STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION OF THE UNITED STATES DEPARTMENT OF ENERGY AND LOS ALAMOS NATIONAL SECURITY, LLC FOR A GROUND WATER DISCHARGE PERMIT (DP-1132) FROM THE RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

No. GWB 17-20(P)

LOS ALAMOS NATIONAL SECURITY, LLC AND THE UNITED STATES DEPARTMENT OF ENRGY'S STATEMENT OF INTENT TO PRESENT TECHNICAL TESTIMONY

Los Alamos National Security, LLC ("LANS") and the United States Department of Energy ("DOE") (collectively "Applicants") hereby submit this Statement of Intent to Present Technical Testimony in support of the issuance of Discharge Permit 1132 at the hearing of this matter, pursuant to the Notice of Public Hearing herein and the requirements of 20.1.4.300 NMAC and 20.6.2.3110.C NMAC.

I. Identity, Qualifications, and Testimony Summaries of Applicants' Technical Witnesses

At the hearing of this matter Applicants will present the following three technical witnesses. Applicants reserve the right to present additional non-technical witnesses as part of their direct presentation, as well as technical and non-technical witnesses in rebuttal or in response to witnesses, statements or evidence of other parties or members of the public:

A. Mr. Robert S. Beers
Los Alamos National Security
PO Box 1663, MS K490
Los Alamos, New Mexico 87545

1. Summary of Mr. Beers' Qualifications and Direct Testimony

Mr. Robert Beers is currently employed as an Environmental Professional at Los Alamos National Laboratory ("LANL"), where he has been employed for approximately twenty-two years. He has broad expertise in environmental project management at LANL, including discharge permit management. Mr. Beers currently manages four discharge permits and one permit application for LANL, DP-1132. He has expertise in regulatory compliance and permit management. Mr. Beers has a Bachelor of Science degree from Cornell University and a Masters in Water Resources Administration from the University of New Mexico.

Mr. Beers' direct testimony, which includes advance written testimony submitted herewith, will cover several subject areas, and will include technical testimony. He will provide an introduction to the Radioactive Liquid Waste Treatment Facility ("RLWTF") and discuss the relevant operations at that facility, including the three discharge pathways identified in Draft DP-1132. Mr. Beers will discuss the permit application for DP-1132 and the regulatory background for issuance of the permit. He will provide an overview of the requirements of Draft DP-1132, including the discharges authorized by Draft DP-1132 and the standards applicable to the RLWTF's treated effluent. Mr. Beers will testify regarding certain particular requirements of Draft DP-1132, including requirements for the operational plan, monitoring requirements, reporting requirements, contingency plan provisions and the closure plan for the RLWTF. Mr. Beers will also provide testimony and an exhibit responding to public comments submitted by the Citizens for Clean Water in a letter dated June 5, 2017. Mr. Beers' testimony will include suggested minor changes to Draft DP-1132 via specific redlining of one of its provisions appearing in Exhibit 5 to his advance written testimony.

2. Estimated Length of Mr. Beers' Direct Testimony

It is estimated that Mr. Beers' direct testimony will last thirty (30) to forty-five (45) minutes, more or less.

B. Mr. Danny Katzman
Los Alamos National Security
PO Box 1663, MS M992
Los Alamos, New Mexico 87545

1. Summary of Mr. Katzman's Qualifications and Direct Testimony

Mr. Danny Katzman is the Technical Program Manager for the Associate Directorate for Environmental Management at LANL. He is an expert with over twenty-four years of experience in hydrogeology and environmental site investigations and remediation. Mr. Katzman has worked at LANL since 1998, where he has served as the lead scientist for LANL's Environmental Management Directorate, group leader for LANL's Environmental Investigations Group, program manager for LANL's Water Stewardship Program, project leader for the Canyons Investigations and team leader for the Canyons Investigation. Mr. Katzman received his Bachelor of Science degree in geology from the University of Texas and his Masters of Science degree, with honors, from the University of New Mexico.

Mr. Katzman's direct testimony, which includes advance written testimony submitted herewith, will provide an introduction to the hydrogeologic setting at LANL and discuss why the setting is relevant to Draft DP-1132. Mr. Katzman will describe the groundwater monitoring requirements set forth in Draft DP-1132 at each of the discharge points included in the permit, specifically at NPDES Outfall 051, the Solar Evaporation Tank ("SET"), and the Mechanical Evaporation System ("MES)". Mr. Katzman will testify about the hydrogeologic setting of the monitoring wells, the purposes for and adequacy of the monitoring wells, the quality of the monitoring wells, and the frequency and suite of monitoring. Mr. Katzman will testify regarding

Draft DP-1132's requirements and procedures for detecting and addressing any future noncompliant releases. He will also offer testimony about pre-existing conditions at LANL that are relevant to certain conditions in Draft DP-1132.

2. Estimated Length of Mr. Katzman's Direct Testimony

It is estimated that Mr. Katzman's direct testimony will last thirty (30) to forty-five (45) minutes, more or less.

C. Ms. Karen E. Armijo
National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico 87545

1. Summary of Ms. Armijo's Qualifications and Direct Testimony

Ms. Armijo is a physical scientist currently employed by the National Nuclear Security Administration. She is a technical subject matter expert for environmental management, including water resources and waste management. Ms. Armijo oversees environmental compliance programs on behalf of DOE, to include hazardous waste management and groundwater discharges, and provides contract oversight of LANS' performance on environmental compliance. Ms. Armijo has a Bachelor of Science degree from New Mexico State University in Environmental Science, with Minors in Environmental Chemistry and Waste Management, and a Masters in Environmental Policy and Management from the University of Denver.

Ms. Armijo's testimony will address certain comments received on the Draft DP-1132 regarding signage in the vicinity of the RLWTF and the staffing of LANL's Emergency Operations Center. Her testimony will explain why the proposed signage requirements of Draft DP-1132 are adequate, and why the suggestions of Communities for Clean Water regarding

signage have been resisted by Applicants and not included in Draft DP-1132. Ms. Armijo will testify as to certain DOE restrictions regarding the staffing of the EOC, and explain that offsite response interfaces present an opportunity to have tribal involvement in the delivery of emergency services that is the basic subject of Communities for Clean Water's comments regarding the staffing of the EOC.

2. Estimated Length of Ms. Armijo's Direct Testimony

It is estimated that Ms. Armijo's direct testimony will last fifteen (15) to thirty (30) minutes, more or less.

II. Materials Referenced by Applicants' Witnesses

In addition to the materials that Applicants will use as exhibits, as listed below and attached, one or more of Applicants witnesses referenced or reviewed the permit application materials that are on file with the New Mexico Environment Department, drafts of the permit that have been exchanged between Applicants and the Environment Department, letters and comments submitted to the Environment Department and made a part of the record, and the Water Quality Control Commission's regulations.

III. LANS and DOE's Hearing Exhibits

A. Mr. Beers' testimony will include presentation of the following exhibits:

1. Advance Written Testimony of Robert Beers
2. Resume of Robert Beers
3. The Community for Clean Water's ("CCW") June 5, 2017 Comment Letter
4. Sections of Los Alamos National Laboratory's NPDES Renewal Application (February 2012)

5. Response to CCW's June 5, 2017 Comment Letter (including Attachments A - E that are part of and appear at the end of the response)

6. PowerPoint Presentation, Robert Beers, Los Alamos National Security

B. Mr. Katzman's testimony will include presentation of the following exhibits:

7. Advance Written Testimony of Danny Katzman (including figures that are part of and appear at the end of his advance written testimony)

8. Resume of Danny Katzman

9. PowerPoint Presentation, Danny Katzman, Technical Program Lead

C. Ms. Armijo's testimony presentation of the following exhibits:

10. Advance Written Testimony of Karen Armijo

11. Resume of Karen Armijo

12. Communications in connection with CCW's comments regarding multi-language signage in the vicinity of the RLWTF

13. Letter from DOE to the New Mexico Environment Department dated May 20, 2015 with comments on a draft of the permit and proposed signage language

D. Yet to be identified exhibits LANS and DOE may use in rebuttal.

Respectfully submitted,

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Attorney for the U.S. Department of Energy

CERTIFICATE OF SERVICE

I hereby certify that on April 9, 2018, a copy of the foregoing "Statement of Intent to Present Technical Testimony" was hand-delivered to the following:

Pam Castaneda
Hearing Clerk
New Mexico Environment Department
1190 Saint Francis Drive, Suite S-2103
Santa Fe, NM 87502
pam.castaneda@state.nm.us

and served via electronic mail to the following:

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New Mexico Environment Department
Office of General Counsel
1190 St. Francis Drive, Suite N-4050
Santa Fe, NM 87505
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Attorney for New Mexico Environment Department, Ground Water Quality Bureau

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3600 Cerrillos Rd., Unit 1001 A
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Attorney for Communities for Clean Water

W3166903.DOCX

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION OF THE UNITED STATES DEPARTMENT OF ENERGY AND LOS ALAMOS NATIONAL SECURITY, LLC FOR A GROUND WATER DISCHARGE PERMIT (DP-1132) FOR THE RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

No. GWB 17-20(P)

PRE-FILED TECHNICAL TESTIMONY OF MR. ROBERT S. BEERS, A WITNESS ON BEHALF OF LOS ALAMOS NATIONAL SECURITY, LLC AND THE UNITED STATES DEPARTMENT OF ENERGY

I. Introduction, Experience and Education

My name is Robert S. Beers. I am currently employed by Los Alamos National Security, LLC ("LANS") as an Environmental Professional. I am offering testimony as an expert in support of the permit application submitted by the Los Alamos National Security, LLC and the U.S. Department of Energy ("DOE") (together referred to as the "Applicants") and the resulting draft discharge permit 1132 ("Draft DP-1132") for the Radioactive Liquid Waste Treatment Facility ("RLWTF") located at TA-50 within Los Alamos National Laboratory ("LANL" or "the Laboratory"). I provide this testimony in support of the New Mexico Environment Department's ("NMED") issuance of DP-1132.

I have a Bachelor of Science degree from Cornell University, Ithaca, New York. I also have a Masters in Water Resources Administration from the University of New Mexico, Albuquerque, New Mexico. I have approximately twenty two years of experience in environmental project management at LANL. While I was a Masters student at the University of New Mexico, I was employed by LANL as a Graduate Research Assistant. In this role, I

supported technical staff with Safe Drinking Water Act compliance. Upon graduation, I obtained a technical staff position at LANL. My resume is attached as LANS/DOE Exhibit 2.

I have detailed knowledge of the groundwater discharge permitting program and requirements of the New Mexico Water Quality Control Commission's ("WQCC") Ground Water Quality Regulations at 20.6.2 NMAC. My exclusive focus for approximately the last twenty years has been on groundwater discharge permits issued by NMED. In this capacity, I have supported numerous permit applications and discharge permits, including the pending permit application for the RLWTF discharges. In addition, I have been directly involved with the implementation of ground water discharge permits including compliance efforts relating to facilities and activities associated with LANL. I have been the environmental project lead for preparing the first discharge permit application for the RLWTF from 1996 until the present time.

II. Purpose of Testimony

The purpose of my testimony is to describe why the proposed Draft DP-1132 fully meets the requirements of the New Mexico Water Quality Act and New Mexico Ground Water Quality Regulations of the Water Quality Control Commission and should be approved by NMED. I will discuss the permit application and the regulatory background for issuance of the Draft DP-1132. In addition, I will explain the basic requirements of the Draft DP-1132, including the operational plan, monitoring, reporting, contingency plan and closure. Further, my testimony will address public comments received on the Draft DP-1132 and provide support for minor recommended changes to the draft. The public comments consist of thirteen points raised in a comment letter that is attached as LANS/DOE Exhibit 3.

III. Introduction to Draft DP-1132

NMED determined that the Applicants were required to submit a ground water permit application and obtain a ground water discharge permit to control the discharge, and potential release, of treated water from the RLWTF so as to protect ground water for present and potential future use as a domestic water supply or an agricultural water supply. The mission of NMED's ground water program, as mandated by 20.6.2 NMAC, is to preserve and protect groundwater in the State of New Mexico for future generations. As provided in 20.6.2.7.R NMAC a "discharge plan" means "a description of any operational, monitoring, contingency, and closure requirements and conditions for any discharge of effluent or leachate which may move directly or indirectly into groundwater." To be approved by NMED, the proposed ground water permit application and Draft DP-1132 must meet the requirements of the ground water quality regulations at 20.6.2.3109 NMAC.

The Applicants submitted an initial ground water permit application to NMED on August 19, 1996, and, at NMED's request, replaced that with a comprehensive updated permit application to NMED on February 16, 2012. Subsequently, the Applicants provided supplemental information all of which is contained in the administrative record for the Draft DP-1132. These supplements ensured that the application was up-to-date, and included plans and specifications for new or upgraded units as well as a Closure Plan.

On May 5, 2017, NMED issued a public notice to accept public comment until June 5, 2017 for the Draft DP-1132. During the public comment period, NMED received public comments and a request for public hearing from the Community for Clean Water ("CCW") dated June 5, 2017. No other public comments were filed. On September 18, 2017, the Secretary of NMED determined to grant a public hearing and the matter was docketed, and Administrative

Law Judge, Erin O. Anderson was appointed to conduct the hearing pursuant to 20.1.4.100(E)(2) NMAC. On December 15, 2017, NMED issued a Notice of Public Hearing on the matter for January 17, 2018; however, the hearing was subsequently vacated based on CCW's extension request. On February 26, 2018, the Secretary of NMED re-issued a Notice of Public Hearing to commence on April 19, 2018.

IV. Introduction to the RLWTF and the Discharges Authorized by Draft DP-1132

The RLWTF is a waste water treatment facility designed to support LANL programs by treating radioactive liquid waste waters received from technical areas throughout the Laboratory. The programs supported include fabrication of fuel for NASA to power projects such as the Mars land rover and the Pluto fly-by mission, work for the Department of Homeland Security, the creation of medical isotopes, and Department of Defense missions.

The RLWTF has an influent collection and storage system, including the Waste Management Risk Mitigation Facility ("WMRM"), a main treatment process for low-level radioactive liquid waste ("RLW"), a process for treating transuranic RLW, and a secondary treatment process for waste streams from both the low-level and transuranic processes. The low-level and transuranic RLW processes have separate collection systems, separate influent storage tanks, and separate treatment equipment. Approximately 99% of the volume of radioactive liquid waste received at the RLWTF is low-level RLW, but in contrast, up to 90% of the radioactivity (curies) is received at the RLWTF in the transuranic RLW stream.

Section V of Draft DP-1132 acknowledges these systems and authorizes the Laboratory to discharge resulting treated effluent streams. Specifically, under Section V.C, the RLWTF would be authorized to discharge up to 40,000 gallons per day. Section V.C, Authorization to Discharge, allows wastewater to be discharged to three different systems:

- to a natural gas-fired mechanical evaporator that receives treated effluent for evaporation, referred to as the Mechanical Evaporator System ("MES");
- to the synthetically lined Solar Evaporative Tank System ("SET") (also referred to as the "Zero Liquid Discharge ("ZLD") solar tanks);[1] and
- through Outfall 051 that is also the subject of a National Pollutant Discharge Elimination System Permit #NM0028355 ("NPDES Permit") issued by Region 6 of the United States Environmental Protection Agency pursuant to the federal Clean Water Act Section 402, 33 U.S.C. §1342.[2]

V. Standards Applicable to the RLWTF's Treated Effluent

The RLWTF treats the effluent to meet standards under a comprehensive and complex regulatory system. The Draft DP-1132 establishes effluent standards to ensure protection against discharges and potential releases that may reach ground water under the New Mexico Water Quality Act.

Specifically, discharges that are authorized by DP-1132 shall not exceed the effluent quality limits specified in Condition Nos. 16 (for discharges through NPDES Outfall 051) and 17 (for discharges to the MES & SET). Effluent quality limits for discharges through NPDES Outfall 051 include all water contaminants listed in 20.6.2.3103 NMAC and toxic pollutants in 20.6.2.7.WW NMAC. For those toxic pollutants without a numeric limit in 20.6.2.3103 NMAC, the limit shall be the concentration listed in Table A-1of NMED Risk Assessment Guidance for Site Investigation and Remediation. (See Table A-1 at Condition VI.D.16.c, Appendix 1).

[1] The SET was constructed in November of 2012, and the design drawings were submitted to NMED in November 2011 [AR #256]. As-built drawings were submitted in November 2012 [AR #322].

[2] Per LANL's NPDES Permit renewal application, Outfall 051 is NPDES-permitted to allow the RLWTF to "maintain capacity to discharge should the [SET] and/or [MES] become unavailable due to maintenance, malfunction, and/or there is an increase in treatment capacity caused by changes to LANL scope/mission." *See* LANS/DOE Exhibit 4, Form 2C, pp. 5, 7, 2012 NPDES Permit Re-Application, Outfall 051, RWLTF, LA-UR-12-00359 (Feb. 2012).

Under Permit Condition VI.A.17, the effluent quality limits for treated discharges to the MES and SET differ from the limits required for treated discharges through NPDES Outfall 051 (Condition VI.A.16). The rationale for establishing different standards for discharges through NPDES Outfall 051, as compared to discharges to MES/SET, is grounded in the difference in potential risk to impact groundwater. The discharges authorized through Outfall 051 consist of treated effluent released directly into Effluent Canyon, which is a tributary to Mortandad Canyon. Unlike the treated effluent to the MES and SET, discharges of treated effluent from Outfall 051 reach surface waters and indirectly, have the potential to impact groundwater. Discharges from Outfall 051 must also be treated to meet the federal Clean Water Act NPDES Permit.

Discharges of treated effluent to the MES and SET are into evaporative tank units, and per NMED, require a discharge plan due to the potential for effluent from the RLWTF to move indirectly into ground water within the meaning of 20.6.2.3104 NMAC. Per Permit Condition VI.A.17, discharges to the MES and SET shall not exceed the numeric limits in 20.6.2.3103 NMAC for general inorganics, metals, Ra-226+228, and Nitrate (as N), and perchlorate with the following exception:

- The numeric limits for Barium, Chromium, Copper, and Silver shall be the less stringent federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs) in lieu of the 20.6.2.3103 NMAC standards.

In other words, for certain constituents where MCLs are less stringent than the 20.6.2.3103 NMAC standards, the MCLs are the applicable effluent limit for discharges to the MES and SET. For discharges through Outfall 051, however, where more stringent standards exist under 20.6.2.3103, those standards apply rather than the less stringent MCLs. This makes

logical sense given that Draft DP 1132 discharges authorized through Outfall 051 are discharges that would be directly to the ground, as opposed to being discharges to evaporative tank units.

VI. The Basic Elements and Key Requirements of Draft DP-1132

Draft Discharge Permit DP-1132 is structured around four foundational elements that are relied upon to ensure protection of groundwater and compliance with regulatory requirements. Each of these foundational elements is briefly discussed below:

A. Operational Plan

The Operational Plan in Section VI.A of Draft DP-1132 contains 21 conditions with specific requirements for the operation and maintenance of those units identified in the permit. For example, Condition VI.A.8 requires certain prescribed testing of, and demonstrations for, various systems intended to convey, store, treat or dispose of liquid or semi-liquid waste streams to ensure they are not leaking, and Condition VI.A.9 details corrective actions to be taken to repair or permanently cease operation of a system in the event successful demonstrations cannot be made. Conditions VI.A.16 and .17 of the Operational plan detail the effluent limitations already discussed for discharges to the MES and the SET, and discharges through Outfall 051.

In addition, the Operational Plan conditions dictate many other aspects of operations such as annual update requirements (Condition VI.A.1), communicating with and obtaining NMED approval for proposed changes to the existing facility (Conditions VI.A.2 through .4), entry restrictions and signage (Conditions VI.A.5 and .6), secondary containment verifications and certifications of leak detection systems (Condition VI.A.7), inspection, maintenance, measurement, containment and calibration requirements (Conditions VI.A.10 through .15, .21 and .22), and corrective action and emergency response procedures and personnel qualifications requirements (Conditions VI.A.18 through .20).

B. Monitoring and Reporting

The Monitoring and Reporting requirements in Section VI.B of Draft DP-1132 prescribe in detail how data on both volume and water quality are collected and reported to NMED. Approved methodologies for conducting sampling and analysis are set forth in Condition VI.B.23. Data collected is reported to the NMED quarterly, including daily volume data on low-level radioactive and TRU influent waste water as well as treated water discharged to the SET, MES and Outfall 051 (Conditions VI.B.24 through .27 and .32). Current written or electronic waste-tracking information must be maintained for NMED inspection, upon request (Condition VI.B.28). Sampling and analyses are required to determine the water quality of treated water discharged to the SET, MES, and Outfall 051. (Condition VI.B.29). A soil moisture monitoring system of monitoring boreholes is required before LANS may use the two double-lined tank cells of the SET in order to detect any leak, and notification and corrective action steps are prescribed in the event one is detected. (Conditions VI.B.30 and .31).

Several conditions address monitoring well replacements, construction, quarterly monitoring and analyses, a process for reporting any newly detected ground water quality exceedances associated with the defined systems in the permit, and a prescribed process for investigating and developing and implementing a work plan for abatement. (Conditions VI.B.32 through .37). The monitoring wells and associated activities addressed by these conditions are addressed more fully in the technical testimony of Danny Katzman.

C. Contingency Plans

Contingency plans to mitigate damages, provide notifications and take corrective actions in the event of any spill or unauthorized release are prescribed in detail by requirements in Section VI.C of Draft DP-1132. In the event of a spill or release not authorized by the permit,

DOE/LANS must notify NMED within 24-hrs, and following this initial notification, DOE/LANS must submit both 7-day and 15-day corrective action plans to address the failure, and those must be implemented according to schedules upon approval by NMED. (Condition VI.C.38). DOE/LANS is not thereby relieved of other aspects of NMED's ground water protection program, and in the event any unauthorized discharge causes or may with reasonable probability cause water pollution in excess of abatement standards under 20.6.2.4103 NMAC, abatement to those standards may be required, and in certain instances may require permit modifications to achieve compliance with the ground water protection program it administers. (Conditions VI.C.38 and .39).

D. Closure

The closure requirements for specific units that are to cease being used after the issuance of Draft DP-1132, as well as at final closure and post-closure monitoring are set forth in Section VI.D of the permit. Condition VI.D.40 prescribes units which are to be permanently removed from service within 60 days of the effective date of the permit. Specific requirements for managing units and systems that will be permanently removed from service are comprised of a two-step process: (1) stabilization of the unit to render it inoperable and remove any potential discharge to the environment; and (2) closure of the unit in accordance with the Closure Plan attached to Draft DP-1132. (Conditions VI.D.41 and .42).

The elements of the Closure Plan are specifically dictated by subparagraphs a through k of Condition VI.D.42 in Draft DP-1132. The following figure briefly identifies those specific requirements and shows what sections of the Closure Plan address the requirements of the permit condition:

Figure 1
DP-1132 Requirements in the RLWTF Closure Plan

Requirement	DP-1132	Closure Plan
Description of how each unit and system at the facility will be closed	C42.a	4.1
Actions to be taken to decommission, demolish, and remove each unit, system, and other structure	C42.b	4.1.9 4.2.3
Actions and controls that will be implemented during closure to prevent the release of water contaminants into the environment	C42.c	5.1
Methods to be used for decontamination of the site and decontamination of equipment used during closure	C42.d	4.1.5 5.3
Actions that will be taken to reclaim the site	C42.e	5.4
Monitoring, maintenance and repair, and controls that will be implemented after closure	C42.f	5.5
Ground water monitoring plan that to detect water contaminants that might move directly or indirectly into ground water after closure	C42.g	5.5
Methods that will be used to characterize all wastes generated during closure	C42.h	5.7
Actions that will be taken to investigate and characterize the potential impact to soil and groundwater from the facility, system, or individual unit	C42.i	3.1 5.2
Methods that will be used to remove, transport, treat, recycle, and dispose of all wastes generated during closure	C42.j	5.8
Detailed schedule for closure and removal of units and systems	C42.k	5.9

VII. Overview of Groundwater Protection and Regulatory Compliance

To ensure protection of groundwater and compliance with WQCC regulations, multiple lines of defense are deployed. Draft DP-1132 adopts this strategy by establishing requirements across the following three fronts: effluent quality monitoring, controls to prevent unplanned releases, and groundwater quality monitoring. Each is addressed briefly below:

A. Effluent quality monitoring. This is the first line of defense against groundwater contamination. Draft DP-1132 achieves that goal by requiring monthly or quarterly monitoring of effluent discharged to the MES, SET or Outfall 051 for all contaminants listed in 20.6.2.3103 NMAC and all Toxic Pollutants defined in 20.6.2.7WW NMAC. These conditions are found at Conditions VI.A.16 and .17.

