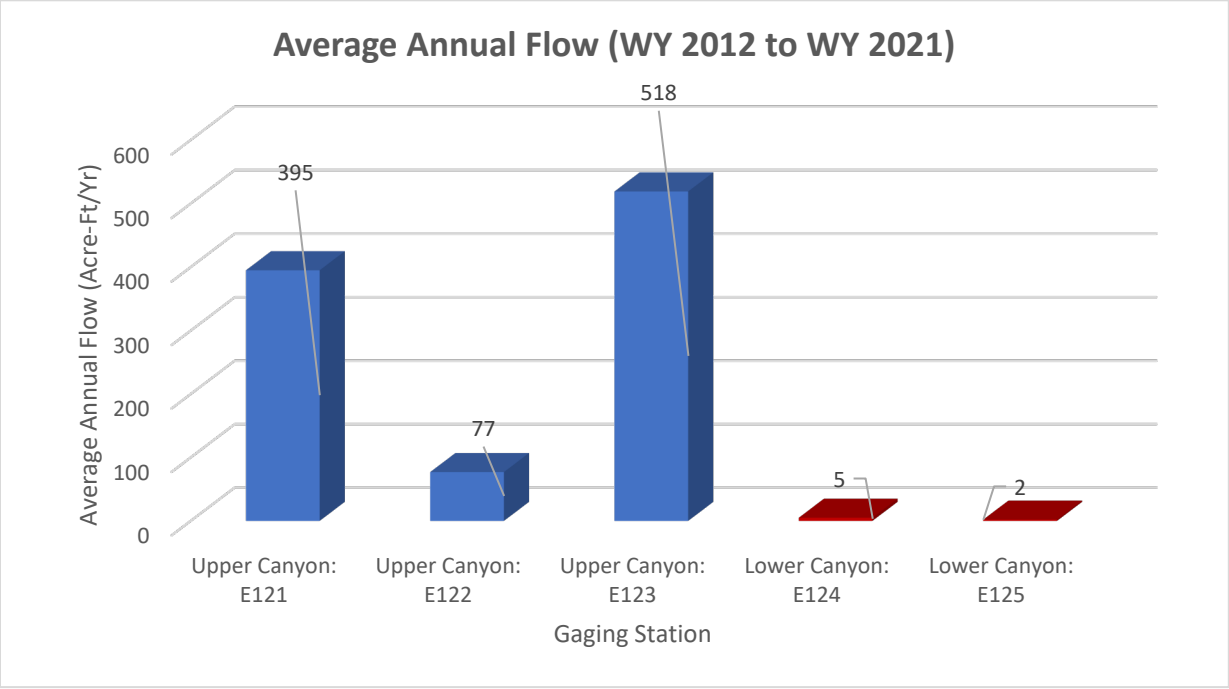
Preserving Coldwater ALU in the Lower Segment

The coldwater designation remains intact from Sigma Canyon to Bedrock Road, where conditions support the current ALU, ensuring the protection of sensitive aquatic species and habitats in that region.

Preventing Negative Downstream Impacts

Thermograph data confirm that water naturally cools as it flows downstream, ensuring that the lower coldwater segment is not affected by the coolwater designation

upstream. Gaging station data, shown in the following figure (adapted from Final UAA Figure 4) show that flows from the upper AU rarely reach the Rio Grande, meaning that no significant impact occurs on downstream water temperatures.



Average annual flow measured in Sandia Canyon gages during the period from October 1, 2011, through September 30, 2021. Period of record for Gage E124 spans only 8 years, from October 1, 2013, to September 30, 2021 (N3B 2022). WY = water year.

Compliance with Federal Water Quality Protections (40 CFR 131.10(b))

The redesignation adheres to regulatory mandates, ensuring that changes in designated use do not degrade water quality or harm downstream ecosystems.

Q. PLEASE DESCRIBE THE POTENTIAL IMPACTS OF THE PROPOSED REGULATORY CHANGES ON THREATENED AND ENDANGERED SPECIES, CRITICAL HABITATS, AND AQUATIC LIFE.

A. The Final UAA assessed the potential impact of the proposed water quality changes on federally listed species, critical habitats, and aquatic life within Sandia Canyon. The UAA predicts no adverse effects on threatened or endangered species, aquatic life, or critical habitats from the proposed regulatory changes.