B. Controls to prevent unplanned releases. These are the second line of defense and are achieved through the Draft DP-1132. Examples of these are as follows:

1. requirements for secondary containment of all units and systems intended to convey, store, treat or dispose of an untreated liquid or semi-liquid waste stream. (Condition VI.A.3.j);
2. verification of secondary containment to ensure it is properly working (Condition VI.A.4);
3. water tightness testing of lines without secondary containment (Condition VI.A.8);
4. routine facility inspections (Condition VI.A.11);
5. freeboard maintenance at the SET (Condition VI.A.15);
6. operator certification (Condition VI.A.19);
7. soil moisture monitoring system at the SET (Condition VI.B.30); and
8. 24-hr reporting of damage to structural integrity (Condition VI.A.14).

C. Groundwater Quality Monitoring. The final line of defense for protection of the environment is groundwater quality monitoring. Section VI.B of Draft DP-1132 contains a system of monitoring at alluvial, perched/intermediate, and regional aquifer

groundwater monitoring wells. These monitoring systems are addressed more fully in the technical testimony offered by Danny Katzman.

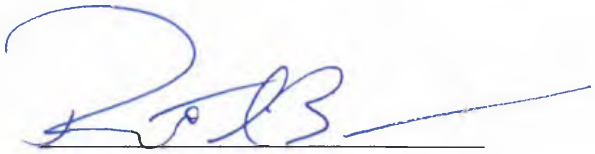
VIII. Draft DP-1132 Comments and Proposed Changes

During the public comment period that ensued following NMED's public notice on May 5, 2017, NMED received public comments from the Citizens for Clean Water ("CCW") in a letter dated June 5, 2017. The letter made 13 numbered comments. Attached as LANS/DOE Exhibit 5 is Applicants' item by item response to each of the 13 comments, and to the extent Applicants believe the comments warrant minor changes to the wording of Draft DP-1132, LANS/DOE Exhibit 5 includes a redline of permit language that it would find acceptable as a change in the final permit.

IX. Opinion Relating to Approval of Draft DP-1132

In my opinion, the Applicants' permit application should be approved and Draft DP-1132 should be issued with the minor changes as proposed in LANS/DOE Exhibit 5. Draft DP-1132 will meet all requirements of the WQCC groundwater regulations and authorized discharges will be fully protective of groundwater quality.

This concludes my testimony.



Robert S. Beers

ROBERT S. BEERS

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EXPERIENCE

ENVIRONMENTAL PROFESSIONAL 4, LOS ALAMOS NATIONAL SECURITY, LLC
MAY 1995--PRESENT

Responsible for preparing and managing NMED discharge permit applications for LANL.

GRADUATE RESEARCH ASSISTANT, LOS ALAMOS NATIOANL LABORATORY
NOVEMBER 1993 TO MAY 1995

Supported LANL technical staff with Safe Drinking Water Act (SDWA) compliance.

EDUCATION

CORNELL UNIVERSITY, ITHACA, NY
B.S. BIOLOGY, 1977

UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, NM
MASTERS IN WATER RESOURCES ADMINISTRATION, 1994

EMPLOYMENT HISTORY

BRENNER COMPANY, PROJECT MANAGER, SANTA FE, NM
1989-1992

RS BEERS CUSTOM BUILDERS, LICENSED RESIDENTIAL CONTRACTOR, SANTA FE
1982-1989

RIO GRANDE SCHOOL, TEACHER, 5TH & 6TH GRADE, SANTA FE
1977-1982

Communities for Clean Water

June 5, 2017

Ms. Kathryn Hayden, Environmental Scientist
Ground Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502-5469
By email to: Kathryn.Hayden@state.nm.us
cc: Michelle.Hunter@state.nm.us

RE: Comments and hearing request on DP-1132

Dear Ms. Hayden:

As you know, Communities for Clean Water ("CCW") has been actively participating in the process of arriving at a valid and protective permit for the Radioactive Liquid Waste Treatment Facility ("RLWTF") at the Los Alamos National Laboratory ("LANL") since December 2013. *See* comment letters and requests for hearing provided in PDF along with this letter.[1] A description of each constituent organization of CCW has been provided in the initial comment letters, and that information is incorporated herein by reference.[2] Despite significant good faith participation in an attempt to arrive at a final permit that our constituent organizations and members are satisfied is adequate to assure public health, safety, and protection of the environment, a number of unresolved issues remain upon which a hearing is requested. In this regard, we refer you to the comments and hearing requests we have incorporated herein by reference which we also identify by attachment number and filing date in the list below. This list shows remaining issues along with our suggestion for potential resolution, which could obviate a hearing. Pursuant to 74-6-5(G) NMSA 1978 and 20.6.2.3108(K) NMAC, we request a public hearing on these issues:

1. CCW has contended since its initial comments that the RLWTF, as, in LANL's words, "a zero liquid discharge" facility, is not properly regulated under the New Mexico Water Quality Act and implementing regulations. *See* **Attachment 15**, CCW Letter to

[1] *See generally* **Attachments 1 to 15** which detail the resolved and continuing issues that CCW has with DP-1132.

[2] Membership in CCW's constituent organizations totals approximately 4,000 people who live downwind and downstream of the emissions from operations at LANL.

NMED re DP-1132 (January 13, 2017); see also **Attachments 1, 2**, and **14a,** Comments and Requests for Hearing Letter to NMED re DP-1132 (December 6, 2013); Comments and Requests for Hearing to NMED re DP-1132 (December 12, 2013);[3] Cover letter, exhibit list, and petition to rescind NPDES permit for the RLWTF (June 17, 2016). CCW requests a hearing on this issue. CCW notes that it may not be necessary to hold a hearing if the Environment Department specifically stipulates in writing on the record that: (a) the RLWTF has not made any discharges since at least late 2011; (b) the RLWTF is a "zero liquid discharge" facility and no liquid discharges are anticipated from this facility; (c) the new RLWTF Low-Level Radioactive Waste Water ("RLW") Treatment System facility adjacent to the current RLWTF will likewise be a "zero liquid discharge facility"; and (d) once operating, no liquid discharges are anticipated to take place from the new RLWTF RLW facility.[4]

2. It is objectionable to have a permit apply to "subsequent replacement systems," which have not undergone the required public notice, comment and hearing under the Resource Conservation and Recovery Act ("RCRA") and the New Mexico Hazardous Waste Act ("NMHWA"). The new RLW facility, absent an exemption from RCRA/NMHWA, is subject to the NMED facility-wide hazardous waste permit for LANL. NMED notes that LANL constructs the building at its own risk. *See* **Attachment 16**, NMED letter to LANL (October 3, 2014). According to the letter, LANL submitted plans and specifications to NMED for review. NMED did not provide written approval. NMED made no comment regarding "the adequacy of the design, compliance with applicable State, Federal, local statute, code and requirements." Furthermore, there was no permit then in place for the new facility, nor would one be effective as there was not (and is no) discharge planned. Thus, NMED had no authority to review the "subsequent replacement systems" plans and specifications. DP-1132 Condition 3 requires "prior written approval by NMED" before implementing "any expansion, process modification, or alternation of a system or unit that could constitute a discharge permit modification (as defined in 20.6.2.7.P NMAC) of the intended function, design or capacity of any of the systems, units or components of the Facility's collection, treatment or disposal systems." Building a new facility would require a Class 3 permit modification under RCRA/NMHWA and requires advance public notice, comments and public hearing on request. A non-discharging facility that is not subject to a National Pollutant Discharge Elimination System ("NPDES") permit is covered under the RCRA/NMHWA permit.

[3] Voluminous documents already in the possession of NMED that were referenced in the January 13, 2017 letter have been omitted from the attached PDF here.

[4] DP-1132 strains to justify a discharge permit ("DP") for a non-discharging facility, incorporating, e.g., elastic "discharge" definition, false "findings" that the facility is discharging, needless "authorization to discharge." *See generally* the issue and documents referenced above.

3. During discussions of DP-1132, LANL committed to working with CCW members to produce multi-language signage warning people to keep out of areas downstream of the RLWTF, but LANL has had no subsequent communication with CCW regarding the signage, despite the fact that CCW submitted draft copies of such signs. *See* **Attachment 7** (copy of email with attached copies of proposed signage).

4. Based upon discussions of DP-1132, LANL needs to include representatives of potentially affected Pueblos in emergency incident planning and provide designated seats within the LANL Emergency Operations Center for Pueblo representatives during preparation drills and actual emergencies.

5. Despite CCW's provision of information concerning current standard industry practices for calibration and sensitivity of monitoring equipment, DP-1132 fails to require monitoring equipment accurate to current industry standards.

6. Despite discussions and provisions of ample documentation on this issue, DP-1132 allows groundwater monitoring to be conducted with defective shallow, intermediate and regional wells.

7. In the final version of DP-1132, at LANL's request, NMED unilaterally changed the time for posting its submittals to NMED to the LANL Electronic Public Reading Room from seven (7) days to thirty (30) days. LANL's change effectively eliminates public notice about the 30-day comment period. *See* Condition 42 (Closure Plan Amendments and Modifications). Moreover, the DP allows public review and comment on proposed amendments to the closure plan "30 days after the submittal." This means the public will likely only learn of a comment opportunity after it expires. *See* DP-1132 Condition 42.

8. The DP-1132 Closure Plan fails to state that closure and post-closure care will take place under the NMED Hazardous Waste Permit for LANL. *See* Sec. VII.A.2 of the 2016 NMED Consent Order for LANL (requiring this)**.**

9. Even if closure would take place under the Consent Order, closure is deferred and there is no proposed schedule provided in the DP-1132 Closure Plan.

10. The DP-1132 Closure Plan is limited to the low-level radioactive liquid waste treatment facility. LANL omitted to provide closure plans for the transuranic treatment facilities, component systems and "replacement" facilities.

11. The DP-1132 Closure Plan provides no performance standards that LANL must meet in order for NMED to assess whether LANL has met the standards so as to warrant closure. For example, it appears that underground pipe sections may be left in

place, yet there is no justification provided for doing so, and no basis provided for assessing the safety of such a decision. *See* Attachment 14b (performance standards).

12. The DP-1132 Closure Plan provides limited provisions for ground water monitoring; significantly, there is continued reliance on defective wells for monitoring purposes as noted above in ¶ 6.

13. The DP-1132 Closure Plan does not include required continued monitoring, sampling and reporting of contaminants of concern, e.g., perchlorates and radionuclides.

The above listed issues include (1) violations of federal and state law; (2) matters of public health and safety in the operation and ultimate clean-up of the RLWTF and any new "replacement" facilities built to handle the functions of the RLWTF after closure; and (3) inadequate public notice likely violating due process through a denuded posting submittal requirement for the LANL's Electronic Public Reading Room. Resolution of these issues is of substantial interest to the interested members of the public represented by Communities for Clean Water. For that reason, we request a public hearing on all of the above listed unresolved issues.

Sincerely,

Communities for Clean Water

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LIST OF ATTACHMENTS

Attachment 1 CCW-TWU-Comments & Hrg Request DP-1132 RLWTF 2013-12-06

Attachment 2 DP1132 Comments Tewa Women and CCW 2013-12-12

Attachment 3 CCW Gilkeson & Sanchez Response to LANL DP1132 Comments 2014-01-26

Attachment 4 CCW RLWTF Comments 2014-10-24

Attachment 5 Rev1 CCW RLWTF Comments 2014-10-27

Attachment 6 CCW Gilkeson Sanchez Remaining Issues 2014-12-03

Attachment 7 Email with attachments re signage 2014-12-08

Attachment 8 CCW Ltr to NMED 2015-06-01

Attachment 9 Email string CCW NMED LANL re delayed postings to EPRR 2015-06-08

Attachment 10 Email plus CCW re 8-31- S Draft DP-1132 and LANL GW report 2015-09-14

Attachment 11 CCW DP-1132 memo to NMED 2015-09-14

Attachment 12 CCW DP-1132 comments 2015-11-23

Attachment 13 CCW Comments DP-1132 draft 2016-08-29

Attachment 14a CCNS Ltr to Region 6-Ex List-Petition to Rescind RLWTF NPDES 8-29-16

Attachment 14b Ex. B to CCW 8-29 Comments - Closure Performance Standards 8-29-16

Attachment 14c Ex. C to CCW 8-29 Comments-Mtg Note DP-1132 Closure Plan 2016-08-30

Attachment 15 CCW Comments to NMED re DP-1132 2017-01-13

Attachment 16 NMED Ltr LANL re RLWTF-Upgrade Plan Plans & Specs 2014-10-3

DISCHARGE RATE AND FREQUENCY

The average daily flow rates for the sources that discharge to Outfall 051 are provided in Table 6.

Table 6
Source Flow Rates/Frequencies to Outfall 051

Operation/Source	Average Flow (Gallon/Day)	Treatment Code
RLWTF	19,700	1G, 1O, 1S, 1Q, 1R 1U, 2J, 1F, 2K, 2C, 5Q, 5U

SAMPLING AND ANALYSIS FOR RE-APPLICATION

The RLWTF has not discharged to Outfall 051 since November 2010. LANL requests to re-permit the outfall so that the RLWTF can maintain the capability to discharge to the outfall should the Mechanical Evaporator and/or Zero Liquid Discharge (ZLD) Solar Evaporation Tanks become unavailable due to maintenance, malfunction, and/or there is an increase in treatment capacity caused by changes in LANL scope/mission.

A grab sample for the Form 2C Constituents will be collected for Outfall 051 when/if the RWLTF discharges effluent through the outfall. See the attached Discharge Monitoring Report Outfall Summary for the analytical data collected prior to November 2010.

ANALYTICAL RESULTS PROVIDED

- NPDES Discharge Monitoring Reports (DMRs) from August 2007 – December 2011.
- Material Safety Data Sheets for treatment chemicals.

ADDITIONAL INFORMATION

- Latitude – 35°51'54"
- Longitude – 106°17'54"

Form 2C Section IV.B - Improvements

ZERO LIQUID DISCHARGE (ZLD) PROJECT

The configuration of the RLWTF and Outfall 051 will be changing in the next 5 years due to the construction of two new Concrete Evaporation Tanks at Technical Area (TA) 52 under the Zero Liquid Discharge (ZLD) Project. These evaporation tanks will receive treated effluent from the RLWTF and will reduce the volume of treated effluent discharged to Outfall 051. The evaporation tanks will be connected to the RLWTF by a transfer pipe line that will be approximately 0.75 miles long. Figures 2 and 3 provide copies of the 90% review design drawings for the transfer line and evaporation tanks.

Department of Energy/ Los Alamos National Security's Preliminary Response To The Communities for Clean Water's Public Comments Dated June 5, 2017

This document contains the U.S. Department of Energy and Los Alamos National Security, LLC ("Applicants") preliminary responses to the Communities for Clean Water ("CCW") public comment letter dated June 5, 2017 on Draft DP-1132.[1] The numbered paragraphs presented below in italics are verbatim restatements of CCW's comments, and following each is the Applicants' preliminary responses. The Applicants reserve the right to further address these comments throughout this public hearing process, including in direct and rebuttal testimony, through cross-examination of witnesses, in the context of any motions or objections, and in post-hearing submissions.

1. *CCW has contended since its initial comments that the RLWTF, as, in LANL's words, "a zero liquid discharge" facility, is not properly regulated under the New Mexico Water Quality Act and implementing regulations. See Attachment 15, CCW Letter NMED re DP-1132 (January 13, 2017); see also Attachments 1, 2, and 14a, Comments and Requests for Hearing Letter to NMED re DP-1132 (December 6, 2013); Comments and Requests for Hearing to NMED re DP-1132 (December 12, 2013); Cover letter, exhibit list, and petition to rescind NPDES permit for the RLWTF (June 17, 2016). CCW requests a hearing on this issue. CCW notes that it may not be necessary to hold a hearing if the Environment Department specifically stipulates in writing on the record that: (a) the RLWTF has not made any discharges since at least late 2011; (b) the RLWTF is a "zero liquid discharge" facility and no liquid discharges are anticipated from this facility; (c) the new RLWTF Low-Level Radioactive Waste Water ("RLW") Treatment System facility adjacent to the current RLWTF will likewise be a "zero liquid discharge facility"; and (d) once operating, no liquid discharges are anticipated to take place from the new RLWTF RLW facility.*

CCW's position is legally and factually unfounded. CCW argues that the RLWTF is "not properly regulated under the New Mexico Water Quality Act," citing letters suggesting that the RLWTF does not "discharge" and should be regulated under RCRA. As an initial matter, any argument that the RLWTF is a facility that should be regulated under RCRA is completely outside the scope of this discharge permit proceeding and has no bearing on the Laboratory's compliance with the WQCC's regulations and the Water Quality Act.

Moreover, the position that the RLWTF does not or will not "discharge" is incorrect. Section V.C of Draft DP-1132, Authorization to Discharge, allows wastewater to be discharged to three different systems: the MES, the SET and Outfall 051. The MES is a natural gas-fired mechanical evaporator. The SET—a two-cell, synthetically lined tank constructed in 2012—is sometimes referred to as a Zero Liquid Discharge ("ZLD") solar evaporation tank. Outfall 051 is an outfall from a pipe system directly to Effluent Canyon.

[1] CCW also filed comments dated January 13, 2017 regarding a draft DP-1132 dated November 15, 2016. Although this draft is not the subject of this proceeding, the comments are legal in nature and are referenced in CCW's June 5, 2017 comments.

CCW's position is premised on mistaken or outdated facts. Neither NMED under the express terms of Draft DP1132, nor the Applicants, contemplate that discharges will not occur from Outfall 051. To the contrary, they contemplate that discharges would be authorized "through an outfall (identified as Outfall 051) also regulated by [NPDES Permit No. NM0028355] issued by [EPA]." *See* Section V.C. of Draft DP-1132. Per LANL's NPDES Permit renewal application, Outfall 051 is NPDES-permitted to allow the RLWTF to "maintain capacity to discharge should the [SET] and/or [MES] become unavailable due to maintenance, malfunction, and/or there is an increase in treatment capacity caused by changes to LANL scope/mission." *See* LANS/DOE Exhibit 4, Form 2C, pp. 5, 7, 2012 NPDES Permit Re-Application, Outfall 051, RWLTF, LA-UR-12-00359 (Feb. 2012). The intention that LANL be allowed to discharge is underscored by Condition VI.C.8 in Draft DP-1132, which would require water tightness testing within 180 days of the effective date of the permit for the conveyance to Outfall 051. This is an action the Applicants will perform, because they have an intention to convey treated effluent from the RLWTF through Outfall 051 to Effluent Canyon as needed to meet operational and maintenance requirements. *See* Affidavit of Robert C. Mason, attached to Applicants' April 2, 2018 Response to CCW's Motion to Dismiss DP-1132 Proceeding.

Even apart from CCW's factually erroneous conflation of the "Zero Liquid Discharge" SET facility with the MES and Outfall 051, CCW unreasonably disregards how Draft DP-1132 and NMED's ground water program regulations use the term "discharge." "Discharge" is defined in Section II.G of Draft DP-1132 to include the "intentional *or unintentional* release of an effluent or leachate which has the *potential* to move directly or indirectly into ground water." (Emphases added). Accordingly, even if the intended discharges authorized by Draft DP-1132 "through Outfall 051" to Effluent Canyon were disregarded, and only the discharges to the MES and SET evaporator systems were to be considered, CCW's position is still flawed, because it is the "potential" for a discharge to get to ground water that matters, regardless of intent.

This regulatory approach is acknowledged as being correct both by the express terms of the Water Quality Act ("WQA") and case law interpreting that Act. The WQA fundamentally defines a "source" to mean "a building, structure, facility or installation from which there is *or may be*, a discharge of water contaminants directly *or indirectly* into water." 1978 NMSA, §74-6-2(L) (emphases added). In turn, the WQA defines a "water contaminant" to mean "any substance that could alter if discharged *or spilled* the physical, chemical, biological or radiological qualities of water." 1978 NMSA, §74-6-2(B) (emphasis added). These central building blocks of the WQA are worded in a way that clearly reflects a legislative intent not to construe the concept of regulated discharges under the Act as narrowly as CCW proposes.

The notion that NMED's regulatory permitting authority under the groundwater protection program only arises if and when there is an *actual* release, as CCW appears to argue, is fundamentally contrary to the central objective of the WQA to *prevent*—and not just *abate* after the fact—groundwater degradation. *See Bokum Resources Corp. v. New Mexico Water Quality Control Comm'n*, 93 N.M. 546, 555, 603 P.2d 285, 284 (1979). If the WQCC intended only to permit facilities once those potential sources *actually* release water contaminants, then its groundwater permitting program would be rendered superfluous, and the separate abatement program adopted by the WQCC and administered by NMED would be all that is needed.

NMED has understood the fundamental groundwater protection and prevention mandate of the WQCC for decades, and has pursued its groundwater protection program under the WQA accordingly. The GWQB's permitting files are replete with examples of groundwater discharge permits issued by NMED under the WQA where the coverage of the permit includes, in whole or part, facilities involving water that is conveyed or stored in man-made systems such as pipelines, tanks or lined ponds and other structures, facilities or installations. In very many of these examples, the company to which the permit has been issued may believe and/or intend that no groundwater will ever actually receive or otherwise be impacted by its facilities as a result of water and contaminant control practices. A conclusion by the GWQB that NMED has no authority to issue a discharge permit for the RLWTF would undermine a substantial portion of the GWQB's permitting program and place in doubt many long-standing permits issued or renewed to manufacturing, mining and other important potential sources for the preventative protection of New Mexico's groundwater resources.

Moreover, the future policy implications of adopting CCW's narrow interpretation of NMED's groundwater permitting authority would be troubling. It is ironic that the groups comprising CCW—concerned, as they laudably are, with environmental protection—would choose to advance such a narrow interpretation of NMED's permitting authority under the WQA. The fact that CCW would advance such a narrow position underscores that it is simply a position of convenience given its positions regarding the hazardous waste permitting regimes, which are beyond the scope of this discharge permit proceeding, and which therefore are clearly addressed to the wrong forum, as already stated.

Additionally, as the CCW comment suggests, CCW may seek to use the permitting proceedings on Draft DP-1132 as a forum in which to argue that the NPDES Permit issued by the EPA to LANS and DOE under the CWA for Outfall 051 relating to the RLWTF should be terminated or rescinded. If CCW attempted to do so, however, it would be wholly inappropriate, as CCW can only pursue—and indeed has pursued—the position administratively with the agency having primacy over NPDES permitting, which is the EPA.

In fact, EPA rejected a similar argument raised by Concerned Citizens for Nuclear Safety ("CCNS") in an action whereby CCNS requested termination of LANL's RLWTF NPDES Permit. In that action, CCNS requested that EPA "terminate" LANL's NPDES Permit on the basis that the RLWTF was a "zero discharge facility." According to CCNS, the facility was outside of EPA's jurisdiction to regulate under the NPDES permit program, and EPA should instead regulate the RLWTF as a RCRA facility. EPA flatly rejected CCNS' arguments. In EPA's final decision, the Agency stated that the NPDES permit coverage applied to the facility's requested NPDES coverage for *possible* discharges, and "*whether or not issuance of NPDES permit coverage might trigger RCRA's [Waste Water Treatment Unit] exemption has no bearing on EPA's NPDES permitting decisions, which must be based on the requirements of the CWA and implementing regulations*." *See* Letter from the Region 6, EPA's Water Division Director to Mr. Lindsey Lovejoy and Mr. Jonathan Block, CCNS dated August 16, 2017 (Attachment A). CCW's position that the RLWTF is not "properly regulated" under the New Mexico Water Quality Act and implementing regulations ignores the plain language of the WQCC regulations that a discharge permit is required for discharges that "may move directly or indirectly into

ground water," *see* 20.6.2.3104 NMAC, and the established purpose of the WQA to prevent ground water degradation. *See Bokum Resources*, 93 N.M. at 555, 603 P.2d at 284.

2. *It is objectionable to have a permit apply to "subsequent replacement systems," which have not undergone the required public notice, comment and hearing under the Resource Conservation and Recovery Act ("RCRA") and the New Mexico Hazardous Waste Act ("NMHWA"). The new RLW facility, absent an exemption from RCRA/NMHWA, is subject to the NMED facility-wide hazardous waste permit for LANL. NMED notes that LANL constructs the building at its own risk. See Attachment 16, NMED letter to LANL (October 3, 2014). According to the letter, LANL submitted plans and specifications to NMED for review. NMED did not provide written approval. NMED made no comment regarding "the adequacy of the design, compliance with applicable State, Federal, local statute, code and requirements." Furthermore, there was no permit then in place for the new facility, nor would one be effective as there was not (and is no) discharge planned. Thus, NMED had no authority to review the "subsequent replacement systems" plans and specifications. DP-1132 Condition 3 requires "prior written approval by NMED" before implementing "any expansion, process modification, or alternation of a system or unit that could constitute a discharge permit modification (as defined in 20.6.2.7.P NMAC) of the intended function, design or capacity of any of the systems, units or components of the Facility's collection, treatment or disposal systems." Building a new facility would require a Class 3 permit modification under RCRA/NMHWA and requires advance public notice, comments and public hearing on request. A non-discharging facility that is not subject to a National Pollutant Discharge Elimination System ("NPDES") permit is covered under the RCRA/NMHWA permit.*

This comment makes arguments pertaining to RCRA and the Hazardous Waste Act that have no relevance whatsoever to this discharge permit hearing, and it seeks to obfuscate and confuse matters by implying that NMED in the October 3, 2014 letter declined to give any indication of approval to the plans and specifications for the RLWTF upgrade project that is the subject of the comment. The letter, however, explicitly states that NMED reviewed the plans and specifications "for compliance with basic elements necessary for protection of groundwater quality," and found that they were "generally appropriate, and include adequate safeguards to protect groundwater quality including secondary containment, structural integrity, capacities, appropriate materials, and leak detection systems." (AR #485; Bates Nos. 12780-12781). CCW's assertions that in the letter NMED "did not provide written approval" and "made no comment regarding 'the adequacy of the design, compliance with applicable State, Federal, local statute, code and requirements'" therefore is completely misleading in that it intentionally confuses and conflates building code compliance reviews, which are not within NMED's province, with review to assess adequacy for groundwater protection, which is within NMED's purview and in fact was performed based on the express statements in the letter.

3. *During discussions of DP-1132, LANL committed to working with CCW members to produce multi-language signage warning people to keep out of areas downstream of the RLWTF, but LANL has had no subsequent communication with CCW regarding the signage, despite the fact that CCW submitted draft copies of such*

signs. See copy of e-mail with attached copies of proposed signage.

This comment and the referenced e-mail is sufficiently addressed by the testimony of Karen Armijo for the Applicants. Her testimony supports that CCW's recommended signage was carefully considered but rejected based upon the fact that the required language would not translate appropriately and the RLWTF facility is interior to LANL property and does not share a boundary with San Ildefonso lands. CCW received notice of the rejection, so the assertion that there was no subsequent communication in the comment is not correct.

4. *Based upon discussions of DP-1132, LANL needs to include representatives of potentially affected Pueblos in emergency incident planning and provide designated seats within the LANL Emergency Operations Center for Pueblo representatives during preparation drills and actual emergencies.*

This comment is also addressed by the testimony of Karen Armijo for the Applicants. Her testimony supports that a DOE order in effect precludes non-LANL personnel from having a direct role in the Emergency Operations Center, but that the same order includes requirements of offsite response interfaces with local, state, tribal and federal organizations responsible for emergency response sufficient to satisfy the thrust of CCW's comment and the requirements of Draft DP-1132.

5. *Despite CCW's provision of information concerning current standard industry practices for calibration and sensitivity of monitoring equipment, DP-1132 fails to require monitoring equipment accurate to current industry standards.*

CCW does not identify what "information" it provided concerning current standard industry practice for calibration and sensitivity of monitoring equipment, nor does it explain or present facts that address why, as alleged, Draft DP-1132 fails to require "monitoring equipment accurate to current industry standards." In addition, CCW does not identify a change to any conditions in the Draft DP-1132. As an initial matter, for these reasons alone, CCW's generalized comment does not warrant any change to the Draft DP-1132.

Applicants will assume, however, that the "monitoring equipment" CCW refers to addresses "flow meters" and that the "information" it provided refers to a written submittal dated December 3, 2014 (AR No. 539, Attachment 6, Comment No. 12, page 7 to CCW's June 5, 2016). For the reasons stated below, CCW's position is technically unwarranted and does not support a change to Permit Condition VI.A.22.

Permit Condition – Calibration of Flow Meters

Draft DP-1132 Condition VI.A.22 requires that flow meters for the effluent lines to the SET, MES and Outfall 051 "shall be calibrated to within *plus or minus 5 percent* of actual flow, as measured under field conditions." The same Condition provides that the influent line to the RLWTF "shall be calibrated to within *plus or minus 10 percent of actual flow, as measured under field conditions*" (emphasis added).

Discussion

In the December 2014 submittal, CCW disagreed with the requirement in the Draft DP-1132 for calibrating flow meters, stating:

> "ISO 17025-certified meters can achieve +/- 0.05 percent accuracy."
>
> and:
>
> "[M]easuring uncertainties of +/- 0.1% of rate are achievable with modern flowmeters." Jerry Stevens & Jason Pennington, "Flowmeter Calibration, Proving, & Verification Ensuring the accuracy & repeatability of your flow measurements (September 26, 2010). Online at:http://www.flowcontrolnetwork.com/articles/calibration-proving-verification
>
> and:
>
> "Additionally, it is important to note that the ISO/TEC 17025 General Requirements are the doormat for competent testing and calibration laboratories, so one would expect that LANL observe these standards in calibration and measurement."
>
> AR No. 539 at 7.

CCW's technical position outlined in the December 2014 written submittal is flawed for multiple reasons.

First, Applicants were unable to locate the referenced 2010 report "*Flowmeter Calibration, Proving, & Verification Ensuring the Accuracy & Repeatability of Your Flow Meters*" purported to exist at the URL address above. In addition, Applicants were unable to locate any report written by the above-mentioned authors.

Second, CCW misrepresents the ISO/IEC 17025 standard as suggesting it is applicable to the RLWTF or flow meter accuracy rates. Instead, the referenced ISO/IEC standard applies to calibration laboratories and not production or treatment facilities like the RLWTF (see Attachment B, International Standard, ISO/IEC 17025:2005). Additionally, review of the referenced ISO/IEC standard reveals that it does not address flow meter accuracy nor contain any references to measuring achievable percentages such as +/- 0.05%.

Third, Contrary to CCW's assertion, the calibration of flow meters identified in Condition VI.A.22 is technically supportable and based on current industry standards. The EPA standard for flowmeter accuracy is ±10%: "*If the permittee's flow measurement system is accurate within ±10 percent, the inspector should use the installed system.*" *See* Attachment C (excerpt from the NPDES Inspection Compliance Manual, Chapter 6, Section B, "Flow Measurement Compliance, p.122). Consistent with this, the Laboratory's NPDES Permit states:

> "Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of

measuring flows with a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes." *See* Attachment D (excerpt from NPDES Permit No. NM0028355, Part III, "Standard Conditions for NPDES Permits," Condition C.6).

The NMED WQCC regulations have no numerical requirement for calibration accuracy and do not define calibration. The only reference in WQCC regulations to "calibration" is as follows: "The permittee shall retain records of all monitoring information, including… the calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation." *See* 20.6.2.5341.K(2)(a) NMAC. At a recent hearing regarding changes to WQCC regulations applicable to the dairy industry, however, the WQCC adopted NMED's proposal that all flow measurement devices be calibrated in-place, under actual operating conditions (field calibration) to within ±10% of the actual flow. At the 2010 WQCC hearing on the Dairy Rule, Mr. Robert George of NMED-GWQB relied on an exhibit regarding "Flow Meter Calibration" in testifying that "NMED has proposed that all flow measurement devices be calibrated in-place, under actual operating conditions (field calibration) to within ±10% of the actual flow." See Attachment E, which is an excerpt from Ashcraft Exhibit 6 from the Dairy Rule hearing in 2010.

In summary, the calibration accuracy for inflow and effluent flowmeters required under Condition VI.A.22 is consistent with what is required by the EPA and the NMED, and CCW has not demonstrated that this standard should be changed.

6. *Despite discussions and provisions of ample documentation on this issue, DP-1132 allows groundwater monitoring to be conducted with defective shallow, intermediate and regional wells.*

This comment is unfounded and is sufficiently addressed by the testimony of Danny Katzman for the Applicants. Groundwater monitoring will occur at four existing regional wells, an intermediate groundwater monitoring well, and two new alluvial wells. All existing groundwater monitoring wells have been constructed in accordance with NMED construction and design guidelines, and the two new alluvial groundwater monitoring wells required by the draft discharge permit are subject to approval by NMED, and will be constructed in accordance with NMED's guidelines.

7. *In the final version of DP-1132, at LANL's request, NMED unilaterally changed the time for posting its submittals to NMED to the LANL Electronic Public Reading Room from seven (7) days to thirty (30) days. LANL's change effectively eliminates public notice about the 30-day comment period. See Condition 42 (Closure Plan Amendments and Modifications). Moreover, the DP allows public review and comment on proposed amendments to the closure plan "30 days after the submittal." This means the public will likely only learn of a comment opportunity after it expires. See DP-1132 Condition 42.*

Based upon this comment, which the Applicants assume to be directed at Condition VI.E.49, DOE/LANS proposes a minor change to Condition VI.E.49 by changing the first sentence of that Condition as shown below:

Commencing on the Effective Date of this Discharge Permit the permittees shall, within thirty~~seven~~ business days of submittal to NMED, post on LANL's Electronic Public Reading Room located at http//eprr.lanl.gov/oppie/service (or as updated) the following submittals to NMED.

8. *The DP-1132 Closure Plan fails to state that closure and post-closure care will take place under the NMED Hazardous Waste Permit for LANL. See Sec. VII.A.2 of the 2016 NMED Consent Order for LANL (requiring this).*

CCW's position is factually and legally unfounded. The Draft DP-1132 does not "fail" to state that closure or post-closure will take place under a different regulatory framework, *e.g.*, the LANL Hazardous Waste Facility Permit. Draft DP-1132 *explicitly* addresses closure requirements for each "unit and system" at the RLWTF under Permit Condition 42, *Closure Plan*, and in the attached "Closure Plan." Permit Section 46, *Integration with the Consent Order*, states that the investigation, characterization, clean up and corrective action requirements for potential media from "solid waste management units" and "areas of concern" associated with the facility are regulated under the June 2016 Consent Order on Consent ("Consent Order") (https://www.env.nm.gov/wp-content/uploads/2015/12/LANL_Consent_Order_FINAL.pdf). This condition further states that "no activities required under [DP-1132] shall conflict with or duplicate activities for SWMUs and AOCs identified under the Consent Order (see Permit Condition 46).

There is no basis to conclude that the RLWTF closure must take place under LANL Hazardous Waste Facility Permit or that the Consent Order "requires" this. The RLWTF "units and systems" must be closed under Draft DP-1132 per the requirements of the ground water quality regulations. Further, Section VII.A.2 of the Consent Order does not, as stated by CCW require the RLWTF to be closed under that document. The Consent Order, Section VII.A.2 states:

> VII. RELATIONSHIP TO PERMITS
>
> NMED has determined that all corrective action for releases of hazardous waste or hazardous constituents at the Facility, required by Sections 3004(u) and (v) and 3008(h) of 24 RCRA, 42 U.S.C. §§ 6924(u) and (v) and 6928(h), and Sections 74-4-4(A)(5)(h) and (i) and 74-4-4.2(B) of the HWA, shall be conducted solely under this Consent Order and *not* under the current or any future Hazardous Waste Facility Permit ("Permit"), *with the exception* of the following five items which will be addressed in the Permit and not in this Consent Order:
>
> ***
>
> 2) The *closure and post-closure care requirements* of 20.4.1.500 NMAC (incorporating 40 C.F.R, Part 264, Subpart G), as they apply to *hazardous waste management units* at the Facility.

In a September 11, 2014 letter to the Ground Water Quality Bureau, the Applicants identified six SWMUs and AOCs at the RLWTF that are regulated under the Consent Order which will establish priorities for characterization, cleanup, and closure of SWMUs and AOCs (see AR #477 and DP-1132, Closure Plan). There are four non-SWMU/AOCs units that are not regulated under the Consent Order, including the Mechanical Evaporator System ("MES"), the Solar Evaporative Tank System ("SET"), the Waste Mitigation and Risk Management Tanks ("MMRM"), and the Bottoms Disposal Tanks. These four units must meet the closure requirements under Draft DP-1132.

The Consent Order does not state, as CCW alleges, that the RLWTF must be "closed" under the LANL Permit. Instead, the Consent Order requires hazardous waste management units ("HWMUs") to meet the closure and post-closure requirements under the LANL Hazardous Waste Facility Permit. Attachment J of the LANL Hazardous Waste Facility Permit identifies the specific HWMUs required to meet closure and post-closure care under that Permit (https://hwbdocuments.env.nm.gov/Los%20Alamos%20National%20Labs/TA%2054/38365/Attachment%20J_February_2018.pdf). The RLWTF is not a HWMU identified in Attachment J to the LANL Hazardous Waste Facility Permit.

9. *Even if closure would take place under the Consent Order, closure is deferred and there is no proposed schedule provided in the DP-1132 Closure Plan.*

For the reasons stated above in Comment No. 8, CCW is incorrect in stating that "even if closure would take place under the consent order *** there is no proposed schedule provided in the DP-1132 Closure Plan." The Closure Plan, Section 5.9 provides a closure schedule including projected timetables and estimated durations for completing the various closure steps. In addition, Draft DP-1132 Permit Condition 43 requires the Permittees to notify NMED at least 120 days prior to initiation of closure activities and to continue ground-water monitoring.

10. *The DP-1132 Closure Plan is limited to the low-level radioactive liquid waste treatment facility. LANL omitted to provide closure plans for the transuranic treatment facilities, component systems and "replacement" facilities.*

CCW is incorrect in stating that the Draft DP-1132 Closure Plan omitted to provide closure for transuranic treatment facilities, component systems and "replacement" facilities. The July 2016 Closure Plan explicitly addresses closure of the transuranic RLW treatment systems under Section 2.3, Section 3, and Section 4.2.2 of the Closure Plan. In addition, "if a replacement facility component is put into operation (e.g., the new low-level treatment facility), then the Closure Plan will be revised to include the replacement facility, then submitted to the Ground Water Bureau for approval." Closure Plan, Section 3.2, *Closure Approach*. Permit Condition 42 also provides that "changes that would affect the implementation of the Closure Plan" must be submitted to NMED for approval and allows for public comment regarding modified or amended closure plans prior to approval.

11. *The DP-1132 Closure Plan provides no performance standards that LANL must meet in order for NMED to assess whether LANL has met the standards so as to warrant closure. For example, it appears that underground pipe sections may be left in place,*

yet there is no justification provided for doing so, and no basis provided for assessing the safety of such a decision. See Attachment 14b (performance standards).

CCW is incorrect in stating that the Draft DP-1132 Closure Plan provides "no performance standards that LANL must meet in order for NMED to assess" whether LANL has "met standards so as to warrant closure." The New Mexico Ground Water Quality Regulations establish performance standards for closure plans stating the "a closure plan to *prevent the exceedance of standards at 20.6.2.3103 NMAC or the presence of a toxic pollutant in ground water after the cessation of operations which include a description of the closure measures, maintenance and monitoring plans… and other measures necessary to prevent or abate such contamination....*" 20.6.2.3107.A.11.

The Draft DP-1132 Closure Plan integrates these requirements as necessary to ensure that the performance standard (above) is achieved. The Closure Plan, establishes an approach that addresses removal of containers, structural assessments, removal of solids and liquids, decontamination, *removal of piping*, removal of units and associated components (Sections 3 and 4.1). In addition, Section 5 establishes requirements for site investigation and characterization, decontamination methods, post-closure monitoring, ground water monitoring, characterization and disposition of wastes and final closure. Finally, CCW's example concluding that underground piping may be "left in place … without justification" is vague and unclear, and not supported by facts.

12. The DP-1132 Closure Plan provides limited provisions for ground water monitoring; significantly, there is continued reliance on defective wells for monitoring purposes as noted above in ¶ 6.

This comment is sufficiently addressed by the testimony of Danny Katzman for the Applicants. As stated above, all existing groundwater monitoring wells have been constructed in accordance with NMED construction and design guidelines, and the two new alluvial groundwater monitoring wells required by the draft discharge permit are subject to approval by NMED, and will be constructed in accordance with NMED's guidelines.

13. The DP-1132 Closure Plan does not include required continued monitoring, sampling and reporting of contaminants of concern, e.g., perchlorates and radionuclides.

CCW is incorrect in stating that the Closure Plan does not include required monitoring, sampling and reporting of contaminants of concern. As set forth in the Closure Plan, Section 5.6, post-closure groundwater monitoring will be conducted at the same wells as used for operational monitoring and will focus on contaminants that were associated with the RLWTF and that have the potential to migrate to groundwater (e.g., nitrate, perchlorate, and fluoride). In the event that groundwater contaminants associated with operations conducted at the RLWTF under the discharge permit are detected in any of the wells, an assessment of the condition would be performed and mitigation may be conducted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733

August 16, 2017

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Douglas Meiklejohn, Jaimie Park,
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RE: Request to Terminate NPDES Permit #NM0028355 as to Outfall #051
for Radioactive Liquid Waste Treatment Facility

Dear Mr. Lovejoy and Mr. Jantz:

This letter is in response to the above-referenced request to terminate permit coverage, which was filed pursuant to 40 C.F.R. § 124.5 with the Acting Regional Administrator of EPA Region 6 (Region 6) by Concerned Citizens for Nuclear Safely (CCNS) on March 9, 2017 ("Request to Terminate"). CCNS asks the Region to terminate permit coverage for Outfall 051 under NPDES Permit #NM0028355, issued in 2014 to Los Alamos National Security, LLC (LANS) and the Department of Energy (DOE) as co-permittees for the Los Alamos National Laboratory facility located at Los Alamos, NM (LANL). The permit authorizes LANL to discharge from eleven sanitary and/or industrial outfalls, including a discharge of treated radioactive liquid waste from the Radioactive Liquid Waste Treatment Facility (RLWTF) through Outfall 051 into Mortandad Canyon.

CCNS argues that because LANL's RLWTF facility was redesigned as a zero discharge facility in the early 2000's and has not discharged since 2010, Outfall 051 does not require NPDES permit coverage, and that in fact issuing such coverage is outside the jurisdiction of EPA pursuant to federal court rulings in *National Pork Producers Council v. EPA*, 635 F.3d 738 (5th Cir. 2011)("*National Pork Producers*") and *Waterkeeper Alliance, Inc. v. EPA*, 399 F.3d 486 (2d Cir. 2005)("*Waterkeeper*"). CCNS further argues that NPDES coverage for Outfall 051 is improper because it makes LANL's RSWTF eligible for a Waste Water Treatment Unit (WWTU) regulatory exemption under the Resource Conservation and Recovery Act (RCRA) despite no actual Clean Water Act (CWA) discharges.

Region 6 does not agree with CCNS's arguments and has determined not to unilaterally propose termination of LANL's NPDES permit coverage for Outfall 051. Under 40 C.F.R. § 124.5(b), if the Regional Administrator decides a request to terminate NPDES permit coverage filed by an interested party is not justified, the Regional Administrator must send the requester "a brief written response giving a reason for the decision." Accordingly, Region 6 provides the following response.

U1701300

LANS/DOE Exhibit 5 - Attachment A

has authority under CWA § 402 (a) to issue a permit authorizing the discharge of pollutants should one occur. Otherwise, the CWA's requirement that facilities obtain NPDES permit coverage **prior to discharge** would be impossible for the agency to implement.

As to CCNS's argument that LANL's NPDES permit for discharges from Outfall 051 should be terminated because the NPDES permit coverage allows LANL to obtain a Waste Water Treatment Unit (WWTU) regulatory exemption under the Resource Conservation and Recovery Act (RCRA), Region 6 has determined this argument to be outside the scope of our decision. Whether or not issuance of NPDES permit coverage might trigger the RCRA WWTU regulatory exemption has no bearing on EPA's NPDES permitting decisions, which must be based on the requirements of the CWA and implementing regulations.

For the above reasons, Region 6 has determined CCNS's Request to Terminate LANL's NPDES permit coverage for Outfall 051 under NPDES Permit No. NM0028355 is not justified. Should you have any question regarding this matter, please contact Ms. Stacey Dwyer of my staff at (214) 665-6729, or Renea Ryland at (214) 665 -2130.

Sincerely,

WK Honker

William K. Honker, P.E.
Director
Water Division

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U1701300

INTERNATIONAL STANDARD

ISO/IEC 17025

Second edition
2005-05-15

General requirements for the competence of testing and calibration laboratories

Exigences générales concernant la compétence des laboratoires d'étalonnages et d'essais

LANS/DOE Exhibit 5 - Attachment B

Reference number
ISO/IEC 17025:2005(E)

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Contents

Page

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of conformity assessment, the ISO Committee on conformity assessment (CASCO) is responsible for the development of International Standards and Guides.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

Draft International Standards are circulated to the national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 17025 was prepared by the *ISO Committee on conformity assessment* (CASCO).

It was circulated for voting to the national bodies of both ISO and IEC, and was approved by both organizations.

This second edition cancels and replaces the first edition (ISO/IEC 17025:1999), which has been technically revised.

Introduction

The first edition (1999) of this International Standard was produced as the result of extensive experience in the implementation of ISO/IEC Guide 25 and EN 45001, both of which it replaced. It contained all of the requirements that testing and calibration laboratories have to meet if they wish to demonstrate that they operate a management system, are technically competent, and are able to generate technically valid results.

The first edition referred to ISO 9001:1994 and ISO 9002:1994. These standards have been superseded by ISO 9001:2000, which made an alignment of ISO/IEC 17025 necessary. In this second edition, clauses have been amended or added only when considered necessary in the light of ISO 9001:2000.

Accreditation bodies that recognize the competence of testing and calibration laboratories should use this International Standard as the basis for their accreditation. Clause 4 specifies the requirements for sound management. Clause 5 specifies the requirements for technical competence for the type of tests and/or calibrations the laboratory undertakes.

Growth in the use of management systems generally has increased the need to ensure that laboratories which form part of larger organizations or offer other services can operate to a quality management system that is seen as compliant with ISO 9001 as well as with this International Standard. Care has been taken, therefore, to incorporate all those requirements of ISO 9001 that are relevant to the scope of testing and calibration services that are covered by the laboratory's management system.

Testing and calibration laboratories that comply with this International Standard will therefore also operate in accordance with ISO 9001.

Conformity of the quality management system within which the laboratory operates to the requirements of ISO 9001 does not of itself demonstrate the competence of the laboratory to produce technically valid data and results. Nor does demonstrated conformity to this International Standard imply conformity of the quality management system within which the laboratory operates to all the requirements of ISO 9001.

The acceptance of testing and calibration results between countries should be facilitated if laboratories comply with this International Standard and if they obtain accreditation from bodies which have entered into mutual recognition agreements with equivalent bodies in other countries using this International Standard.

The use of this International Standard will facilitate cooperation between laboratories and other bodies, and assist in the exchange of information and experience, and in the harmonization of standards and procedures.