Given that no fish were observed in Upper Sandia Canyon, benthic invertebrate diversity remains stable, and no aquatic species listed as threatened or endangered by the NMDGF or the USFWS were found within the study region of Sandia Canyon, the proposed regulatory changes would not adversely affect aquatic life in the segments. In addition, the proposed coolwater designation aligns with the existing LANL HMP and does not require further regulatory consultation.

5. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Q. PLEASE SUMMARIZE THE FINDINGS AND RECOMMENDATIONS OF PETITIONERS' FINAL USE ATTAINABILITY ANALYSIS.

A. The Final UAA provides a comprehensive, science-based evaluation of the attainability of the coldwater ALU in Upper Sandia Canyon. The findings are based on measured field data, predictive modeling, ecological assessments, and regulatory compliance requirements. The report's conclusions are drawn from multiple lines of evidence,

including thermograph data, air-water temperature modeling, outfall analysis, and aquatic life surveys.

- *Coldwater ALU is Unattainable in Upper Sandia Canyon*: Thermograph data collected over a five-year period (2014–2018) show that water temperatures in the upper reach exceed coldwater criteria (6T3 ≥ 20°C, TMAX ≥ 24°C). AWTC modeling results confirm that Upper Sandia Canyon cannot naturally support coldwater aquatic life. MWAT analysis further validates that coldwater criteria are consistently exceeded and coolwater criteria (TMAX ≤ 29°C) remain attainable.
- *Proposed Segmentation of the AU*: Two distinct temperature regimes exist within Sandia Canyon, necessitating a split into two regulatory segments:
  - Upper Sandia Canyon (Bedrock Road to Outfall 001): The Coldwater ALU is unattainable. The reach meets coolwater criteria. We recommend a redesignation as Coolwater ALU with a 6T3 criterion of 25°C as an extra protection for the reach.
  - Lower Sandia Canyon (Sigma Canyon to Bedrock Road): Coldwater ALU is currently met and should be retained.
- *Proposed Changes Do Not Negatively Impact Downstream Uses or Regulatory Protections*: Water naturally cools downstream, ensuring that coldwater ALU remains intact from Bedrock Road to Sigma Canyon. The downstream segments of Sandia Canyon and the Rio Grande will not be affected due to limited hydrological connectivity. Gaging station data confirm that Upper Sandia Canyon flows rarely reach LANL's eastern boundary, and no significant surface flow

reaches the Rio Grande, about 9 miles downstream. The proposed segmentation is in full compliance with federal and state water quality regulations (40 CFR 131.10(b)).

- *Proposed Changes Do Not Negatively Impact Threatened and Endangered Species or Aquatic Life Protections*: Habitat assessments confirm that no federally listed aquatic species are present in Upper Sandia Canyon. The proposed coolwater designation aligns with LANL's HMP, requiring no further regulatory consultation. No fish populations exist in the AU, and benthic macroinvertebrate diversity remains stable, confirming that the change will not affect aquatic biodiversity.
- *Proposed Change Balances Environmental Protection with Sustainability*: Cooling the effluent at Outfall 001 will not significantly lower downstream temperatures because air temperature is the dominant driver of instream water temperature dynamics. Artificial cooling would increase energy use and greenhouse gas emissions.

Conclusions

The Final UAA provides compelling, science-based justification for the redesignation of Upper Sandia Canyon to coolwater ALU while maintaining coldwater ALU downstream. This data-driven recommendation ensures that each segment of Sandia Canyon is assigned its highest attainable use, balancing scientific integrity, ecological protection, and responsible resource management. The proposed change:

- More accurately reflects observed environmental conditions,
- Protects aquatic ecosystems and downstream uses,

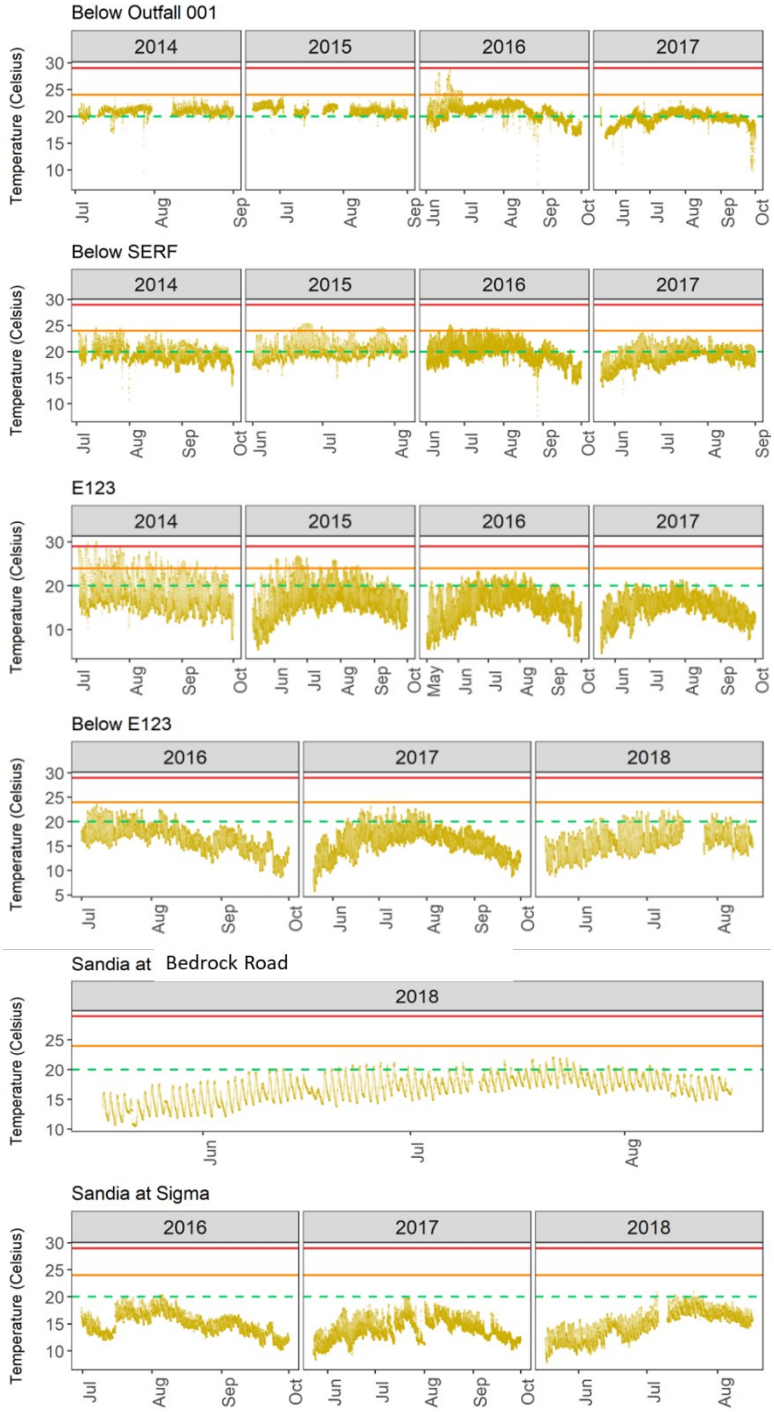
- Maintains regulatory compliance with federal and state water quality standards, and
- Aligns with LANL's long-term sustainability initiatives.

IV. CONCLUSION

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

Figure A1. Water temperature in upper Sandia Canyon assessment unit 2014–2018. (Final UAA Figure 3, LANL UAA_0040.)



Water temperature in upper Sandia Canyon assessment unit 2014–2018. Source: LA-UR-18-28589. Sub-figures are organized in the direction of flow from below Outfall 001 to Sandia at Sigma. Horizontal lines represent temperature criteria associated with designated uses. Green dash = coldwater 6T3 (20°C); orange solid = coldwater TMAX (24°C); and red solid = coolwater TMAX (29°C). High-quality coldwater TMAX of 23°C not shown. Data were removed from thermograph datasets from periods when thermographs became exposed to air (Final UAA Table 3). Note that the coldwater 6T3 threshold is presented for reference only (thermograph data is from instantaneous measurements and Figure A1 does not represent attainment or non-attainment of the calculated coldwater 6T3 criterion).

Table A1. Measured and Predicted Water Temperature Thresholds[a] 2014–2018 (Final UAA Table 3, as updated, LANL UAA_0204.)