General requirements for the competence of testing and calibration laboratories

1 Scope

1.1 This International Standard specifies the general requirements for the competence to carry out tests and/or calibrations, including sampling. It covers testing and calibration performed using standard methods, non-standard methods, and laboratory-developed methods.

1.2 This International Standard is applicable to all organizations performing tests and/or calibrations. These include, for example, first-, second- and third-party laboratories, and laboratories where testing and/or calibration forms part of inspection and product certification.

This International Standard is applicable to all laboratories regardless of the number of personnel or the extent of the scope of testing and/or calibration activities. When a laboratory does not undertake one or more of the activities covered by this International Standard, such as sampling and the design/development of new methods, the requirements of those clauses do not apply.

1.3 The notes given provide clarification of the text, examples and guidance. They do not contain requirements and do not form an integral part of this International Standard.

1.4 This International Standard is for use by laboratories in developing their management system for quality, administrative and technical operations. Laboratory customers, regulatory authorities and accreditation bodies may also use it in confirming or recognizing the competence of laboratories. This International Standard is not intended to be used as the basis for certification of laboratories.

NOTE 1 The term 'management system' in this International Standard means the quality, administrative and technical systems that govern the operations of a laboratory.

NOTE 2 Certification of a management system is sometimes also called registration.

1.5 Compliance with regulatory and safety requirements on the operation of laboratories is not covered by this International Standard.

1.6 If testing and calibration laboratories comply with the requirements of this International Standard, they will operate a quality management system for their testing and calibration activities that also meets the principles of ISO 9001. Annex A provides nominal cross-references between this International Standard and ISO 9001. This International Standard covers technical competence requirements that are not covered by ISO 9001.

NOTE 1 It might be necessary to explain or interpret certain requirements in this International Standard to ensure that the requirements are applied in a consistent manner. Guidance for establishing applications for specific fields, especially for accreditation bodies (see ISO/IEC 17011) is given in Annex B.

NOTE 2 If a laboratory wishes accreditation for part or all of its testing and calibration activities, it should select an accreditation body that operates in accordance with ISO/IEC 17011.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 17000, *Conformity assessment — Vocabulary and general principles*

VIM, *International vocabulary of basic and general terms in metrology*, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML

NOTE Further related standards, guides, etc. on subjects included in this International Standard are given in the Bibliography.

3 Terms and definitions

For the purposes of this document, the relevant terms and definitions given in ISO/IEC 17000 and VIM apply.

NOTE General definitions related to quality are given in ISO 9000, whereas ISO/IEC 17000 gives definitions specifically related to certification and laboratory accreditation. Where different definitions are given in ISO 9000, the definitions in ISO/IEC 17000 and VIM are preferred.

4 Management requirements

4.1 Organization

4.1.1 The laboratory or the organization of which it is part shall be an entity that can be held legally responsible.

4.1.2 It is the responsibility of the laboratory to carry out its testing and calibration activities in such a way as to meet the requirements of this International Standard and to satisfy the needs of the customer, the regulatory authorities or organizations providing recognition.

4.1.3 The management system shall cover work carried out in the laboratory's permanent facilities, at sites away from its permanent facilities, or in associated temporary or mobile facilities.

4.1.4 If the laboratory is part of an organization performing activities other than testing and/or calibration, the responsibilities of key personnel in the organization that have an involvement or influence on the testing and/or calibration activities of the laboratory shall be defined in order to identify potential conflicts of interest.

NOTE 1 Where a laboratory is part of a larger organization, the organizational arrangements should be such that departments having conflicting interests, such as production, commercial marketing or financing do not adversely influence the laboratory's compliance with the requirements of this International Standard.

NOTE 2 If the laboratory wishes to be recognized as a third-party laboratory, it should be able to demonstrate that it is impartial and that it and its personnel are free from any undue commercial, financial and other pressures which might influence their technical judgement. The third-party testing or calibration laboratory should not engage in any activities that may endanger the trust in its independence of judgement and integrity in relation to its testing or calibration activities.

4.1.5 The laboratory shall

a) have managerial and technical personnel who, irrespective of other responsibilities, have the authority and resources needed to carry out their duties, including the implementation, maintenance and improvement of the management system, and to identify the occurrence of departures from the management system or from the procedures for performing tests and/or calibrations, and to initiate actions to prevent or minimize such departures (see also 5.2);

b) have arrangements to ensure that its management and personnel are free from any undue internal and external commercial, financial and other pressures and influences that may adversely affect the quality of their work;

c) have policies and procedures to ensure the protection of its customers' confidential information and proprietary rights, including procedures for protecting the electronic storage and transmission of results;

d) have policies and procedures to avoid involvement in any activities that would diminish confidence in its competence, impartiality, judgement or operational integrity;

e) define the organization and management structure of the laboratory, its place in any parent organization, and the relationships between quality management, technical operations and support services;

f) specify the responsibility, authority and interrelationships of all personnel who manage, perform or verify work affecting the quality of the tests and/or calibrations;

g) provide adequate supervision of testing and calibration staff, including trainees, by persons familiar with methods and procedures, purpose of each test and/or calibration, and with the assessment of the test or calibration results;

h) have technical management which has overall responsibility for the technical operations and the provision of the resources needed to ensure the required quality of laboratory operations;

i) appoint a member of staff as quality manager (however named) who, irrespective of other duties and responsibilities, shall have defined responsibility and authority for ensuring that the management system related to quality is implemented and followed at all times; the quality manager shall have direct access to the highest level of management at which decisions are made on laboratory policy or resources;

j) appoint deputies for key managerial personnel (see Note);

k) ensure that its personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the objectives of the management system.

NOTE Individuals may have more than one function and it may be impractical to appoint deputies for every function.

4.1.6 Top management shall ensure that appropriate communication processes are established within the laboratory and that communication takes place regarding the effectiveness of the management system.

4.2 Management system

4.2.1 The laboratory shall establish, implement and maintain a management system appropriate to the scope of its activities. The laboratory shall document its policies, systems, programmes, procedures and instructions to the extent necessary to assure the quality of the test and/or calibration results. The system's documentation shall be communicated to, understood by, available to, and implemented by the appropriate personnel.

4.2.2 The laboratory's management system policies related to quality, including a quality policy statement, shall be defined in a quality manual (however named). The overall objectives shall be established, and shall be reviewed during management review. The quality policy statement shall be issued under the authority of top management. It shall include at least the following:

a) the laboratory management's commitment to good professional practice and to the quality of its testing and calibration in servicing its customers;

b) the management's statement of the laboratory's standard of service;

c) the purpose of the management system related to quality;

d) a requirement that all personnel concerned with testing and calibration activities within the laboratory familiarize themselves with the quality documentation and implement the policies and procedures in their work; and

e) the laboratory management's commitment to comply with this International Standard and to continually improve the effectiveness of the management system.

NOTE The quality policy statement should be concise and may include the requirement that tests and/or calibrations shall always be carried out in accordance with stated methods and customers' requirements. When the test and/or calibration laboratory is part of a larger organization, some quality policy elements may be in other documents.

4.2.3 Top management shall provide evidence of commitment to the development and implementation of the management system and to continually improving its effectiveness.

4.2.4 Top management shall communicate to the organization the importance of meeting customer requirements as well as statutory and regulatory requirements.

4.2.5 The quality manual shall include or make reference to the supporting procedures including technical procedures. It shall outline the structure of the documentation used in the management system.

4.2.6 The roles and responsibilities of technical management and the quality manager, including their responsibility for ensuring compliance with this International Standard, shall be defined in the quality manual.

4.2.7 Top management shall ensure that the integrity of the management system is maintained when changes to the management system are planned and implemented.

4.3 Document control

4.3.1 General

The laboratory shall establish and maintain procedures to control all documents that form part of its management system (internally generated or from external sources), such as regulations, standards, other normative documents, test and/or calibration methods, as well as drawings, software, specifications, instructions and manuals.

NOTE 1 In this context "document" could be policy statements, procedures, specifications, calibration tables, charts, text books, posters, notices, memoranda, software, drawings, plans, etc. These may be on various media, whether hard copy or electronic, and they may be digital, analog, photographic or written.

NOTE 2 The control of data related to testing and calibration is covered in 5.4.7. The control of records is covered in 4.13.

4.3.2 Document approval and issue

4.3.2.1 All documents issued to personnel in the laboratory as part of the management system shall be reviewed and approved for use by authorized personnel prior to issue. A master list or an equivalent document control procedure identifying the current revision status and distribution of documents in the management system shall be established and shall be readily available to preclude the use of invalid and/or obsolete documents.

4.3.2.2 The procedure(s) adopted shall ensure that:

a) authorized editions of appropriate documents are available at all locations where operations essential to the effective functioning of the laboratory are performed;

b) documents are periodically reviewed and, where necessary, revised to ensure continuing suitability and compliance with applicable requirements;

c) invalid or obsolete documents are promptly removed from all points of issue or use, or otherwise assured against unintended use;

d) obsolete documents retained for either legal or knowledge preservation purposes are suitably marked.

4.3.2.3 Management system documents generated by the laboratory shall be uniquely identified. Such identification shall include the date of issue and/or revision identification, page numbering, the total number of pages or a mark to signify the end of the document, and the issuing authority(ies).

4.3.3 Document changes

4.3.3.1 Changes to documents shall be reviewed and approved by the same function that performed the original review unless specifically designated otherwise. The designated personnel shall have access to pertinent background information upon which to base their review and approval.

4.3.3.2 Where practicable, the altered or new text shall be identified in the document or the appropriate attachments.

4.3.3.3 If the laboratory's document control system allows for the amendment of documents by hand pending the re-issue of the documents, the procedures and authorities for such amendments shall be defined. Amendments shall be clearly marked, initialled and dated. A revised document shall be formally re-issued as soon as practicable.

4.3.3.4 Procedures shall be established to describe how changes in documents maintained in computerized systems are made and controlled.

4.4 Review of requests, tenders and contracts

4.4.1 The laboratory shall establish and maintain procedures for the review of requests, tenders and contracts. The policies and procedures for these reviews leading to a contract for testing and/or calibration shall ensure that:

a) the requirements, including the methods to be used, are adequately defined, documented and understood (see 5.4.2);

b) the laboratory has the capability and resources to meet the requirements;

c) the appropriate test and/or calibration method is selected and is capable of meeting the customers' requirements (see 5.4.2).

Any differences between the request or tender and the contract shall be resolved before any work commences. Each contract shall be acceptable both to the laboratory and the customer.

NOTE 1 The request, tender and contract review should be conducted in a practical and efficient manner, and the effect of financial, legal and time schedule aspects should be taken into account. For internal customers, reviews of requests, tenders and contracts can be performed in a simplified way.

NOTE 2 The review of capability should establish that the laboratory possesses the necessary physical, personnel and information resources, and that the laboratory's personnel have the skills and expertise necessary for the performance of the tests and/or calibrations in question. The review may also encompass results of earlier participation in interlaboratory comparisons or proficiency testing and/or the running of trial test or calibration programmes using samples or items of known value in order to determine uncertainties of measurement, limits of detection, confidence limits, etc.

NOTE 3 A contract may be any written or oral agreement to provide a customer with testing and/or calibration services.

4.4.2 Records of reviews, including any significant changes, shall be maintained. Records shall also be maintained of pertinent discussions with a customer relating to the customer's requirements or the results of the work during the period of execution of the contract.

NOTE For review of routine and other simple tasks, the date and the identification (e.g. the initials) of the person in the laboratory responsible for carrying out the contracted work are considered adequate. For repetitive routine tasks, the review need be made only at the initial enquiry stage or on granting of the contract for on-going routine work performed under a general agreement with the customer, provided that the customer's requirements remain unchanged. For new, complex or advanced testing and/or calibration tasks, a more comprehensive record should be maintained.

4.4.3 The review shall also cover any work that is subcontracted by the laboratory.

4.4.4 The customer shall be informed of any deviation from the contract.

4.4.5 If a contract needs to be amended after work has commenced, the same contract review process shall be repeated and any amendments shall be communicated to all affected personnel.

4.5 Subcontracting of tests and calibrations

4.5.1 When a laboratory subcontracts work, whether because of unforeseen reasons (e.g. workload, need for further expertise or temporary incapacity) or on a continuing basis (e.g. through permanent subcontracting, agency or franchising arrangements), this work shall be placed with a competent subcontractor. A competent subcontractor is one that, for example, complies with this International Standard for the work in question.

4.5.2 The laboratory shall advise the customer of the arrangement in writing and, when appropriate, gain the approval of the customer, preferably in writing.

4.5.3 The laboratory is responsible to the customer for the subcontractor's work, except in the case where the customer or a regulatory authority specifies which subcontractor is to be used.

4.5.4 The laboratory shall maintain a register of all subcontractors that it uses for tests and/or calibrations and a record of the evidence of compliance with this International Standard for the work in question.

4.6 Purchasing services and supplies

4.6.1 The laboratory shall have a policy and procedure(s) for the selection and purchasing of services and supplies it uses that affect the quality of the tests and/or calibrations. Procedures shall exist for the purchase, reception and storage of reagents and laboratory consumable materials relevant for the tests and calibrations.

4.6.2 The laboratory shall ensure that purchased supplies and reagents and consumable materials that affect the quality of tests and/or calibrations are not used until they have been inspected or otherwise verified as complying with standard specifications or requirements defined in the methods for the tests and/or calibrations concerned. These services and supplies used shall comply with specified requirements. Records of actions taken to check compliance shall be maintained.

4.6.3 Purchasing documents for items affecting the quality of laboratory output shall contain data describing the services and supplies ordered. These purchasing documents shall be reviewed and approved for technical content prior to release.

NOTE The description may include type, class, grade, precise identification, specifications, drawings, inspection instructions, other technical data including approval of test results, the quality required and the management system standard under which they were made.

4.6.4 The laboratory shall evaluate suppliers of critical consumables, supplies and services which affect the quality of testing and calibration, and shall maintain records of these evaluations and list those approved.

4.7 Service to the customer

4.7.1 The laboratory shall be willing to cooperate with customers or their representatives in clarifying the customer's request and in monitoring the laboratory's performance in relation to the work performed, provided that the laboratory ensures confidentiality to other customers.

NOTE 1 Such cooperation may include:

a) providing the customer or the customer's representative reasonable access to relevant areas of the laboratory for the witnessing of tests and/or calibrations performed for the customer;

b) preparation, packaging, and dispatch of test and/or calibration items needed by the customer for verification purposes.

NOTE 2 Customers value the maintenance of good communication, advice and guidance in technical matters, and opinions and interpretations based on results. Communication with the customer, especially in large assignments, should be maintained throughout the work. The laboratory should inform the customer of any delays or major deviations in the performance of the tests and/or calibrations.

4.7.2 The laboratory shall seek feedback, both positive and negative, from its customers. The feedback shall be used and analysed to improve the management system, testing and calibration activities and customer service.

NOTE Examples of the types of feedback include customer satisfaction surveys and review of test or calibration reports with customers.

4.8 Complaints

The laboratory shall have a policy and procedure for the resolution of complaints received from customers or other parties. Records shall be maintained of all complaints and of the investigations and corrective actions taken by the laboratory (see also 4.11).

4.9 Control of nonconforming testing and/or calibration work

4.9.1 The laboratory shall have a policy and procedures that shall be implemented when any aspect of its testing and/or calibration work, or the results of this work, do not conform to its own procedures or the agreed requirements of the customer. The policy and procedures shall ensure that:

a) the responsibilities and authorities for the management of nonconforming work are designated and actions (including halting of work and withholding of test reports and calibration certificates, as necessary) are defined and taken when nonconforming work is identified;

b) an evaluation of the significance of the nonconforming work is made;

c) correction is taken immediately, together with any decision about the acceptability of the nonconforming work;

d) where necessary, the customer is notified and work is recalled;

e) the responsibility for authorizing the resumption of work is defined.

NOTE Identification of nonconforming work or problems with the management system or with testing and/or calibration activities can occur at various places within the management system and technical operations. Examples are customer complaints, quality control, instrument calibration, checking of consumable materials, staff observations or supervision, test report and calibration certificate checking, management reviews and internal or external audits.

4.9.2 Where the evaluation indicates that the nonconforming work could recur or that there is doubt about the compliance of the laboratory's operations with its own policies and procedures, the corrective action procedures given in 4.11 shall be promptly followed.

4.10 Improvement

The laboratory shall continually improve the effectiveness of its management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review.

4.11 Corrective action

4.11.1 General

The laboratory shall establish a policy and a procedure and shall designate appropriate authorities for implementing corrective action when nonconforming work or departures from the policies and procedures in the management system or technical operations have been identified.

NOTE A problem with the management system or with the technical operations of the laboratory may be identified through a variety of activities, such as control of nonconforming work, internal or external audits, management reviews, feedback from customers and from staff observations.

4.11.2 Cause analysis

The procedure for corrective action shall start with an investigation to determine the root cause(s) of the problem.

NOTE Cause analysis is the key and sometimes the most difficult part in the corrective action procedure. Often the root cause is not obvious and thus a careful analysis of all potential causes of the problem is required. Potential causes could include customer requirements, the samples, sample specifications, methods and procedures, staff skills and training, consumables, or equipment and its calibration.

4.11.3 Selection and implementation of corrective actions

Where corrective action is needed, the laboratory shall identify potential corrective actions. It shall select and implement the action(s) most likely to eliminate the problem and to prevent recurrence.

Corrective actions shall be to a degree appropriate to the magnitude and the risk of the problem.

The laboratory shall document and implement any required changes resulting from corrective action investigations.

4.11.4 Monitoring of corrective actions

The laboratory shall monitor the results to ensure that the corrective actions taken have been effective.

4.11.5 Additional audits

Where the identification of nonconformities or departures casts doubts on the laboratory's compliance with its own policies and procedures, or on its compliance with this International Standard, the laboratory shall ensure that the appropriate areas of activity are audited in accordance with 4.14 as soon as possible.

NOTE Such additional audits often follow the implementation of the corrective actions to confirm their effectiveness. An additional audit should be necessary only when a serious issue or risk to the business is identified.

4.12 Preventive action

4.12.1 Needed improvements and potential sources of nonconformities, either technical or concerning the management system, shall be identified. When improvement opportunities are identified or if preventive action is required, action plans shall be developed, implemented and monitored to reduce the likelihood of the occurrence of such nonconformities and to take advantage of the opportunities for improvement.

4.12.2 Procedures for preventive actions shall include the initiation of such actions and the application of controls to ensure that they are effective.

NOTE 1 Preventive action is a pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints.

NOTE 2 Apart from the review of the operational procedures, the preventive action might involve analysis of data, including trend and risk analyses and proficiency-testing results.

4.13 Control of records

4.13.1 General

4.13.1.1 The laboratory shall establish and maintain procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records. Quality records shall include reports from internal audits and management reviews as well as records of corrective and preventive actions.

4.13.1.2 All records shall be legible and shall be stored and retained in such a way that they are readily retrievable in facilities that provide a suitable environment to prevent damage or deterioration and to prevent loss. Retention times of records shall be established.

NOTE Records may be in any media, such as hard copy or electronic media.

4.13.1.3 All records shall be held secure and in confidence.

4.13.1.4 The laboratory shall have procedures to protect and back-up records stored electronically and to prevent unauthorized access to or amendment of these records.

4.13.2 Technical records

4.13.2.1 The laboratory shall retain records of original observations, derived data and sufficient information to establish an audit trail, calibration records, staff records and a copy of each test report or calibration certificate issued, for a defined period. The records for each test or calibration shall contain sufficient information to facilitate, if possible, identification of factors affecting the uncertainty and to enable the test or calibration to be repeated under conditions as close as possible to the original. The records shall include the identity of personnel responsible for the sampling, performance of each test and/or calibration and checking of results.

NOTE 1 In certain fields it may be impossible or impractical to retain records of all original observations.

NOTE 2 Technical records are accumulations of data (see 5.4.7) and information which result from carrying out tests and/or calibrations and which indicate whether specified quality or process parameters are achieved. They may include forms, contracts, work sheets, work books, check sheets, work notes, control graphs, external and internal test reports and calibration certificates, customers' notes, papers and feedback.

4.13.2.2 Observations, data and calculations shall be recorded at the time they are made and shall be identifiable to the specific task.

4.13.2.3 When mistakes occur in records, each mistake shall be crossed out, not erased, made illegible or deleted, and the correct value entered alongside. All such alterations to records shall be signed or initialled by the person making the correction. In the case of records stored electronically, equivalent measures shall be taken to avoid loss or change of original data.

4.14 Internal audits

4.14.1 The laboratory shall periodically, and in accordance with a predetermined schedule and procedure, conduct internal audits of its activities to verify that its operations continue to comply with the requirements of the management system and this International Standard. The internal audit programme shall address all elements of the management system, including the testing and/or calibration activities. It is the responsibility of the quality manager to plan and organize audits as required by the schedule and requested by management. Such audits shall be carried out by trained and qualified personnel who are, wherever resources permit, independent of the activity to be audited.

NOTE The cycle for internal auditing should normally be completed in one year.

4.14.2 When audit findings cast doubt on the effectiveness of the operations or on the correctness or validity of the laboratory's test or calibration results, the laboratory shall take timely corrective action, and shall notify customers in writing if investigations show that the laboratory results may have been affected.

4.14.3 The area of activity audited, the audit findings and corrective actions that arise from them shall be recorded.

4.14.4 Follow-up audit activities shall verify and record the implementation and effectiveness of the corrective action taken.

4.15 Management reviews

4.15.1 In accordance with a predetermined schedule and procedure, the laboratory's top management shall periodically conduct a review of the laboratory's management system and testing and/or calibration activities to ensure their continuing suitability and effectiveness, and to introduce necessary changes or improvements. The review shall take account of:

— the suitability of policies and procedures;

— reports from managerial and supervisory personnel;

— the outcome of recent internal audits;

— corrective and preventive actions;

— assessments by external bodies;

— the results of interlaboratory comparisons or proficiency tests;

— changes in the volume and type of the work;

— customer feedback;

— complaints;

— recommendations for improvement;

— other relevant factors, such as quality control activities, resources and staff training.

NOTE 1 A typical period for conducting a management review is once every 12 months.

NOTE 2 Results should feed into the laboratory planning system and should include the goals, objectives and action plans for the coming year.

NOTE 3 A management review includes consideration of related subjects at regular management meetings.

4.15.2 Findings from management reviews and the actions that arise from them shall be recorded. The management shall ensure that those actions are carried out within an appropriate and agreed timescale.

5 Technical requirements

5.1 General

5.1.1 Many factors determine the correctness and reliability of the tests and/or calibrations performed by a laboratory. These factors include contributions from:

— human factors (5.2);

— accommodation and environmental conditions (5.3);

— test and calibration methods and method validation (5.4);

— equipment (5.5);

— measurement traceability (5.6);

— sampling (5.7);

— the handling of test and calibration items (5.8).

5.1.2 The extent to which the factors contribute to the total uncertainty of measurement differs considerably between (types of) tests and between (types of) calibrations. The laboratory shall take account of these factors in developing test and calibration methods and procedures, in the training and qualification of personnel, and in the selection and calibration of the equipment it uses.

5.2 Personnel

5.2.1 The laboratory management shall ensure the competence of all who operate specific equipment, perform tests and/or calibrations, evaluate results, and sign test reports and calibration certificates. When using staff who are undergoing training, appropriate supervision shall be provided. Personnel performing specific tasks shall be qualified on the basis of appropriate education, training, experience and/or demonstrated skills, as required.

NOTE 1 In some technical areas (e.g. non-destructive testing) it may be required that the personnel performing certain tasks hold personnel certification. The laboratory is responsible for fulfilling specified personnel certification requirements. The requirements for personnel certification might be regulatory, included in the standards for the specific technical field, or required by the customer.

NOTE 2 The personnel responsible for the opinions and interpretation included in test reports should, in addition to the appropriate qualifications, training, experience and satisfactory knowledge of the testing carried out, also have:

— relevant knowledge of the technology used for the manufacturing of the items, materials, products, etc. tested, or the way they are used or intended to be used, and of the defects or degradations which may occur during or in service;

— knowledge of the general requirements expressed in the legislation and standards; and

— an understanding of the significance of deviations found with regard to the normal use of the items, materials, products, etc. concerned.

5.2.2 The management of the laboratory shall formulate the goals with respect to the education, training and skills of the laboratory personnel. The laboratory shall have a policy and procedures for identifying training needs and providing training of personnel. The training programme shall be relevant to the present and anticipated tasks of the laboratory. The effectiveness of the training actions taken shall be evaluated.

5.2.3 The laboratory shall use personnel who are employed by, or under contract to, the laboratory. Where contracted and additional technical and key support personnel are used, the laboratory shall ensure that such personnel are supervised and competent and that they work in accordance with the laboratory's management system.

5.2.4 The laboratory shall maintain current job descriptions for managerial, technical and key support personnel involved in tests and/or calibrations.

NOTE Job descriptions can be defined in many ways. As a minimum, the following should be defined:

— the responsibilities with respect to performing tests and/or calibrations;

— the responsibilities with respect to the planning of tests and/or calibrations and evaluation of results;

— the responsibilities for reporting opinions and interpretations;

— the responsibilities with respect to method modification and development and validation of new methods;

— expertise and experience required;

— qualifications and training programmes;

— managerial duties.

5.2.5 The management shall authorize specific personnel to perform particular types of sampling, test and/or calibration, to issue test reports and calibration certificates, to give opinions and interpretations and to operate particular types of equipment. The laboratory shall maintain records of the relevant authorization(s), competence, educational and professional qualifications, training, skills and experience of all technical personnel, including contracted personnel. This information shall be readily available and shall include the date on which authorization and/or competence is confirmed.

5.3 Accommodation and environmental conditions

5.3.1 Laboratory facilities for testing and/or calibration, including but not limited to energy sources, lighting and environmental conditions, shall be such as to facilitate correct performance of the tests and/or calibrations.

The laboratory shall ensure that the environmental conditions do not invalidate the results or adversely affect the required quality of any measurement. Particular care shall be taken when sampling and tests and/or calibrations are undertaken at sites other than a permanent laboratory facility. The technical requirements for accommodation and environmental conditions that can affect the results of tests and calibrations shall be documented.

5.3.2 The laboratory shall monitor, control and record environmental conditions as required by the relevant specifications, methods and procedures or where they influence the quality of the results. Due attention shall be paid, for example, to biological sterility, dust, electromagnetic disturbances, radiation, humidity, electrical supply, temperature, and sound and vibration levels, as appropriate to the technical activities concerned. Tests and calibrations shall be stopped when the environmental conditions jeopardize the results of the tests and/or calibrations.

5.3.3 There shall be effective separation between neighbouring areas in which there are incompatible activities. Measures shall be taken to prevent cross-contamination.

5.3.4 Access to and use of areas affecting the quality of the tests and/or calibrations shall be controlled. The laboratory shall determine the extent of control based on its particular circumstances.

5.3.5 Measures shall be taken to ensure good housekeeping in the laboratory. Special procedures shall be prepared where necessary.

5.4 Test and calibration methods and method validation

5.4.1 General

The laboratory shall use appropriate methods and procedures for all tests and/or calibrations within its scope. These include sampling, handling, transport, storage and preparation of items to be tested and/or calibrated, and, where appropriate, an estimation of the measurement uncertainty as well as statistical techniques for analysis of test and/or calibration data.

The laboratory shall have instructions on the use and operation of all relevant equipment, and on the handling and preparation of items for testing and/or calibration, or both, where the absence of such instructions could jeopardize the results of tests and/or calibrations. All instructions, standards, manuals and reference data relevant to the work of the laboratory shall be kept up to date and shall be made readily available to personnel (see 4.3). Deviation from test and calibration methods shall occur only if the deviation has been documented, technically justified, authorized, and accepted by the customer.

NOTE International, regional or national standards or other recognized specifications that contain sufficient and concise information on how to perform the tests and/or calibrations do not need to be supplemented or rewritten as internal procedures if these standards are written in a way that they can be used as published by the operating staff in a laboratory. It may be necessary to provide additional documentation for optional steps in the method or additional details.

5.4.2 Selection of methods

The laboratory shall use test and/or calibration methods, including methods for sampling, which meet the needs of the customer and which are appropriate for the tests and/or calibrations it undertakes. Methods published in international, regional or national standards shall preferably be used. The laboratory shall ensure that it uses the latest valid edition of a standard unless it is not appropriate or possible to do so. When necessary, the standard shall be supplemented with additional details to ensure consistent application.

When the customer does not specify the method to be used, the laboratory shall select appropriate methods that have been published either in international, regional or national standards, or by reputable technical organizations, or in relevant scientific texts or journals, or as specified by the manufacturer of the equipment. Laboratory-developed methods or methods adopted by the laboratory may also be used if they are appropriate for the intended use and if they are validated. The customer shall be informed as to the method chosen. The laboratory shall confirm that it can properly operate standard methods before introducing the tests or calibrations. If the standard method changes, the confirmation shall be repeated.

The laboratory shall inform the customer when the method proposed by the customer is considered to be inappropriate or out of date.

5.4.3 Laboratory-developed methods

The introduction of test and calibration methods developed by the laboratory for its own use shall be a planned activity and shall be assigned to qualified personnel equipped with adequate resources.

Plans shall be updated as development proceeds and effective communication amongst all personnel involved shall be ensured.

5.4.4 Non-standard methods

When it is necessary to use methods not covered by standard methods, these shall be subject to agreement with the customer and shall include a clear specification of the customer's requirements and the purpose of the test and/or calibration. The method developed shall have been validated appropriately before use.

NOTE For new test and/or calibration methods, procedures should be developed prior to the tests and/or calibrations being performed and should contain at least the following information:

a) appropriate identification;

b) scope;

c) description of the type of item to be tested or calibrated;

d) parameters or quantities and ranges to be determined;

e) apparatus and equipment, including technical performance requirements;

f) reference standards and reference materials required;

g) environmental conditions required and any stabilization period needed;

h) description of the procedure, including

- affixing of identification marks, handling, transporting, storing and preparation of items,
- checks to be made before the work is started,
- checks that the equipment is working properly and, where required, calibration and adjustment of the equipment before each use,
- the method of recording the observations and results,
- any safety measures to be observed;

i) criteria and/or requirements for approval/rejection;

j) data to be recorded and method of analysis and presentation;

k) the uncertainty or the procedure for estimating uncertainty.

5.4.5 Validation of methods

5.4.5.1 Validation is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

5.4.5.2 The laboratory shall validate non-standard methods, laboratory-designed/developed methods, standard methods used outside their intended scope, and amplifications and modifications of standard methods to confirm that the methods are fit for the intended use. The validation shall be as extensive as is necessary to meet the needs of the given application or field of application. The laboratory shall record the results obtained, the procedure used for the validation, and a statement as to whether the method is fit for the intended use.

NOTE 1 Validation may include procedures for sampling, handling and transportation.

NOTE 2 The techniques used for the determination of the performance of a method should be one of, or a combination of, the following:

— calibration using reference standards or reference materials;

— comparison of results achieved with other methods;

— interlaboratory comparisons;

— systematic assessment of the factors influencing the result;

— assessment of the uncertainty of the results based on scientific understanding of the theoretical principles of the method and practical experience.

NOTE 3 When some changes are made in the validated non-standard methods, the influence of such changes should be documented and, if appropriate, a new validation should be carried out.

5.4.5.3 The range and accuracy of the values obtainable from validated methods (e.g. the uncertainty of the results, detection limit, selectivity of the method, linearity, limit of repeatability and/or reproducibility, robustness against external influences and/or cross-sensitivity against interference from the matrix of the sample/test object), as assessed for the intended use, shall be relevant to the customers' needs.

NOTE 1 Validation includes specification of the requirements, determination of the characteristics of the methods, a check that the requirements can be fulfilled by using the method, and a statement on the validity.

NOTE 2 As method-development proceeds, regular review should be carried out to verify that the needs of the customer are still being fulfilled. Any change in requirements requiring modifications to the development plan should be approved and authorized.

NOTE 3 Validation is always a balance between costs, risks and technical possibilities. There are many cases in which the range and uncertainty of the values (e.g. accuracy, detection limit, selectivity, linearity, repeatability, reproducibility, robustness and cross-sensitivity) can only be given in a simplified way due to lack of information.

5.4.6 Estimation of uncertainty of measurement

5.4.6.1 A calibration laboratory, or a testing laboratory performing its own calibrations, shall have and shall apply a procedure to estimate the uncertainty of measurement for all calibrations and types of calibrations.

5.4.6.2 Testing laboratories shall have and shall apply procedures for estimating uncertainty of measurement. In certain cases the nature of the test method may preclude rigorous, metrologically and statistically valid, calculation of uncertainty of measurement. In these cases the laboratory shall at least attempt to identify all the components of uncertainty and make a reasonable estimation, and shall ensure that the form of reporting of the result does not give a wrong impression of the uncertainty. Reasonable estimation shall be based on knowledge of the performance of the method and on the measurement scope and shall make use of, for example, previous experience and validation data.

NOTE 1 The degree of rigor needed in an estimation of uncertainty of measurement depends on factors such as:

— the requirements of the test method;

— the requirements of the customer;

— the existence of narrow limits on which decisions on conformity to a specification are based.

NOTE 2 In those cases where a well-recognized test method specifies limits to the values of the major sources of uncertainty of measurement and specifies the form of presentation of calculated results, the laboratory is considered to have satisfied this clause by following the test method and reporting instructions (see 5.10).

5.4.6.3 When estimating the uncertainty of measurement, all uncertainty components which are of importance in the given situation shall be taken into account using appropriate methods of analysis.

NOTE 1 Sources contributing to the uncertainty include, but are not necessarily limited to, the reference standards and reference materials used, methods and equipment used, environmental conditions, properties and condition of the item being tested or calibrated, and the operator.

NOTE 2 The predicted long-term behaviour of the tested and/or calibrated item is not normally taken into account when estimating the measurement uncertainty.

NOTE 3 For further information, see ISO 5725 and the Guide to the Expression of Uncertainty in Measurement (see Bibliography).

5.4.7 Control of data

5.4.7.1 Calculations and data transfers shall be subject to appropriate checks in a systematic manner.

5.4.7.2 When computers or automated equipment are used for the acquisition, processing, recording, reporting, storage or retrieval of test or calibration data, the laboratory shall ensure that:

a) computer software developed by the user is documented in sufficient detail and is suitably validated as being adequate for use;

b) procedures are established and implemented for protecting the data; such procedures shall include, but not be limited to, integrity and confidentiality of data entry or collection, data storage, data transmission and data processing;

c) computers and automated equipment are maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of test and calibration data.

NOTE Commercial off-the-shelf software (e.g. wordprocessing, database and statistical programmes) in general use within their designed application range may be considered to be sufficiently validated. However, laboratory software configuration/modifications should be validated as in 5.4.7.2 a).

5.5 Equipment

5.5.1 The laboratory shall be furnished with all items of sampling, measurement and test equipment required for the correct performance of the tests and/or calibrations (including sampling, preparation of test and/or calibration items, processing and analysis of test and/or calibration data). In those cases where the laboratory needs to use equipment outside its permanent control, it shall ensure that the requirements of this International Standard are met.

5.5.2 Equipment and its software used for testing, calibration and sampling shall be capable of achieving the accuracy required and shall comply with specifications relevant to the tests and/or calibrations concerned. Calibration programmes shall be established for key quantities or values of the instruments where these properties have a significant effect on the results. Before being placed into service, equipment (including that used for sampling) shall be calibrated or checked to establish that it meets the laboratory's specification requirements and complies with the relevant standard specifications. It shall be checked and/or calibrated before use (see 5.6).

5.5.3 Equipment shall be operated by authorized personnel. Up-to-date instructions on the use and maintenance of equipment (including any relevant manuals provided by the manufacturer of the equipment) shall be readily available for use by the appropriate laboratory personnel.

5.5.4 Each item of equipment and its software used for testing and calibration and significant to the result shall, when practicable, be uniquely identified.

5.5.5 Records shall be maintained of each item of equipment and its software significant to the tests and/or calibrations performed. The records shall include at least the following:

a) the identity of the item of equipment and its software;

b) the manufacturer's name, type identification, and serial number or other unique identification;

c) checks that equipment complies with the specification (see 5.5.2);

d) the current location, where appropriate;

e) the manufacturer's instructions, if available, or reference to their location;

f) dates, results and copies of reports and certificates of all calibrations, adjustments, acceptance criteria, and the due date of next calibration;

g) the maintenance plan, where appropriate, and maintenance carried out to date;

h) any damage, malfunction, modification or repair to the equipment.

5.5.6 The laboratory shall have procedures for safe handling, transport, storage, use and planned maintenance of measuring equipment to ensure proper functioning and in order to prevent contamination or deterioration.

NOTE Additional procedures may be necessary when measuring equipment is used outside the permanent laboratory for tests, calibrations or sampling.

5.5.7 Equipment that has been subjected to overloading or mishandling, gives suspect results, or has been shown to be defective or outside specified limits, shall be taken out of service. It shall be isolated to prevent its use or clearly labelled or marked as being out of service until it has been repaired and shown by calibration or test to perform correctly. The laboratory shall examine the effect of the defect or departure from specified limits on previous tests and/or calibrations and shall institute the “Control of nonconforming work” procedure (see 4.9).

5.5.8 Whenever practicable, all equipment under the control of the laboratory and requiring calibration shall be labelled, coded or otherwise identified to indicate the status of calibration, including the date when last calibrated and the date or expiration criteria when recalibration is due.

5.5.9 When, for whatever reason, equipment goes outside the direct control of the laboratory, the laboratory shall ensure that the function and calibration status of the equipment are checked and shown to be satisfactory before the equipment is returned to service.

5.5.10 When intermediate checks are needed to maintain confidence in the calibration status of the equipment, these checks shall be carried out according to a defined procedure.

5.5.11 Where calibrations give rise to a set of correction factors, the laboratory shall have procedures to ensure that copies (e.g. in computer software) are correctly updated.

5.5.12 Test and calibration equipment, including both hardware and software, shall be safeguarded from adjustments which would invalidate the test and/or calibration results.

5.6 Measurement traceability

5.6.1 General

All equipment used for tests and/or calibrations, including equipment for subsidiary measurements (e.g. for environmental conditions) having a significant effect on the accuracy or validity of the result of the test, calibration or sampling shall be calibrated before being put into service. The laboratory shall have an established programme and procedure for the calibration of its equipment.

NOTE Such a programme should include a system for selecting, using, calibrating, checking, controlling and maintaining measurement standards, reference materials used as measurement standards, and measuring and test equipment used to perform tests and calibrations.

5.6.2 Specific requirements

5.6.2.1 Calibration

5.6.2.1.1 For calibration laboratories, the programme for calibration of equipment shall be designed and operated so as to ensure that calibrations and measurements made by the laboratory are traceable to the International System of Units (SI) (*Système international d'unités*).

A calibration laboratory establishes traceability of its own measurement standards and measuring instruments to the SI by means of an unbroken chain of calibrations or comparisons linking them to relevant primary standards of the SI units of measurement. The link to SI units may be achieved by reference to national measurement standards. National measurement standards may be primary standards, which are primary realizations of the SI units or agreed representations of SI units based on fundamental physical constants, or they may be secondary standards which are standards calibrated by another national metrology institute. When using external calibration services, traceability of measurement shall be assured by the use of calibration services from laboratories that can demonstrate competence, measurement capability and traceability. The calibration certificates issued by these laboratories shall contain the measurement results, including the measurement uncertainty and/or a statement of compliance with an identified metrological specification (see also 5.10.4.2).

NOTE 1 Calibration laboratories fulfilling the requirements of this International Standard are considered to be competent. A calibration certificate bearing an accreditation body logo from a calibration laboratory accredited to this International Standard, for the calibration concerned, is sufficient evidence of traceability of the calibration data reported.

NOTE 2 Traceability to SI units of measurement may be achieved by reference to an appropriate primary standard (see VIM:1993, 6.4) or by reference to a natural constant, the value of which in terms of the relevant SI unit is known and recommended by the General Conference of Weights and Measures (CGPM) and the International Committee for Weights and Measures (CIPM).

NOTE 3 Calibration laboratories that maintain their own primary standard or representation of SI units based on fundamental physical constants can claim traceability to the SI system only after these standards have been compared, directly or indirectly, with other similar standards of a national metrology institute.

NOTE 4 The term "identified metrological specification" means that it must be clear from the calibration certificate which specification the measurements have been compared with, by including the specification or by giving an unambiguous reference to the specification.

NOTE 5 When the terms "international standard" or "national standard" are used in connection with traceability, it is assumed that these standards fulfil the properties of primary standards for the realization of SI units.

NOTE 6 Traceability to national measurement standards does not necessarily require the use of the national metrology institute of the country in which the laboratory is located.

NOTE 7 If a calibration laboratory wishes or needs to obtain traceability from a national metrology institute other than in its own country, this laboratory should select a national metrology institute that actively participates in the activities of BIPM either directly or through regional groups.

NOTE 8 The unbroken chain of calibrations or comparisons may be achieved in several steps carried out by different laboratories that can demonstrate traceability.

5.6.2.1.2 There are certain calibrations that currently cannot be strictly made in SI units. In these cases calibration shall provide confidence in measurements by establishing traceability to appropriate measurement standards such as:

— the use of certified reference materials provided by a competent supplier to give a reliable physical or chemical characterization of a material;

— the use of specified methods and/or consensus standards that are clearly described and agreed by all parties concerned.

Participation in a suitable programme of interlaboratory comparisons is required where possible.

5.6.2.2 Testing

5.6.2.2.1 For testing laboratories, the requirements given in 5.6.2.1 apply for measuring and test equipment with measuring functions used, unless it has been established that the associated contribution from the calibration contributes little to the total uncertainty of the test result. When this situation arises, the laboratory shall ensure that the equipment used can provide the uncertainty of measurement needed.

NOTE The extent to which the requirements in 5.6.2.1 should be followed depends on the relative contribution of the calibration uncertainty to the total uncertainty. If calibration is the dominant factor, the requirements should be strictly followed.

5.6.2.2.2 Where traceability of measurements to SI units is not possible and/or not relevant, the same requirements for traceability to, for example, certified reference materials, agreed methods and/or consensus standards, are required as for calibration laboratories (see 5.6.2.1.2).

5.6.3 Reference standards and reference materials

5.6.3.1 Reference standards

The laboratory shall have a programme and procedure for the calibration of its reference standards. Reference standards shall be calibrated by a body that can provide traceability as described in 5.6.2.1. Such reference standards of measurement held by the laboratory shall be used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated. Reference standards shall be calibrated before and after any adjustment.

5.6.3.2 Reference materials

Reference materials shall, where possible, be traceable to SI units of measurement, or to certified reference materials. Internal reference materials shall be checked as far as is technically and economically practicable.

5.6.3.3 Intermediate checks

Checks needed to maintain confidence in the calibration status of reference, primary, transfer or working standards and reference materials shall be carried out according to defined procedures and schedules.

5.6.3.4 Transport and storage

The laboratory shall have procedures for safe handling, transport, storage and use of reference standards and reference materials in order to prevent contamination or deterioration and in order to protect their integrity.

NOTE Additional procedures may be necessary when reference standards and reference materials are used outside the permanent laboratory for tests, calibrations or sampling.

5.7 Sampling

5.7.1 The laboratory shall have a sampling plan and procedures for sampling when it carries out sampling of substances, materials or products for subsequent testing or calibration. The sampling plan as well as the sampling procedure shall be available at the location where sampling is undertaken. Sampling plans shall, whenever reasonable, be based on appropriate statistical methods. The sampling process shall address the factors to be controlled to ensure the validity of the test and calibration results.

NOTE 1 Sampling is a defined procedure whereby a part of a substance, material or product is taken to provide for testing or calibration of a representative sample of the whole. Sampling may also be required by the appropriate specification for which the substance, material or product is to be tested or calibrated. In certain cases (e.g. forensic analysis), the sample may not be representative but is determined by availability.

NOTE 2 Sampling procedures should describe the selection, sampling plan, withdrawal and preparation of a sample or samples from a substance, material or product to yield the required information.

5.7.2 Where the customer requires deviations, additions or exclusions from the documented sampling procedure, these shall be recorded in detail with the appropriate sampling data and shall be included in all documents containing test and/or calibration results, and shall be communicated to the appropriate personnel.

5.7.3 The laboratory shall have procedures for recording relevant data and operations relating to sampling that forms part of the testing or calibration that is undertaken. These records shall include the sampling procedure used, the identification of the sampler, environmental conditions (if relevant) and diagrams or other equivalent means to identify the sampling location as necessary and, if appropriate, the statistics the sampling procedures are based upon.

5.8 Handling of test and calibration items

5.8.1 The laboratory shall have procedures for the transportation, receipt, handling, protection, storage, retention and/or disposal of test and/or calibration items, including all provisions necessary to protect the integrity of the test or calibration item, and to protect the interests of the laboratory and the customer.

5.8.2 The laboratory shall have a system for identifying test and/or calibration items. The identification shall be retained throughout the life of the item in the laboratory. The system shall be designed and operated so as to ensure that items cannot be confused physically or when referred to in records or other documents. The system shall, if appropriate, accommodate a sub-division of groups of items and the transfer of items within and from the laboratory.

5.8.3 Upon receipt of the test or calibration item, abnormalities or departures from normal or specified conditions, as described in the test or calibration method, shall be recorded. When there is doubt as to the suitability of an item for test or calibration, or when an item does not conform to the description provided, or the test or calibration required is not specified in sufficient detail, the laboratory shall consult the customer for further instructions before proceeding and shall record the discussion.

5.8.4 The laboratory shall have procedures and appropriate facilities for avoiding deterioration, loss or damage to the test or calibration item during storage, handling and preparation. Handling instructions provided with the item shall be followed. When items have to be stored or conditioned under specified environmental conditions, these conditions shall be maintained, monitored and recorded. Where a test or calibration item or a portion of an item is to be held secure, the laboratory shall have arrangements for storage and security that protect the condition and integrity of the secured items or portions concerned.

NOTE 1 Where test items are to be returned into service after testing, special care is required to ensure that they are not damaged or injured during the handling, testing or storing/waiting processes.

NOTE 2 A sampling procedure and information on storage and transport of samples, including information on sampling factors influencing the test or calibration result, should be provided to those responsible for taking and transporting the samples.

NOTE 3 Reasons for keeping a test or calibration item secure can be for reasons of record, safety or value, or to enable complementary tests and/or calibrations to be performed later.

5.9 Assuring the quality of test and calibration results

5.9.1 The laboratory shall have quality control procedures for monitoring the validity of tests and calibrations undertaken. The resulting data shall be recorded in such a way that trends are detectable and, where practicable, statistical techniques shall be applied to the reviewing of the results. This monitoring shall be planned and reviewed and may include, but not be limited to, the following:

a) regular use of certified reference materials and/or internal quality control using secondary reference materials;

b) participation in interlaboratory comparison or proficiency-testing programmes;

c) replicate tests or calibrations using the same or different methods;

d) retesting or recalibration of retained items;

e) correlation of results for different characteristics of an item.

NOTE The selected methods should be appropriate for the type and volume of the work undertaken.

5.9.2 Quality control data shall be analysed and, where they are found to be outside pre-defined criteria, planned action shall be taken to correct the problem and to prevent incorrect results from being reported.

5.10 Reporting the results

5.10.1 General

The results of each test, calibration, or series of tests or calibrations carried out by the laboratory shall be reported accurately, clearly, unambiguously and objectively, and in accordance with any specific instructions in the test or calibration methods.

The results shall be reported, usually in a test report or a calibration certificate (see Note 1), and shall include all the information requested by the customer and necessary for the interpretation of the test or calibration results and all information required by the method used. This information is normally that required by 5.10.2, and 5.10.3 or 5.10.4.