Thermograph	Year	Actual TMAX (°C)	Actual 6T3[b] (°C)	AWTC TMAX (°C)	AWTC 6T3[b] (°C)	Designated Use Attained[c]	Dates Exposed/Data Excluded
Sandia Canyon below Outfall 001	2014	23.9	21.6	27.4	22.6	Coolwater	7/7 to 7/9, 7/31 to 8/7
	2015	23.9	22.4	26.2	21.7	Coolwater	6/1 to 6/17, 7/3 to 7/7, 7/15 to 7/21, 7/29 to 8/3
	2016	29.1	23.4	30.8	26.2	Warmwater	None
	2017	22.9	21.0	28.5	24.0	Coolwater	None
Sandia Canyon below SERF	2014	24.7	21.5	27.4	22.6	Coolwater	7/7 to 7/9
	2015	25.4	22.5	26.2	21.7	Coolwater	None
	2016	25.2	22.8	30.8	26.2	Coolwater	None
	2017	23.6	21.0	28.5	24.0	Coolwater	None
Sandia Canyon at E123	2014	30.1	23.6	27.4	22.6	Warmwater	None
	2015	26.8	22.7	26.2	21.7	Coolwater	None
	2016	23.3	20.1	30.8	26.2	Coolwater	None
	2017	21.4	19.1	28.5	24.0	Coldwater	None
Sandia Canyon below E123	2016	23.5	20.7	30.8	26.2	Coolwater	None
	2017	23.2	19.7	28.5	24.0	Coldwater	None
	2018	22.6	18.9	28.9	24.4	Coldwater	7/17 to 7/25
Sandia Canyon at Bedrock Road	2018	22.1	20.1	28.9	24.4	Coolwater	7/10
Sandia Canyon at Sigma Canyon	2016	20.4	18.4	30.8	26.2	Coldwater	None
	2017	20.0	17.6	28.5	24.0	Coldwater	None
	2018	21.0	18.7	28.9	24.4	Coldwater	7/6 to 7/9

	Meets warmwater based on TMAX
	Meets marginal coldwater based on TMAX and 6T3
	Meets high-quality coldwater based on TMAX and 4T3

[a] Predicted thresholds based on AWTC.
[b] Actual 6T3 values were calculated using NMED long-term data management spreadsheets found in Final UAA Appendix D.
[c] Designated use determined from actual TMAX and actual 6T3 measurements from thermographs.

Figure B1. Upper Sandia Canyon (Bedrock Road to Outfall 001) – (Final UAA Figure 2, as updated, LANL UAA_0207).