In the case of tests or calibrations performed for internal customers, or in the case of a written agreement with the customer, the results may be reported in a simplified way. Any information listed in 5.10.2 to 5.10.4 which is not reported to the customer shall be readily available in the laboratory which carried out the tests and/or calibrations.

NOTE 1 Test reports and calibration certificates are sometimes called test certificates and calibration reports, respectively.

NOTE 2 The test reports or calibration certificates may be issued as hard copy or by electronic data transfer provided that the requirements of this International Standard are met.

5.10.2 Test reports and calibration certificates

Each test report or calibration certificate shall include at least the following information, unless the laboratory has valid reasons for not doing so:

a) a title (e.g. “Test Report” or “Calibration Certificate”);

b) the name and address of the laboratory, and the location where the tests and/or calibrations were carried out, if different from the address of the laboratory;

c) unique identification of the test report or calibration certificate (such as the serial number), and on each page an identification in order to ensure that the page is recognized as a part of the test report or calibration certificate, and a clear identification of the end of the test report or calibration certificate;

d) the name and address of the customer;

e) identification of the method used;

f) a description of, the condition of, and unambiguous identification of the item(s) tested or calibrated;

g) the date of receipt of the test or calibration item(s) where this is critical to the validity and application of the results, and the date(s) of performance of the test or calibration;

h) reference to the sampling plan and procedures used by the laboratory or other bodies where these are relevant to the validity or application of the results;

i) the test or calibration results with, where appropriate, the units of measurement;

j) the name(s), function(s) and signature(s) or equivalent identification of person(s) authorizing the test report or calibration certificate;

k) where relevant, a statement to the effect that the results relate only to the items tested or calibrated.

NOTE 1 Hard copies of test reports and calibration certificates should also include the page number and total number of pages.

NOTE 2 It is recommended that laboratories include a statement specifying that the test report or calibration certificate shall not be reproduced except in full, without written approval of the laboratory.

5.10.3 Test reports

5.10.3.1 In addition to the requirements listed in 5.10.2, test reports shall, where necessary for the interpretation of the test results, include the following:

a) deviations from, additions to, or exclusions from the test method, and information on specific test conditions, such as environmental conditions;

b) where relevant, a statement of compliance/non-compliance with requirements and/or specifications;

c) where applicable, a statement on the estimated uncertainty of measurement; information on uncertainty is needed in test reports when it is relevant to the validity or application of the test results, when a customer's instruction so requires, or when the uncertainty affects compliance to a specification limit;

d) where appropriate and needed, opinions and interpretations (see 5.10.5);

e) additional information which may be required by specific methods, customers or groups of customers.

5.10.3.2 In addition to the requirements listed in 5.10.2 and 5.10.3.1, test reports containing the results of sampling shall include the following, where necessary for the interpretation of test results:

a) the date of sampling;

b) unambiguous identification of the substance, material or product sampled (including the name of the manufacturer, the model or type of designation and serial numbers as appropriate);

c) the location of sampling, including any diagrams, sketches or photographs;

d) a reference to the sampling plan and procedures used;

e) details of any environmental conditions during sampling that may affect the interpretation of the test results;

f) any standard or other specification for the sampling method or procedure, and deviations, additions to or exclusions from the specification concerned.

5.10.4 Calibration certificates

5.10.4.1 In addition to the requirements listed in 5.10.2, calibration certificates shall include the following, where necessary for the interpretation of calibration results:

a) the conditions (e.g. environmental) under which the calibrations were made that have an influence on the measurement results;

b) the uncertainty of measurement and/or a statement of compliance with an identified metrological specification or clauses thereof;

c) evidence that the measurements are traceable (see Note 2 in 5.6.2.1.1).

5.10.4.2 The calibration certificate shall relate only to quantities and the results of functional tests. If a statement of compliance with a specification is made, this shall identify which clauses of the specification are met or not met.

When a statement of compliance with a specification is made omitting the measurement results and associated uncertainties, the laboratory shall record those results and maintain them for possible future reference.

When statements of compliance are made, the uncertainty of measurement shall be taken into account.

5.10.4.3 When an instrument for calibration has been adjusted or repaired, the calibration results before and after adjustment or repair, if available, shall be reported.

5.10.4.4 A calibration certificate (or calibration label) shall not contain any recommendation on the calibration interval except where this has been agreed with the customer. This requirement may be superseded by legal regulations.

5.10.5 Opinions and interpretations

When opinions and interpretations are included, the laboratory shall document the basis upon which the opinions and interpretations have been made. Opinions and interpretations shall be clearly marked as such in a test report.

NOTE 1 Opinions and interpretations should not be confused with inspections and product certifications as intended in ISO/IEC 17020 and ISO/IEC Guide 65.

NOTE 2 Opinions and interpretations included in a test report may comprise, but not be limited to, the following:

— an opinion on the statement of compliance/noncompliance of the results with requirements;

— fulfilment of contractual requirements;

— recommendations on how to use the results;

— guidance to be used for improvements.

NOTE 3 In many cases it might be appropriate to communicate the opinions and interpretations by direct dialogue with the customer. Such dialogue should be written down.

5.10.6 Testing and calibration results obtained from subcontractors

When the test report contains results of tests performed by subcontractors, these results shall be clearly identified. The subcontractor shall report the results in writing or electronically.

When a calibration has been subcontracted, the laboratory performing the work shall issue the calibration certificate to the contracting laboratory.

5.10.7 Electronic transmission of results

In the case of transmission of test or calibration results by telephone, telex, facsimile or other electronic or electromagnetic means, the requirements of this International Standard shall be met (see also 5.4.7).

5.10.8 Format of reports and certificates

The format shall be designed to accommodate each type of test or calibration carried out and to minimize the possibility of misunderstanding or misuse.

NOTE 1 Attention should be given to the lay-out of the test report or calibration certificate, especially with regard to the presentation of the test or calibration data and ease of assimilation by the reader.

NOTE 2 The headings should be standardized as far as possible.

5.10.9 Amendments to test reports and calibration certificates

Material amendments to a test report or calibration certificate after issue shall be made only in the form of a further document, or data transfer, which includes the statement:

"Supplement to Test Report [or Calibration Certificate], serial number... [or as otherwise identified]",

or an equivalent form of wording.

Such amendments shall meet all the requirements of this International Standard.

When it is necessary to issue a complete new test report or calibration certificate, this shall be uniquely identified and shall contain a reference to the original that it replaces.

Annex A
(informative)

Nominal cross-references to ISO 9001:2000

Table A.1 — Nominal cross-references to ISO 9001:2000

ISO 9001:2000	ISO/IEC 17025
Clause 1	Clause 1
Clause 2	Clause 2
Clause 3	Clause 3
4.1	4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4
4.2 1	4.2.2, 4.2.3, 4.3.1
4.2.2	4.2.2, 4.2.3, 4.2.4
4.2.3	4.3
4.2.4	4.3.1, 4.12
5.1	4.2.2, 4.2.3
5.1 a)	4.1.2, 4.1.6
5.1 b)	4.2.2
5.1 c)	4.2.2
5.1 d)	4.15
5.1 e)	4.1.5
5.2	4.4.1
5.3	4.2.2
5.3 a)	4.2.2
5.3 b)	4.2.3
5.3 c)	4.2.2
5.3 d)	4.2.2
5.3 e)	4.2.2
5.4.1	4.2.2 c)
5.4.2	4.2.1
5.4.2 a)	4.2.1
5.4.2 b)	4.2.1
5.5.1	4.1.5 a), f), h)
5.5.2	4.1.5 i)
5.5.2 a)	4.1.5 i)
5.5.2 b)	4.11.1
5.5.2 c)	4.2.4
5.5.3	4.1.6
5.6.1	4.15
5.6.2	4.15
5.6.3	4.15

ISO 9001:2000	ISO/IEC 17025
6.1 a)	4.10
6.1 b)	4.4.1, 4.7, 5.4.2, 5.4.3, 5.4.4, 5.10.1
6.2.1	5.2.1
6.2.2 a)	5.2.2, 5.5.3
6.2.2 b)	5.2.1, 5.2.2
6.2.2 c)	5.2.2
6.2.2 d)	4.1.5 k)
6.2.2 e)	5.2.5
6.3.1 a)	4.1.3, 4.12.1.2, 4.12.1.3, 5.3
6.3.1 b)	4.12.1.4, 5.4.7.2, 5.5, 5.6
6.3.1 c)	4.6, 5.5.6, 5.6.3.4, 5.8, 5.10
6.4	5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.3.5
7.1	5.1
7.1 a)	4.2.2
7.1 b)	4.1.5 a), 4.2.1, 4.2.3
7.1 c)	5.4, 5.9
7.1 d)	4.1, 5.4, 5.9
7.2.1	4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 5.4, 5.9, 5.10
7.2.2	4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 5.4, 5.9, 5.10
7.2.3	4.4.2, 4.4.4, 4.5, 4.7, 4.8
7.3	5, 5.4, 5.9
7.4.1	4.6.1, 4.6.2, 4.6.4
7.4.2	4.6.3
7.4.3	4.6.2
7.5.1	5.1, 5.2, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9
7.5.2	5.2.5, 5.4.2, 5.4.5
7.5.3	5.8.2
7.5.4	4.1.5 c), 5.8
7.5.5	4.6.1, 4.12, 5.8, 5.10
7.6	5.4, 5.5
8.1	4.10, 5.4, 5.9
8.2.1	4.10
8.2.2	4.11.5, 4.14
8.2.3	4.11.5, 4.14, 5.9
8.2.4	4.5, 4.6, 4.9, 5.5.2, 5.5.9, 5.8, 5.8.3, 5.8.4, 5.9
8.3	4.9
8.4	4.10, 5.9
8.5.1	4.10, 4.12
8.5.2	4.11, 4.12
8.5.3	4.9, 4.11, 4.12

ISO/IEC 17025 covers several technical competence requirements that are not covered by ISO 9001:2000.

Annex B
(informative)

Guidelines for establishing applications for specific fields

B.1 The requirements specified in this International Standard are stated in general terms and, while they are applicable to all test and calibration laboratories, explanations might be needed. Such explanations on applications are herein referred to as applications. Applications should not include additional general requirements not included in this International Standard.

B.2 Applications can be thought of as an elaboration of the generally stated criteria (requirements) of this International Standard for specified fields of test and calibration, test technologies, products, materials or specific tests or calibrations. Accordingly, applications should be established by persons having appropriate technical knowledge and experience, and should address items that are essential or most important for the proper conduct of a test or calibration.

B.3 Depending on the application at hand, it may be necessary to establish applications for the technical requirements of this International Standard. Establishing applications may be accomplished by simply providing detail or adding extra information to the already generally stated requirements in each of the clauses (e.g. specific limitations to the temperature and humidity in the laboratory).

In some cases the applications will be quite limited, applying only to a given test or calibration method or to a group of calibration or test methods. In other cases the applications may be quite broad, applying to the testing or calibration of various products or items or to entire fields of testing or calibration.

B.4 If the applications apply to a group of test or calibration methods in an entire technical field, common wording should be used for all of the methods.

Alternatively, it may be necessary to develop a separate document of applications to supplement this International Standard for specific types or groups of tests or calibrations, products, materials or technical fields of tests or calibrations. Such a document should provide only the necessary supplementary information, while maintaining this International Standard as the governing document through reference. Applications which are too specific should be avoided in order to limit the proliferation of detailed documents.

B.5 The guidance in this annex should be used by accreditation bodies and other types of evaluation bodies when they develop applications for their own purposes (e.g. accreditation in specific areas).

Bibliography

[1] ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1 General principles and definitions*

[2] ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

[3] ISO 5725-3, *Accuracy (trueness and precision) of measurement methods and results — Part 3: Intermediate measures of the precision of a standard measurement method*

[4] ISO 5725-4, *Accuracy (trueness and precision) of measurement methods and results — Part 4: Basic methods for the determination of the trueness of a standard measurement method*

[5] ISO 5725-6, *Accuracy (trueness and precision) of measurement methods and results — Part 6: Use in practice of accuracy values*

[6] ISO 9000:—[1)], *Quality management systems — Fundamentals and vocabulary*

[7] ISO 9001:2000, *Quality management systems — Requirements*

[8] ISO/IEC 90003, *Software engineering — Guidelines for the application of ISO 9001:2000 to computer software*

[9] ISO 10012:2003, *Measurement management systems — Requirements for measurement processes and measuring equipment*

[10] ISO/IEC 17011, *Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies*

[11] ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*

[12] ISO 19011, *Guidelines for quality and/or environmental management systems auditing*

[13] ISO Guide 30, *Terms and definitions used in connection with reference materials*

[14] ISO Guide 31, *Reference materials — Contents of certificates and labels*

[15] ISO Guide 32, *Calibration in analytical chemistry and use of certified reference materials*

[16] ISO Guide 33, *Uses of certified reference materials*

[17] ISO Guide 34, *General requirements for the competence of reference material producers*

[18] ISO Guide 35, *Certification of reference materials — General and statistical principles*

[19] ISO/IEC Guide 43-1, *Proficiency testing by interlaboratory comparisons — Part 1: Development and operation of proficiency testing schemes*

[20] ISO/IEC Guide 43-2, *Proficiency testing by interlaboratory comparisons — Part 2: Selection and use of proficiency testing schemes by laboratory accreditation bodies*

1) To be published. (Revision of ISO 9000:2000)

[21] ISO/IEC Guide 58:1993, *Calibration and testing laboratory accreditation systems — General requirements for operation and recognition*

[22] ISO/IEC Guide 65, *General requirements for bodies operating product certification systems*

[23] GUM, *Guide to the Expression of Uncertainty in Measurement*, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML

[24] Information and documents on laboratory accreditation can be found on the ILAC (International Laboratory Accreditation Cooperation): www.ilac.org

ICS 03.120.20

Price based on 28 pages

NPDES Compliance Inspection Manual

Chapter 6

EPA Publication Number: 305-K-17-001
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LANS/DOE Exhibit 5 - Attachment C

CHAPTER 6 – FLOW MEASUREMENT

Contents

Associated Appendices

O. Supplemental Flow Measurement Information

A. EVALUATION OF PERMITTEE'S FLOW MEASUREMENT

OBJECTIVE AND REQUIREMENTS

To comply with the permit requirements established under the National Pollutant Discharge Elimination System (NPDES), the permittee must accurately determine the quantity of wastewater being discharged. Discharge flow measurement is an integral part of the NPDES program, it is important that the inspector evaluate the accuracy of the measurement.

In addition to providing usable information for enforcement purposes, flow measurement serves to:

- Provide data for pollutant mass loading calculations.
- Provide operating and performance data on the wastewater treatment plant.
- Compute treatment costs, based on wastewater volume.
- Obtain data for long-term planning of plant capacity, versus capacity used.
- Provide information on Infiltration and Inflow (I/I) conditions, and the need for cost-effective I/I correction.

A Flow Measurement Inspection Checklist for the inspector's use appears at the end of this chapter.

EVALUATION OF FACILITY INSTALLED FLOW DEVICES AND DATA

There are two types of wastewater flow: closed-channel flow and open-channel flow. Closed-channel flow occurs under pressure in a liquid-full conduit (usually a pipe). The facility will usually have a metering device inserted into the conduit that measures flow. Examples of closed-channel flow measuring devices are the Venturi meter, the Pitot tube, the paddle wheel, the electromagnetic flowmeter, Doppler, and the transit-time flowmeter. In practice, closed-channel flow is normally encountered between treatment units in a wastewater treatment plant, where liquids and/or sludges are pumped under pressure.

Open-channel flow occurs in conduits that are not liquid-full. Open-channel flow is partially full pipes not under pressure. Open-channel flow is the most prevalent type of flow at NPDES-regulated discharge points. Open-channel flows are typically measured using primary and secondary devices. Primary devices are standard hydraulic structures, such as flumes and weirs that are inserted in the open channel. Inspectors can obtain accurate flow measurements merely by measuring the depth of liquid (head) at the specific point in the primary device. In a weir application, for example, the flow rate is a function of the head of liquid above the weir crest.

Facilities use secondary devices in conjunction with primary devices to automate the flow measuring process. Typically, secondary devices measure the liquid depth in the primary device and convert the depth measurement to a corresponding flow, using established mathematical relationships. Examples of secondary devices are gauges, floats, ultrasonic transducers, bubblers, and transit-time flowmeters. A recorder generally measures the output of the

secondary device transmitted to a recorder and/or totalizer to provide instantaneous and historical flow data to the operator. Outputs may also be transmitted to sampling systems to facilitate flow proportioning. Appendix O, "Supplemental Flow Measurement Information," contains further information on flow measurement devices.

The inspector must assure that the permittee obtains accurate wastewater flow data to calculate mass loading (quantity) from measured concentrations of pollutants discharged as required by many NPDES permits. The permittee must produce data that meet requirements in terms of precision and accuracy. Precision refers to data reproducibility or the ability to obtain consistent data from repeated measurements of the same quantity. Accuracy refers to the agreement between the amount of a component measured by the test and the amount present.

The accuracy of flow measurement (including both primary and secondary devices) varies widely with the device, its location, environmental conditions, and other factors such as maintenance and calibration. Faulty fabrication, construction, and installation of primary devices are common sources of errors. Improper calibration, misreading, and variation in the speed of totalizer drive motors are major errors related to secondary devices (see Appendix O, "Supplemental Flow Measurement Information"). When evaluating facility installed devices, the inspector should do the following:

- Verify that the facility has installed primary and/or secondary devices according to the manufacturer's manual instructions.
- Inspect the primary device for evidence of corrosion, scale formation, or solids accumulation that may bias the flow measurement.
- Verify that weirs are level, plumb, and perpendicular to the flow direction.
- Verify that flumes are level and smooth-finished, the throat walls (narrowed section of flume) are plumb, and the throat width is the standard size intended.
- Inspect historical records (i.e., strip charts and logs) for evidence of continuous flow measurements and for routine and maintenance operations schedules. Compare periods of missing data with maintenance logs for explanations of measuring system problems.
- Observe the flow patterns near the primary device for excessive turbulence, velocity, or accumulating foam. The flow lines should be straight.
- Ensure that the flow measurement system or technique being used measures the entire wastewater discharge as required by the NPDES permit. Inspect carefully the piping to determine whether there are any wastewater diversions, return lines, or bypasses around the system. Make sure the system meets the permit requirement, such as instantaneous or continuous, daily, or other time interval measures. Note anomalies in the inspection report.
- Verify that the site chosen for flow measurement by the facility is appropriate and is in accordance with permit requirements.

- Verify that the site chosen by the facility for flow measurement is suitable for the type of discharge, flow range, suspended solids concentration, and other relevant factors.
- Determine if the facility has closed-channel flow measuring devices where the pipe is always full. If these devices are used, then there must also be a means for the permittee and regulatory agencies/inspector to verify the accuracy of these meters. Primary open-channeled flow measuring devices such as weirs and flumes should be used in an open-channel segment above or below the closed-channel segment to verify the flow measured by the closed-channel flow measuring devices.
- Verify that the facility uses appropriate tables, curves, and formulas to calculate flow rates.
- Review and evaluate calibration and maintenance programs for the discharger's flow measurement system. The permit normally requires the facility to check the calibration regularly by the permittee. The facility must ensure that their flow measurement systems are calibrated by a qualified source at least once a year to ensure their accuracy. Lack of such a program is considered unacceptable for NPDES compliance purposes.
- Verify that the facility calibrates secondary flowmeter systems to be within 10 percent of the primary flow measurement system.
- Verify that primary and secondary devices are adequate for normal flow as well as maximum expected flows. Note whether the flow measurement system can measure the expected range of flows.
- Collect accurate flow data during inspection to validate self-monitoring data collected by the permittee.
- The facility must install a flow measuring system that has the capability of routine flow verification by the permittee or appropriate regulatory personnel.

EVALUATION OF PERMITTEE DATA HANDLING AND REPORTING

The permittee or facility must keep flow measurement records for a minimum period of three years. Many flow-measuring devices produce a continuous flowchart for plant records. Flow records should contain date, flow, time of reading, and operator's name. The facility should record maintenance, inspection dates, and calibration data.

The inspector should review the permittee's records and note the presence or absence of data such as:

- Frequency of routine operational inspections.
- Frequency of maintenance inspections.
- Frequency of flowmeter calibration (should be as specified in permit, generally at least once per year).
- Irregularity or uniformity of flow.

EVALUATION OF PERMITTEE QUALITY CONTROL

The inspection should evaluate the following quality control issues during a compliance inspection to ensure:

- Proper operation and maintenance of equipment
- Accurate records
- Sufficient inventory of spare parts
- Valid flow measurement techniques
- Precise flow data
- Adequate frequency of calibration checks

Evaluate precision of float driven flow meters when flows are stable. Push the float gently downward, hold for 30 seconds, then allowed to return normally. The recorded flow rate should be the same before and after the float was moved. Evaluate accuracy by measuring the instantaneous flow rate at the primary device used at the facility and comparing the value against the value on the meter, graph, integrator, or company record. The difference between two stable totalizer readings (flow is steady for 10 minutes or more) should not exceed ±10 percent of the instantaneous flow measured at the primary device. Note that most flow measurement systems have both an instantaneous meter readout and a totalizer. Both devices should agree, but that is not always the case due to electrical and other various malfunctions in the flow measuring system. In most cases, the totalizer reading will be what is reported by the permittee. If this is the case, then that device should be checked for accuracy and the permittee's flow measuring system rated accordingly.

In addition, the inspector can evaluate accuracy by installing a second flow measurement system, sometimes referred to as a reference system. Agreement in measured flow rates between the two systems should be within ±10 percent of the reference rate if all conditions are as recommended for the systems.

B. FLOW MEASUREMENT COMPLIANCE

OBJECTIVES

The current NPDES program depends heavily on the permittee's submittal of self-monitoring data. The flow discharge measured during the NPDES compliance inspection should verify the flow measurement data collected by the permittee, support any enforcement action that may be necessary, and provide a basis for reissuing or revising the NPDES permit.

FLOW MEASUREMENT SYSTEM EVALUATION

The responsibility of the inspector includes collecting accurate flow data during the inspection and validating data collected during the permittee's self-monitoring.

The NPDES inspector must check both the permittee's flow data and the flow measurement system to verify the permittee's compliance with NPDES permit requirements. If a flow-measuring device is located below ground or in confined space, inspectors are not to enter

confined spaces unless trained and permitted to do so. When evaluating a flow measurement system, the inspector should consider and record findings on the following:

- Whether the system measures the entire discharge flow.
- The system's accuracy and good working order. This will include a thorough physical inspection of the system and comparison of system readings to actual flow or those obtained with calibrated portable instruments.
- The need for new system equipment.
- The existence or absence of a routine calibration and maintenance program for flow measurement equipment.

If the permittee's flow measurement system is accurate within ±10 percent, the inspector should use the installed system. If the flow sensor or recorder is found to be inaccurate, the inspector should determine whether the equipment can be corrected in time for use during the inspection. If the equipment cannot be repaired in a timely manner, use the portable flow sensor and recorder used to assess the accuracy of the permittee's system for the duration of the inspection. If nonstandard primary flow devices are being used, request the permittee to supply data on the accuracy and precision of the method being employed.

For flow measurement in pipelines, the inspector may use a portable flowmeter. The inspector should select a flowmeter with an operating range wide enough to cover the anticipated flow to be measured. The inspector should test and calibrate the selected flowmeter before use. The inspector should select the site for flow measurement according to permit requirements and install the selected flowmeter according to the manufacturer's specifications. The inspector should use the proper tables, charts, and formulas as specified by the manufacturer to calculate flow rates.

Four basic steps are involved in evaluating the permittee's flow measurement system:

- Physical inspection of the primary device
- Physical inspection of the secondary device and ancillary equipment
- Flow measurement using the primary/secondary device combination of the permittee
- Certification of the system using a calibrated, portable instrument

Facilities with a closed pipe flow measurement system present a challenge to the inspector. Have the facility personnel explain the operation of the system and how they calibrate the flow measurement system. Check if it is calibrated yearly at a minimum. It is suggested that the facility conduct periodic monthly checks of the flow measurement system. The inspector can do a calibration of the closed pipe flow measurement systems in the following ways:

1. If an open-channel primary device is maintained at the facility the inspector can obtain an instantaneous head reading to verify the accuracy of the closed channel flow measuring system. Flow should be within ±10 percent of the closed channel system.

2. The inspector can use a portable flow meter (usually consists of two strap-on sensors that mount on the pipe and utilize the Doppler principle) to verify the accuracy of the facility's flow measurement system by conducting side-by-side comparisons. Flow should be within ±10 percent.
3. Confirm that the calibration procedure demonstrated by the facility's calibration personnel is adequate.

The following sections present procedures for inspecting the more common types of primary and secondary devices, for measuring flow using common permanent and portable systems, and for evaluating flow data. Please note that the number of primary/secondary device combinations is limitless; therefore, it is not feasible to provide procedures for all systems. When encountering systems other than those discussed here the inspector should consult the manufacturer's manual or facility personnel for advice on how the flow-measurement system operates before preparing a written inspection procedure.

CLOSED CONDUIT EVALUATION PROCEDURES

For closed-channel flow, the inspector performs the following checks on the system:

- Check for straight pipe runs of sufficient length both upstream (8–10 inches) and downstream (4–6 inches) of the measuring device.
- Determine if the meter size is appropriate for pipe diameter and flow ranges based on equipment manufacturer literature.
- Determine frequency of cleaning of pressure taps.

PRIMARY DEVICE INSPECTION PROCEDURES

The two most common open-channel primary devices are sharp-crested weirs and Parshall flumes. Common sources of error when using them include the following:

- Faulty fabrication—weirs may be too narrow or not "sharp" enough. Flume surfaces may be rough, critical dimensions may exceed tolerances, or throat walls may not be vertical.
- Improper installation—the facility may install weirs and flumes too near pipe elbows, valves, or other sources of turbulence. The devices may be out of level or plumb.
- Sizing errors—the primary device's recommended applications may not include the actual flow range.
- Poor maintenance—primary devices corrode and deteriorate. Debris and solids may accumulate in them Specific inspection procedures for the sharp-crested weir, the Parshall flume, and the Palmer-Bowlus flume devices follow.

Sharp-Crested Weir Inspection Procedures

- Inspect the upstream approach to the weir.
  - Verify that the weir is perpendicular to the flow direction.

  - Verify that the approach is a straight section of conduit with a length at least 20 times the maximum expected head of liquid above the weir crest.
  - Observe the flow pattern in the approach channel. The flow should occur in smooth stream lines without velocity gradients and turbulence.
  - Check the approach, particularly near the weir, for accumulated solids, debris, or oil and grease. The approach must have no accumulated matter.

- Inspect the sharp-crested weir.
  - Verify that the crest of the weir is level across the entire conduit traverse.
  - Measure the width of the weir crest. The edge of the weir crest should be no more than 1/8-inch thick.
  - Make certain the weir crest corresponds to zero-gauge elevation (zero output on the secondary device).
  - Measure the angle formed by the top of the crest and the upstream face of the weir. This angle must be 90 degrees.
  - Measure the chamfer (beveled edge) on the downstream side of the crest. The chamfer should be approximately 45 degrees.
  - Visually survey the weir-bulkhead connection for evidence of leaks or cracks that permit bypass.
  - Measure the height of the weir crests above the channel floor. The height should be at least twice the maximum expected head (2H) of liquid above the crest.
  - Measure the width of the end contraction. The width should be at least twice the maximum expected head (2H) of the liquid above the crest.
  - Confirm the location of the head-measuring device. The device should be located upstream of the weir at a point at least four times the maximum head.
  - Inspect the weir for evidence of corrosion, scale formation, or clinging matter. The weir must be clean and smooth.
  - Observe flow patterns on the downstream side of the weir. Check for the existence of an air gap (ventilation) immediately adjacent to the downstream face of the weir. Ventilation is necessary to prevent a vacuum that can induce errors in head measurements. Also, ensure that the crest is higher than the maximum downstream level of water in the conduit.
  - Verify that the nappe is not submerged and that it springs free of the weir plate.
  - If the weir contains a V-notch, measure the apex angle. The apex should range from 22.5 degrees to 90 degrees. Verify that the head is between 0.2 and 2.0 feet. The weir should not be operated with a head of less than 0.2 feet since the nappe may not spring clear of the crest.

King's *Handbook of Hydraulics* (King, 1963) frequently referenced throughout this chapter, provides a detailed discussion on weirs.

Parshall Flume Inspection Procedures

- Inspect the overall flume design.
  - Check that the flume is in a straight section of the conduit.
  - Check that the flume design is symmetrical and level in the transverse and translational directions.
  - Check that the flume is smooth-finished and constructed using a corrosion resistant material.
  - Measure the dimensions of the flume. Dimensions are strictly prescribed as a function of throat width (see Figure O-5 in Appendix O for critical dimensions).
  - Measure the head of liquid in the flume at two-thirds upstream of the throat in the convergence section and compare with the acceptable ranges in Table O-4 in Appendix O.
  - Check that the flow at the entrance is free of turbulence or "white" water. Flows should be laminar through the flume with uniform velocities across the width of the flume. Smaller flumes should have velocities less than 0.5 meters per second. Larger flumes should have velocities less than 2 meters per second.

- Inspect the flume approach (convergent section).
  - Confirm that the upstream channel is straight, horizontal, and of a uniform cross-section for a distance that is at least ten times the flume throat width.
  - Verify that the mouth of the convergent section is as wide as the channel and that the convergent section is merged flushed against the channel wall with rounded transitions (smooth transition between convergent section and channel wall—i.e., no sharp edges) to avoid turbulence in the flow.
  - Check that the upstream channel is free of accumulated matter. Accumulated matter may be indicative of oversizing of the flume or an incorrect setting of the flume in the channel.
  - Confirm that the location of the liquid measuring device is two-thirds upstream of the throat in the convergence section.

- Inspect the flume discharge (divergent section).
  - Check that the design of the downstream channel is low enough to allow free discharge conditions in the divergent section of the flume.
  - Check that the downstream channel is also free of accumulated matter.
  - Verify that the head of water in the discharge is not restricting flow through the flume. There should not be any obstruction, constriction, or channel turns in the divergent section that may cause the flow to back up in the flume. The existence of a "standard wave" is good evidence of free flow and verifies that there is no submergence present. This must be accounted for in the calculation of flow rate through the flume as described in the next section.

  - Determine whether submergence occurs at or near maximum flow (e.g., look for water marks on the wall).

Palmer-Bowlus Flume Inspection Procedures

- Inspect the overall flume design as outlined above. These flumes are seldom used for effluent flow measurement.
- Inspect the flume.
  - The flume should be in a straight section of the conduit.
  - Flow at the entrance should be free of "white" water.
  - Observe the flow in the flume. The profile should approximate that depicted in Figure O-8 in Appendix O.
  - The flume should be level in the transverse direction and should not exceed the translational slope in Table O-6 in Appendix O.
  - Measure the head of water in the flume. Head should be within the ranges specified in Table O-6 in Appendix O.
- Inspect the flume discharge.
  - Verify that free flow exists. Look for the characteristic "standing wave" in the divergent section of the flume.

Venturi Meter Inspection Procedures

- Verify that the facility installed the Venturi meter according to manufacturer's instructions.
- Verify that the facility installed the Venturi meter downstream from a straight and uniform section of pipe, at least 5 to 20 diameters, depending on the ratio of pipe to throat diameter and whether straightening vanes are installed upstream. (Installation of straightening vanes upstream will reduce the upstream piping requirements.)
- Verify that the pressure measuring taps are free of debris and are not plugged.
- Verify the facility calibrated the Venturi meter in place by either the volumetric method or the comparative dye dilution method to check the manufacturer's calibration curve or to develop a new calibration curve.

SECONDARY DEVICE INSPECTION PROCEDURES

The following are common sources of error in the use of secondary devices:

- Improper location—gauge is in the wrong position relative to the primary device.
- Inadequate maintenance—gauge is not serviced regularly.
- Incorrect zero setting—zero setting of gauge is not the zero point of the primary device.
- Operator error—human error exists in the reading.

Flow Measurement Procedures in Weir Applications

- Determine that the head measurement device is positioned 3 to 4 head lengths upstream of a weir.
- Verify that the zero or other point of the gauge is equal to that of the primary device.

The inspector should use an independent method of measuring head, such as with a yardstick or carpenter's rule (be sure to take your measurement at least four times the maximum head upstream and from the weir and convert to nearest hundredth of a foot). To determine flow rate, use the appropriate head discharge relationship formula (see Table O-1 in Appendix O).

Flow Measurement Procedures in Parshall Flume Applications

Flow Measurement—Free-Flow Conditions.

- Determine upstream head (H_a) using staff gauge.
  - Verify that staff gauge is set to zero head. Use either a yardstick or carpenter's rule.
  - Verify that staff gauge is at proper location (two-thirds the length of the converging section back from the beginning of the throat).
  - Read to nearest division the gauge division at which liquid surface intersects gauge.
  - Read H_a in feet from staff gauge.
- To determine flow rate, use Figure N-6 in Appendix O in the unit desired, use tables published in flow measurement standard references, or calculate using the coefficients in Table O-5 in Appendix O.

Flow Measurement—Submerged-Flow Condition.

Generally, it is difficult to make field measurements with submerged-flow conditions. In cases when measurements can be obtained (using a staff or float gauge), the procedures listed below should be followed:

- Determine upstream head using staff or float gauge.
  - Read to nearest division and, at the same time as for H_b, the gauge division at which liquid surface intersects gauge.
  - Calculate H_a from gauge reading.
- Determine downstream head (H_b) using staff or float gauge.
  - H_b refers to a measurement at the crest.
  - Read to nearest division, and at the same time as for H_a, the gauge division at which liquid surface intersects gauge.
  - Calculate H_b from staff reading.
- Determine flow rate.
  - Calculate percent submergence:

$$\left[\frac{H_b}{H_a}\right] \times 100$$

- Consult Table O-6 in Appendix O.
- When a correction factor is obtained, use H_a and find free-flow from Figure I-6.
- Multiply this free-flow value by the correction factor to obtain the submerged flow.

The inspector may use an independent method of measuring head, such as a yardstick or carpenter's rule at the proper head measurement point. Because of the sloping water surface in the converging section of a flume, it is essential that the proper head measurement point be used.

Flow Measurement in Palmer-Bowlus Flume Applications

- Obtain head measurements as in the Parshall Flume application, using the secondary device. The head is the height of water above the step. The total depth upstream of the step is not the head.
- Refer to manufacturer-supplied discharge tables to convert head measurements to flow data. Palmer-Bowlus flumes, unlike Parshall flumes, are not constructed to standard dimensional standards. The inspector must not use discharge tables supplied by other manufacturers.

Verification

Most flow measurement errors result from inadequate calibration of the flow totalizer, and recorder. If the inspector has determined that the primary device has been installed properly, verification of the permittee's system is relatively simple. Compare the flow determined from the inspector's independent measurement to the flow of the permittee's totalizer or recorder. The permittee's flow measurements should be within 10 percent of the inspector's measurements to certify accurate flow measurement. Optimally, flow comparisons should be made at various flow rates to check system accuracy.

When the permit requires that the daily average flow be measured by a totalizing meter, the inspector should verify that the totalizer is accurate (i.e., properly calibrated). This can be done during a period of steady flow by reading the totalizer and at the same time starting a stopwatch. Start the stopwatch just as a new digit starts to appear on the totalizer. After 10 to 30 minutes, the totalizer should be read again; just as a new digit begins to appear, the stop watch is read. Subtract the two totalizer readings to determine, the total flow over the measured time period. Calculate the flow rate in gallons per minute by using the time from the stopwatch. Compare this flow rate to the flow determined by actual measurement of the head made at the primary device at the time interval. Consider the calibration of the totalizer satisfactory if the two flows are within 10 percent of each other, when the actual measured flow is used as the known value, or divisor, in the percent calculation.

C. REFERENCES

The following is a list of resources providing additional information on flow measurement.

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D. FLOW MEASUREMENT INSPECTION CHECKLIST

A. GENERAL				
Yes	No	N/A	1.	a. Primary flow measuring device properly installed and maintained.
Yes	No	N/A		b. Flow measured at each outfall? _____ Number of outfalls? _____
Yes	No	N/A		c. Is there a straight length of pipe or channel before and after the flowmeter of at least 5 to 20 diameter lengths?
Yes	No	N/A		d. If a magnetic flowmeter is used, are there sources of electric noise in the near vicinity?
Yes	No	N/A		e. Is the magnetic flowmeter properly grounded?
Yes	No	N/A		f. Is the full pipe requirement met?
Yes	No	N/A	2.	a. Flow records properly kept.
Yes	No	N/A		b. All charts maintained in a file.
Yes	No	N/A		c. All calibration data entered into a logbook.
Yes	No	N/A	3.	Actual discharged flow measured.
Yes	No	N/A	4.	Effluent flow measured after all return lines.
Yes	No	N/A	5.	Secondary instruments (totalizers, recorders, etc.) properly operated and maintained.
Yes	No	N/A	6.	Spare parts stocked.
Yes	No	N/A	7.	Effluent loadings calculated using effluent flow.
B. FLUMES				
Yes	No	N/A	1.	Flow entering flume reasonably well-distributed across the channel and free of turbulence, boils, or other disturbances.
Yes	No	N/A	2.	Cross-sectional velocities at entrance relatively uniform.
Yes	No	N/A	3.	Flume clean and free of debris and deposits.
Yes	No	N/A	4.	All dimensions of flume accurate and level.
Yes	No	N/A	5.	Side walls of flume vertical and smooth.
Yes	No	N/A	6.	Sides of flume throat vertical and parallel.
Yes	No	N/A	7.	Flume head being measured at proper location.
Yes	No	N/A	8.	Measurement of flume head zeroed to flume crest.
Yes	No	N/A	9.	Flume properly sized to measure range of existing flow.
Yes	No	N/A	10.	Flume operating under free-flow conditions over existing range of flows.
Yes	No	N/A	11.	Flume submerged under certain flow conditions.
Yes	No	N/A	12.	Flume operation invariably free-flow.

C. WEIRS				
Yes	No	N/A	1.	What type of weir does the facility use?
Yes	No	N/A	2.	Weir exactly level.
Yes	No	N/A	3.	Weir plate plumb and its top and edges sharp and clean.
Yes	No	N/A	4.	Downstream edge of weir is chamfered at 45°.
Yes	No	N/A	5.	Free access for air below the nappe of the weir.
Yes	No	N/A	6.	Upstream channel of weir straight for at least four times the depth of water level and free from disturbances.
Yes	No	N/A	7.	Distance from sides of weir to side of channel at least 2H.
Yes	No	N/A	8.	Area of approach channel at least (8 × nappe area) for upstream distance of 15H.
Yes	No	N/A	9.	If not, is velocity of approach too high?
Yes	No	N/A	10.	Head measurements properly made by facility personnel.
Yes	No	N/A	11.	Leakage does not occur around weir.
Yes	No	N/A	12.	Use of proper flow tables by facility personnel.
D. OTHER FLOW DEVICES				
			1.	Type of flowmeter used:
			2.	What are the most common problems that the operator has had with the flowmeter?
			3.	Measured wastewater flow: _____ MGD; Recorded flow: _____; Error _____%
E. CALIBRATION AND MAINTENANCE				
Yes	No	N/A	1.	Flow totalizer properly calibrated.
			2.	Frequency of routine inspection by proper operator: _____/day.
			3.	Frequency of maintenance inspections by plant personnel: _____/year.
Yes	No	N/A	4.	Flowmeter calibration records kept. Frequency of flowmeter calibration: _____/month.
Yes	No	N/A	5.	Flow measurement equipment adequate to handle expected ranges of flow rates.
Yes	No	N/A	6.	Calibration frequency adequate.

b. The individual(s) who performed the sampling or measurements;

c. The date(s) and time(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

5. MONITORING PROCEDURES

a. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit or approved by the Regional Administrator.

b. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instruments at intervals frequent enough to insure accuracy of measurements and shall maintain appropriate records of such activities.

c. An adequate analytical quality control program, including the analyses of sufficient standards, spikes, and duplicate samples to insure the accuracy of all required analytical results shall be maintained by the permittee or designated commercial laboratory.

6. FLOW MEASUREMENTS

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes.

D. REPORTING REQUIREMENTS

1. PLANNED CHANGES

a. INDUSTRIAL PERMITS

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b); or,

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements listed at Part III.D.10.a.

b. MUNICIPAL PERMITS

Any change in the facility discharge (including the introduction of any new source or significant discharge or significant changes in the quantity or quality of existing discharges of pollutants) must be reported to the permitting authority. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. ANTICIPATED NONCOMPLIANCE

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. TRANSFERS

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act.

4. DISCHARGE MONITORING REPORTS AND OTHER REPORTS

Monitoring results must be reported to EPA on either the electronic or paper Discharge Monitoring Report (DMR) approved formats. Monitoring results can be submitted electronically in lieu of the paper DMR Form. To submit electronically, access the NetDMR website at www.epa.gov/netdmr and contact the R6NetDMR.epa.gov in-box for further instructions. Until you

Exhibit (how to calibrate)

Flow Meter Calibration

Prepared by Robert George, NMED-GWQB

Definition of Flow Meter Calibration

The Bureau of Reclamation's *Water Measurement Manual* defines calibration as:

"**Calibration** is the process used to check or adjust the output of a measuring device in convenient units of gradations. During calibration, manufacturers also determine robustness of equation forms and coefficients and collect sufficient data to statistically define accuracy performance limits. In the case of long-throated flumes and weirs, calibration can be done by computers using hydraulic theory. Users often do less rigorous calibration of devices in the field to check and help correct for problems of incorrect use and installation of devices or structural settlement. A calibration is no better than the comparison standards used during calibration."

This definition makes clear that calibration is the act of comparing and adjusting a measuring device against a standard. It also highlights that there are different levels of calibration that are performed for different purposes. NMED has proposed that all flow measurement devices be calibrated in-place, under actual operating conditions (field calibration) to within ± 10% of the actual flow. Calibrations are required following the installation of a device, repair of a device and annually thereafter. This proposal fits the latter description of calibration from the definition above, which is a calibration performed by users to a less rigorous standard for the purposes of checking and correcting problems with newly installed or repair devices or for devices that have been affected over the course of time. It is not intended to require a rigorous field calibration to determine the maximum accuracy that a manufactured device is capable of achieving in a particular setting, which NMED recognizes would be overly time-consuming, difficult and costly.

The Need for Flow Meter Equipment Field Calibration

The need for field flow meter equipment calibration is not obvious to some. Devices are frequently sold with statements that no calibration is required in order to achieve a stated accuracy, provided the device is installed and maintained in accordance with specific requirements. In the case of an ideal installation, this statement may be true. However, what is not considered is that: (1) most installation situations require compromise which leads to less that ideal installation conditions, (2) there are a wide variety of errors that can contribute to inaccuracy and these often go unidentified, and; (3) degradation tends to affect the accuracy of all installations over time in a manner that cannot be predicted. Without field calibration of flow measurement devices, NMED has no way of determining that gross inaccuracy of a flow measurement device does not exist. To this

EXHIBIT 124-5

end, NMED is less concerned with absolute precision than with verifying that measurements are reasonably accurate and repeatable over time.

Definition of Terms Related to Calibration Accuracy
(Adapted from the Bureau of Reclamation's Water Measurement Manual)

Precision is the ability to produce the same value within given accuracy bounds when successive readings of a specific quantity are measured. Precision represents the maximum departure of all readings from the mean value of the readings. Thus, a measurement cannot be more accurate than the inherent precision of the combined primary and secondary device precision.

Error is the deviation of a measurement, observation, or calculation from the truth. The deviation can be small and inherent in the structure and functioning of the system and be within the bounds or limits specified. Lack of care and mistakes during fabrication, installation, and use can often cause large errors well outside expected performance bounds. Since the true value is seldom known, some investigators prefer to use the term uncertainty.

Spurious errors are commonly caused by accident, resulting in false data. Misreading and intermittent mechanical malfunction can cause discharge readings well outside of expected random statistical distribution about the mean. A hurried operator might incorrectly measure discharge on a staff gauge. Spurious errors can be minimized by good supervision, maintenance, inspection, and training. Experienced, well-trained operators are more likely to recognize readings that are significantly out of the expected range of deviation. Unexpected blockages of flow in the approach or in the device itself can cause spurious errors. Repeating measurements does not provide any information on spurious error unless repetitions occur before and after the introduction of the error. On a statistical basis, spurious errors confound evaluation of accuracy performance.

Systematic errors are errors that persist and cannot be considered entirely random. Systematic errors are caused by deviations from standard device dimensions. Systematic errors cannot be detected by repeated measurements. They usually cause persistent error on one side of the true value. For example, error in determining the crest elevation for setting staff or recorder chart gage zeros relative to actual elevation of a weir crest causes systematic error. The error for this case can be corrected when discovered by adjusting to accurate dimensional measurements. Worn, broken, and defective flow meter parts, such as a permanently deformed, over-stretched spring, can cause systematic errors. This kind of systematic error is corrected by maintenance or replacement of parts or the entire meter. Fabrication error comes from dimensional deviation of fabrication or construction allowed because of limited ability to exactly reproduce important standard dimensions that govern pressure or heads in measuring devices. Allowable tolerances produce small systematic errors which should be specified.

Calibration equations can have systematic errors, depending on the quality of their derivation and selection of form. Equation errors are introduced by selection of equation forms that usually only approximate calibration data. These errors can be reduced by finding better equations or by using more than one equation to cover specific ranges of measurement. In some cases, tables and plotted curves are the only way to present calibration data.

Random errors are caused by such things as the estimating required between the smallest division on a head measurement device and water surface waves at a head measuring device. Loose linkages between parts of flow meters provide room for random movement of parts relative to each other, causing subsequent random output errors. Repeating readings decreases average random error by a factor of the square root of the number of readings.

Total error of a measurement is the result of systematic and random errors caused by component parts and factors related to the entire system. Sometimes, error limits of all component factors are well known. In this case, total limits of simpler systems can be determined by computation. In more complicated cases, different investigators may not agree on how to combine the limits. In this case, only a thorough calibration of the entire system as a unit will resolve the difference. In any case, it is better to do error analysis with data where entire system parts are operating simultaneously and compare discharge measurement against an adequate discharge comparison standard.

Comparison standards for water measurement are systems or devices capable of measuring discharge to within limits at least equal to the desired limits for the device being calibrated. Outside of the functioning capability of the primary and secondary elements, the quality of the comparison standard governs the quality of calibration.

Discrepancy is simply the difference of two measurements of the same quantity. Even if measured in two different ways, discrepancy does not indicate error with any confidence unless the accuracy capability of one of the measurement techniques is fully known and can be considered a working standard or better.

Flow Measurement Device Field Calibration

NMED is seeking to have initial and routine calibrations performed on flow measurement devices under actual operating conditions (field calibrations). Field calibrations of this type are to be performed by individuals knowledgeable in flow measurement and in the installation/operation of the particular device. As mentioned before, this type of calibration is performed for the purposes of checking and correcting problems with newly installed or repaired devices or for devices that may have been affected over the course of time and is recognized to be held to a less rigorous standard than a full characterization of a device to it maximum accuracy. NMED is proposing that accuracy of flow measuring devices be maintained to within ± 10% of the comparison standard discharge (actual

flow). The acceptable level of accuracy to be attained by the comparison standard discharge is at least equal to that of the allowable error of the device being calibrated (± 10%). The comparison standard is accepted to be "actual flow" but understood to contain some (undetermined) systematic and random level of error, although reasonable efforts should be made to minimize both. Spurious errors in establishing the comparison standard are to be largely avoided by careful oversight.