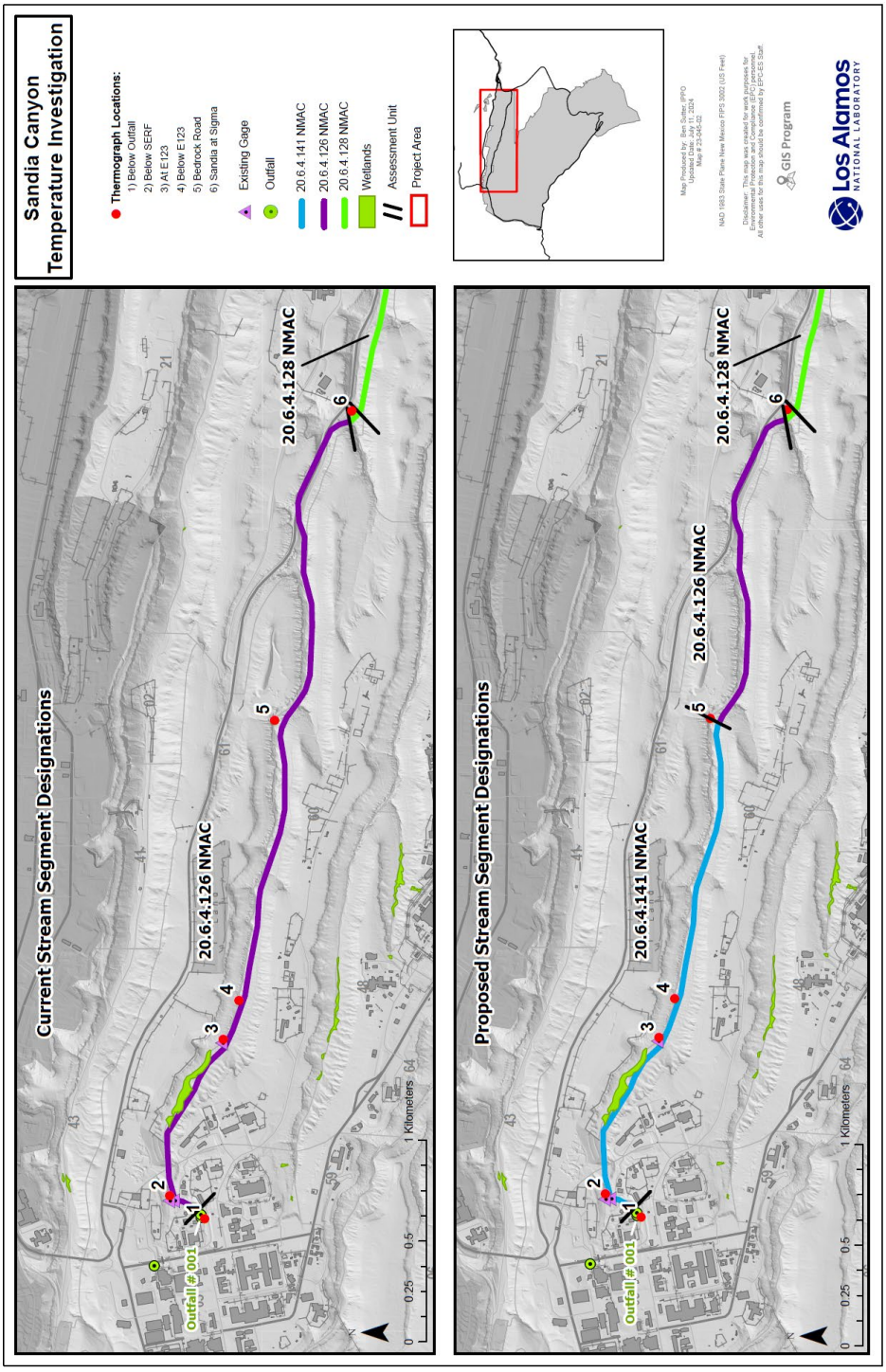


Table B1. Measured MWAT and Predicted 6T3 and TMAX Criteria Based on MWAT - (Final UAA Table 4, as updated, LANL UAA_0204).

Location	Year	Measured MWAT (°C)	Predicted 6T3 (°C)[a]	Predicted TMAX (°C)[a]	Predicted Attainable Use[c]
Sandia Canyon below Outfall 001	2014	21.44	23.48	27.81	coolwater
	2015	nd[b]	nd[b]	nd[b]	nd[b]
	2016	22.31	24.20	28.55	coolwater
	2017	20.96	22.99	27.30	coolwater
Sandia Canyon below SERF	2014	20.67	22.69	26.99	coolwater
	2015	21.20	23.24	27.56	coolwater
	2016	21.18	23.22	27.53	coolwater
	2017	20.18	22.18	26.47	coolwater
Sandia Canyon at E123	2014	20.36	22.37	26.66	coolwater
	2015	19.35	21.32	25.58	coolwater
	2016	18.61	20.56	24.79	coolwater
	2017	17.87	19.79	24.01	coolwater
Sandia Canyon below E123	2016	19.29	21.26	25.52	coolwater
	2017	18.88	20.84	25.08	coolwater
	2018	17.62	19.53	23.74	coldwater
Sandia Canyon at Bedrock Road	2018	19.19	21.16	25.41	coolwater
Sandia Canyon at Sigma Canyon	2016	17.89	19.81	24.03	coolwater
	2017	16.63	18.51	22.68	coldwater
	2018	18.05	19.98	24.20	coolwater

[a] The 6T3 and TMAX values were predicted by inputting measured MWAT into Equations 1 and 2, respectively.
[b] nd = not determined; MWAT values were not determined for Sandia Canyon below Outfall 001 in 2015 because of frequent periods of exposure of the thermograph to air, which resulted in large data gaps and uncertainty in the MWAT calculation.
[c] Predicted Attainable Use is based on predicted values for both 6T3 and TMAX criteria.