Typically during field calibration, the measurement output of the flow measurement device is evaluated at a stable discharge rate against the comparison standard. The discrepancy between the indicated discharge for the device and the actual flow (as determined by the comparison standard) is use to calculate percent of error (offset) as follows:

$$E_{\%Q_{Cs}} = \frac{100(Q_{Ind} - Q_{Cs})}{Q_{Cs}}$$

Where:

Q_{Ind} = *indicated discharge from device output*
Q_{Cs} = *comparison standard discharge concurrently measured in a more precise way*
$E\%Q_{Cs}$= *offset error in percent of comparison standard discharge*

The level of error detected during the calibration represents the positive or negative offset of the device from the actual flow. Technically, this is not a statistically appropriate representation of the measurement error of the device, because no attempt at characterizing the accuracy of the calibration standard or of the discrepancy of the output of the device from the calibration standard throughout the measurement range (zero, mid-range and full scale) is made. Additionally, the level of inaccuracy allowable (± 10%) is not defined in terms of scale (zero, mid-range, full scale), so ±10% is potentially acceptable at any range. However, because NMED is less concerned with absolute precision than with attaining a reasonable accuracy and a reasonable degree of repeatability, this level of calibration measurement is sufficient for this purpose. More sophisticated statistical analysis of the accuracy of a measurement device will be accepted by NMED, provided it follows accepted principals for calibration.

If the offset of the device is beyond the bounds of ± 10% of the calibration standard, adjustment of the device to bring it within these bounds is appropriate and should be attempted and the calibration rechecked. If the device shows a high level of inaccuracy beyond these bounds, displays an inability to repeat a measurement (within the same bounds), or calibration to within ± 10% cannot be attained, a faulty device or non-standard installation may be indicated and more in-depth investigation and device repair/replacement may be warranted.

Calibration of Hydraulic Structure Primary Measuring Devices

Hydraulic structure primary measuring devices are capable of accuracies of varying degree, dependent upon the device type and the range that it is operating in (scale) compared with its design range (full scale). Virtually all hydraulic structure primary measuring devices are capable of accuracies within ± 10% when installed in accordance with the specific requirements for each unique device. Beneficially, under most circumstances, the errors that can adversely affect the accuracy of hydraulic structure primary measuring devices are relatively limited and easy to detect. Should a hydraulic structure be installed improperly or damaged in place, problems with its operation can be readily identified by visual inspection (provided the inspector has an understanding of the function of the particular structure type). Once identified, most problems are easily corrected. Put simply, this class of device is fairly easy to install in a manner that will produce reasonably accurate results and the causes of inaccuracy are readily indentified.

Because of these two characteristics, hydraulic structure primary measuring devices, when installed correctly, constitute a suitable comparison standard discharge (in and of themselves) which can therefore be used to represent "actual flow" for the purposes of calibrating secondary devices (head sensing, readout and totalizers). For this reason, NMED is not seeking field calibration of *standard* hydraulic structure primary measuring devices. The ability to act as a calibration standard and the inherit simplicity of these devices, accounts for their widespread use throughout the water supply, wastewater treatment and agricultural industries.

Calibration of Head Sensing, Readout and Totalizing Secondary Devices

In the case of head sensing, readout and totalizing equipment, initial and routine calibration/adjustment by comparison to the hydraulic structure primary measuring device is necessary to ensure that accurate flow measurements are first established and then maintained. NMED is proposing that calibrations be performed initially and then annually thereafter. When an initial or routine calibration is performed, the degree of inaccuracy (positive or negative offset) is characterized in relation to the flow in the hydraulic structure primary device.

Calibration of Commercial Velocity Sensing Meters

Commercial meters are sold with the device's stated accuracy clearly identified. Many meters claim that the device is sold pre-calibrated and that no field (sometimes referred to as "wet") calibration is needed. Some of the newest velocity sensing meters do allow diagnostics of the primary device elements (e.g. mag-meters often have the ability to self check their magnetic field characteristics), but they do not provide a suitable comparison standard discharge in and of themselves. Furthermore, what is not typically clear is that any deviation from the laboratory conditions under which the device was calibrated can result in inaccuracy. For example; the application of a device that was calibrated on

clean water to measuring wastewater with a high concentration of suspended solids could greatly affect accuracy. Unexpected (or detected) turbulence induced prior to a meter can result in very different performance than during calibration conditions. The length of pipe prior to and after a meter, the pipe material and even the roughness of the interior surface of the pipe can affect accuracy. The incident angle that a device is mounted at can affect accuracy and function. In fact, a great number of systematic, random and spurious errors can contribute to inaccuracies in real world conditions. Worse, these errors are generally not readily observable or measurable in closed-pipe systems and therefore not easily detected. NMED has no way of ensuring that closed-pipe flow measurement devices have been installed and are operating completely within the manufacturer's requirements, and therefore capable of accurate flow measurement. For this reason, field calibration of the primary and secondary elements of commercial closed-pipe velocity sensing meters is critical.

The selection of a suitable comparison standard discharge for the field calibration of commercial velocity sensing meters requires skill and knowledge about flow measurement. NMED is seeking to have individuals knowledgeable in flow measurements with the particular device in use develop and perform field calibrations. Examples of the type of comparison standard discharges that could be utilized for field commercial meter calibrations include:

- Volume/time comparison, where a known volume of liquid moves through the meter in a known amount of time. For example, the liquid level in a sump of known dimensions is measured before and after a pump moves liquid from the sump and through the meter over a five minute interval. By calculating the volume of liquid pumped in five minutes, a comparison standard discharge can be established. The totalized meter reading discrepancy from the actual flow for the five minute interval can be determined and the meter offset calculated. Errors of measurement and timing must be controlled.
- A standard hydraulic device primary measuring structure, such as an orifice plate can be inserted in the pipe metered by the device in question. Head readings taken at standard locations before and after the orifice plate can be used to determine the discharge (using an equation or table specific for the orifice plate) and the discharge can be used as a comparison standard discharge. Care must be taken in the centering of the orifice plate and in the head readings. The method can typically only be employed on wastewater for short calibration durations due to plugging at the head measurement locations.
- A standard hydraulic structure primary measuring device, such as a weir or flume can be constructed at the outlet of the discharge stream so that the actual discharge can be determined from the weir or flume for comparison by the close-pipe measuring device output.

NMED acknowledges that field calibration of commercial in-pipe meters can be difficult to accomplish under many circumstances but contends that field calibrations are necessary to eliminate gross inaccuracies of flow measurements at dairy facilities. NMED is seeking to have field calibration procedures outlined by dairy facilities (as

opposed to requiring specific approaches) to allow the use of the least expensive, most easily accomplished procedure for a given facility. NMED is proposing that calibration procedures be performed by individuals with experience in flow measurement and the use of the particular device in question. NMED anticipates that a variety of calibration methods will be used, as applicable in various settings.

Flow Meter Calibration Reports

NMED is proposing to have dairy facilities submit a flow meter calibration report annually to demonstrate that flow measurements are achieving the required level of accuracy. The reports are required to contain an identification of the flow meter consistent with the Discharge Permit, the location of the meter, the method of flow meter calibration employed (assumed to be a narrative description), the measured accuracy of the meter before and after adjustment and a list of any repairs made to the meter in the previous year.

The report is to be submitted in the facility's monitoring report due by May 1 of each year.

References

United States Department of the Interior, Bureau of Reclamation, *Water Measurement Manual*, Revised Reprint 2001, available at:
http://www.usbr.gov/pmts/hydraulics_lab/pubs/wmm/

United States Department of the Interior, Environmental Protection Agency, NPDES Compliance Inspection Manual, Chapter 6, Flow Measurement, available at:
http://www.epa.gov/compliance/resources/publications/monitoring/cwa/inspections/npdesinspect/npdesmanual.html

DP-1132 LANL RLWTF

Bob Beers
Los Alamos National Security, LLC

Public Hearing
April 19, 2018

UNCLASSIFIED

LA-UR-17-31367

LANS/DOE
Exhibit 6

Qualifications: Experience & Education

- Employed by LANL as an Environmental Professional
- 20+ yrs. of experience in discharge permit management
- Currently manage 4 discharge permits and 1 application
- Serve as single point of contact with NMED GWQB for NM WQCC regulatory compliance
- Bachelors of Science from Cornell University, Ithaca, NY
- Masters in Water Resources Administration from UNM, Albuquerque, NM

DP-1132 Permitting History

- RLWTF at Technical Area (TA)-50
  - Pre-dates 1978 NM Water Quality Act and the June 18, 1977 permit application requirement in 20.6.2.3106.A NMAC
  - April 1996: NMED requests a DP application
  - August 1996: LANL submits 1st DP application
  - November 2011: NMED requests a new, comprehensive, and updated DP application
  - February 2012: LANL submits 2nd DP application
  - May 2017: NMED issues final draft permit DP-1132

DP-1132 Permit Application Coverage

- What is covered by DP-1132?
  - All future discharges from the RLWTF to these:
    - ✓ Solar Evaporation Tank System (SET)
    - ✓ Mechanical Evaporation System (MES)
    - ✓ NPDES Permitted Outfall 051
  - Existing Low-Level & TRU treatment at TA-50
  - New WMRM tanks for influent storage
  - New Low-Level Treatment Facility

DP-1132 Coverage: SET

SET: One Tank, Two Cells
Tank Dimensions: ~500 ft long, ~70 ft wide
Tank Capacity: ~760,000 gal @ 3 ft deep

DP-1132 Coverage: MES

MES: Natural gas-fired mechanical evaporator

DP-1132 Coverage: NPDES Outfall 051

NPDES Outfall 051 in Effluent Canyon (a tributary to Mortandad Canyon)

DP-1132 Coverage: WMRM Facility

WMRM Tanks: 6 influent storage tanks, 50,000 gal each

DP-1132: NMED Permitting Activity: 2012-2018

- New application submitted in February 2012
- Approximately 25 technical meetings in 56 months
- Approximately 6 meetings w/ NGOs in 22 months to negotiate draft permit conditions
- Multiple draft permits for NGOs & LANL review
- Multiple tours of the RLWTF by NMED
- RLWTF tour by ~10 individuals from NGOs
- Final draft permit for Public Notice (PN2): May 2017
- Reissuance of PN2: March 2018
- Public hearing: April 2018

DP-1132: Substantial Changes to the Draft Permit Prompted by NGO Participation

- LANL Electronic Reading Room posting requirements
- More rigorous discharge flow meter accuracy
- Adding ‘Calibration’ definition to the draft permit
- Soil moisture monitoring baseline prior to using SET
- Action Level for the Soil Moisture Monitoring System
- Two new alluvial wells in Mortandad Canyon
- Developed detailed Closure Plan to facilitate public input

DP-1132: Draft Permit Approves New Systems and is Protective of Groundwater

- New WMRM tanks for influent storage
- New Solar Evaporative Tank System (SET)
- New SET Soil Moisture Monitoring System
- New water tightness testing requirements
- New alluvial groundwater monitoring wells
- Routine monitoring at groundwater wells, SET, MES and Outfall
- Operational Plan requirements for discharges
- Extensive Engineering and Administrative Controls
- Annual updates to the Closure Plan

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLCIATION OF THE UNITED STATES DEPARTMENT OF ENERGY AND LOS ALAMOS NATIONAL SECURITY, LLC FOR A GROUND WATER DISCHARGE PERMIT (DP-1132) FROM THE RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

No. GWB 17-20(P)

PRE-FILED TECHNICAL TESTIMONY OF MR. DANNY KATZMAN, A WITNESS ON BEHALF OF LOS ALAMOS NATIONAL SECURITY, LLC

I. Introduction to My Testimony

My name is Danny Katzman. I am testifying as an expert witness in support of the New Mexico Environment Department's ("NMED") draft discharge permit 1132 ("Draft DP-1132") in this proceeding. This testimony begins with an overview of my credentials. I will then go on to discuss NMED's proposed groundwater monitoring at Los Alamos National Laboratories ("LANL") that is set forth in Draft DP-1132. I will specifically explain the complex hydrogeologic setting at LANL, the adequacy of the proposed groundwater monitoring under Draft DP-1132, the quality of the monitoring wells that are proposed to be used for groundwater monitoring under Draft DP-1132, and finally will provide some information about pre-existing conditions at LANL that are relevant to Draft DP-1132.

I fully understand the importance of sound and appropriate monitoring requirements of a discharge permit, especially with respect to environmental protection. I served as LANL's technical lead for discussions of monitoring requirements that are included in Draft DP-1132, and am intimately familiar with the hydrogeologic setting that provides the basis for the monitoring configuration and approach in the draft permit. Based on this knowledge and

LANS/DOE Exhibit 7

expertise and for the reasons set forth in my testimony, Draft DP-1132 is protective of New Mexico's groundwater resources and should be approved.

II. Statement of My Qualifications and Relevant Experience.

My Resume is attached as LANS/DOE Exhibit 8. I received a Bachelor of Science degree in geology from the University of Texas in Austin in 1985 and a Master of Science in geology, with honors, from the University of New Mexico in 1991. I have twenty-four years of experience working with multidisciplinary teams implementing innovative environmental site investigations and remediation. My focus since 2004 has been on groundwater investigations, groundwater program development and management, fate and transport analysis, conceptual model development, geomorphic and geologic studies, development of innovative analytical techniques for expedited field characterization and remediation, decision analysis, waste management, and EVMS baseline management.

My work as a hydrogeologist is extensive. I worked at the NMED from 1991-1993. In my two years at the NMED, my responsibilities included groundwater-related regulatory work, including regulatory issues at LANL. I then worked as a consultant to LANL's environmental program from 1993-1998 as a senior geologist. I began working as a LANL employee, where I am currently employed, in 1998. My work at LANL has been focused in groundwater issues since 2004.

My current title at LANL is Technical Program Manager for the Associate Directorate for Environmental Management. My current responsibilities include technical oversight over LANL's groundwater program. I am specifically responsible for oversight of groundwater monitoring well installation, monitoring, and remediation. I also currently serve as technical lead for LANL's Chromium Project. In this capacity, I have been intimately involved with

NMED on the development of the monitoring requirements in two separate discharge permits that are integral to LANL's technical strategy for mitigation of the chromium plume beneath LANL. I have extensive experience with regulatory compliance at LANL, and am very familiar with state rules and regulatory programs related to groundwater protection, including discharge permits.

III. Hydrogeologic Setting for Groundwater Monitoring at LANL

A. Groundwater Occurrences

i. Overview of Groundwater at LANL

In order to understand the proposed permit requirements set forth in Draft DP-1132, it is essential to understand the complex hydrogeology that exists at LANL. This section of my testimony is intended to provide an overview of groundwater occurrences at LANL. I would like to clarify that when I refer to groundwater in my testimony, I am simply referring to water that is beneath the ground surface, and am not using the term as it is defined by the NMED ground and surface water regulations. See 20.6.2.7.Z NMAC (which defines "ground water" as "interstitial water which occurs in saturated earth material and which is capable of entering a well in sufficient amounts to be utilized as a water supply").

There are three depths of groundwater occurrences that are present beneath LANL (Figure 1). The groundwater occurrence nearest to the ground surface is called alluvial groundwater. When alluvial groundwater is present, it occurs at the bottom of canyons. Sources of alluvial groundwater can include natural runoff from the mountains to the west of LANL, and, in some cases, permitted effluent associated with LANL operations. Alluvial groundwater fills loose sand and gravel, is generally only a few feet below ground surface, and most often is only a few feet thick. Alluvial groundwater sits "perched" on underlying bedrock, because the bedrock

has lower permeability than the overlying alluvium. Alluvial groundwater can percolate downward into underlying bedrock where conditions are favorable, including along canyon reaches with fault-related fractures, or into bedrock layers with sufficiently high permeability to allow water to infiltrate. Alluvial groundwater is present in "Effluent Canyon" at the location of NPDES Outfall 051, which was historically a source recharge to alluvial groundwater in the Effluent Canyon. Alluvial groundwater flow at LANL is downcanyon (to the east), because the canyon floors slope to the east causing the water to drain in that direction.

The next groundwater occurrence from the ground surface is called perched-intermediate groundwater (Figure 1). Where present, it generally occurs beneath canyons that have persistently large amounts of surface water and alluvial groundwater. Occurrences of perched-intermediate groundwater also rely on the presence of geologic layers at depth with relatively low permeability causing infiltrating alluvial groundwater to collect (perch) on and within the low-permeability layers. Groundwater flow directions within the perched-intermediate groundwater can be in any direction and are generally governed by the slope of the perching layer(s). Depths of perched-intermediate groundwater vary widely across LANL, but are generally several hundred feet below ground surface. Drilling that has been conducted across LANL indicates that the perched-groundwater is of limited lateral extent and occurs as stair-step like groundwater zones that may interconnect vertically where perched water "spills" off the edge of laterally discontinuous perching layers or infiltrates through fractures. Drilling conducted in the area near Radioactive Liquid Waste Treatment Facility ("RLWTF") has not identified the presence of perched-intermediate groundwater, although it is present in the subsurface approximately two miles downcanyon of the facility and NPDES Outfall 051.

The deepest of the three groundwater occurrences is groundwater located in the regional aquifer (Figure 1). The regional aquifer constitutes the large groundwater zone that is the source of water supply for Los Alamos County ("LAC") and LANL. The depth of the regional aquifer below ground surface ranges from greater than 1400 feet in the western portion of LANL to less than 800 feet below ground surface east of the Laboratory. Groundwater flow is generally from west to east and southeast, but can have local-scale variability depending on recharge areas and orientation of the sedimentary layers that make up the regional aquifer. Many of LAC's water-supply wells are located within LANL's property; LAC operates its water-supply wells and distribution and treatment systems. The nearest water supply well is PM-5 approximately approximately one mile downgradient from the RLWTF/mechanical evaporation system ("MES") area, and approximately two-thirds of a mile downgradient from the solar evaporation tanks ("SET").

B. Water Flow Through Groundwater Occurrences at Proposed Discharge Points at LANL

The time for water and soluble contaminants to travel from the alluvial groundwater to the regional aquifer varies widely across the LANL area. Beneath wet canyons, where alluvial groundwater and perched-intermediate groundwater are present and persistent, travel times for water, and associated dissolved contaminants, to the regional aquifer may be as short as approximately 5-10 years. Beneath dry canyons and dry mesas, travel times are at least several hundred years. Birdsell, et al., 2005. Mesa-top areas that are persistently wet because of disturbances, such as basins or impoundments, have travel times that may be as short as several years, similar to the travel time of water through wet canyons.

Effluent Canyon, where NPDES Outfall 051 is located, is generally considered a wet canyon largely because of historical discharges from Outfall 051. Effluent Canyon has its headwaters on the Pajarito Plateau, within LANL property and not within the mountain-front uplands to the west of the LANL, where there is very little natural continuous runoff. Although the Pajarito Plateau is not an area associated with a watershed that may receive seasonal snowmelt or have a large drainage basin area, there is still sufficient runoff from rainfall and snowmelt from surrounding paved areas to create alluvial groundwater that can extend several kilometers downcanyon during particularly wet periods and/or periods of continuous effluent releases (such as those historically associated with Outfall 051).

The mesa-top area where the RLWTF and mechanical evaporator system are located is considered a dry location. Although the RLWTF/MES area does constitute a disturbed area, there are no facilities or conditions where water will be impounded and come in direct contact with underlying disturbed ground surface that would allow for infiltration of groundwater. Additionally, as I discuss later in my testimony, all facilities in the RLWTF/MES will incorporate engineering controls that do not allow for infiltration to occur. Furthermore, administrative controls will ensure that accidental releases are caught with early detection and stopped before they can infiltrate groundwater.

Unlike the RLWTF/MES area, the SET area is a good example of a disturbed area where water impoundment under this permit could potentially result in enhanced infiltration rates more similar to the wet canyons described above if impoundment led to a long-term undetected release. As described above, typically the hydrology of a dry mesa setting is such that infiltration to deep groundwater zones would be unlikely or take several hundred years. However, under the unlikely scenario of a long-term undetected release, infiltration to deep groundwater zone would

be more feasible and would also occur over much shorter timeframes than from a typical dry mesa setting. As I discuss later in my testimony, pursuant to the conditions of Draft DP-1132, LANL will incorporate engineering controls at the SET that will not allow for infiltration to occur. Furthermore, administrative controls will ensure that accidental releases are caught with early detection and stopped before they can infiltrate to groundwater.

IV. Proposed Groundwater Monitoring in Draft DP-1132

The following portion of my testimony details the groundwater monitoring strategy associated with each discharge point identified in Draft DP-1132.

Draft DP-1132 proposes a comprehensive groundwater monitoring plan, which includes monitoring systems, a set of monitoring wells and associated monitoring strategies. The monitoring approach outlined in Draft DP-1132 is specifically designed to support early-detection, which includes early detection of a noncompliant discharge as well as early detection of environmental impacts that may result from a noncompliant discharge. The approach provides a defenses-in-depth strategy, where groundwater monitoring is conducted ensure that groundwater and environmental protection is achieved.

Two figures, Figure 2 and Figure 3, show the monitoring network set forth in Draft DP-1132. Figure 2 shows the monitoring wells in "map view" and Figure 3 shows the wells superimposed on a cross section that illustrates the geology that exists beneath and around the RLWTF. The geology represented in Figure 3 is interpreted from geologic data collected from numerous boreholes and wells near and surrounding the RLWTF, and are based on decades of geologic studies conducted by LANL and contractor staff, including early drilling conducted by the United States Geologic Survey.

A. NPDES Outfall 051

i. Monitoring Wells

NPDES Outfall 051 discharges into Effluent Canyon just north of the RLWTF. Draft DP-1132, Condition 33, requires the installation of two new alluvial groundwater monitoring wells in the canyon downgradient of the outfall. The two new alluvial wells are proposed as replacements for former alluvial groundwater monitoring wells that were destroyed in floods several years ago. Draft DP-1132, Condition 33, requires LANL to submit a work plan to NMED's Ground Water Quality Bureau for approval prior to well installation. The work plan will propose the specific location of each well and will describe how the wells will be installed in accordance with NMED guidance on construction of monitoring wells. The location of these two alluvial groundwater monitoring wells will be downgradient of and close to Outfall 051 and will be ideal for measuring water quality near Outfall 051. The location of the wells will allow LANL to detect any unpermitted discharges from Outfall 051. In the event that a noncompliant release occurs at Outfall 051, the data from the alluvial wells will be used to determine if the release creates a measurable environmental impact in downcanyon alluvial groundwater.

The draft permit also includes a downgradient perched-intermediate groundwater monitoring well, MCOI-6, that provides an additional monitoring point to assess a potential downgradient noncompliant release from Outfall 051. Monitoring well MCOI-6 is located in the perched-intermediate groundwater zone that is known to be along the flow path between the alluvial groundwater and the regional aquifer (LANL, 2006). The regional groundwater monitoring wells in the permit were neither identified for early detection, nor expected to provide early detection. As described earlier, transport of soluble contaminants from the alluvial

system to the perched-intermediate groundwater would likely take several years to manifest, if at all.

As I will describe in later testimony, contamination is known to be present in the alluvial groundwater in Effluent Canyon, in downgradient Mortandad Canyon, and in the perched-intermediate groundwater beneath Mortandad Canyon associated, in part, with past releases from Outfall 051. Draft DP-1132 is not intended to address this legacy contamination and only addresses any potential future noncompliant discharges, as provided by Draft DP 1132, Condition 37. Accordingly, pursuant to the draft permit conditions, any potential new release would have to be carefully assessed to determine whether the new release creates a discernable change to pre-existing conditions in the alluvial groundwater and perched-intermediate groundwater. *See* Draft DP-1132, Condition 37.

ii. Monitoring Frequency and Suite

The alluvial groundwater monitoring wells will be sampled quarterly for the following constituents: total Kjehldal nitrogen (TKN), nitrate, total dissolved solids, chloride, perchlorate, and fluoride. *See* Draft DP-1132, Condition 36. Annually, the suite also includes a "full suite" of constituents that includes a large list of organic compounds, metals, and general inorganic compounds. *See* Draft DP-1132, Condition 36. The full suite is determined pursuant to regulatory standards set forth in 20.6.2.3103 NMAC and 20.6.2.7 NMAC. This proposed monitoring regime is a supplement to the direct monitoring of Outfall 051. The proposed monitoring provides a strong foundation for determining whether a noncompliant discharge has occurred and for determining whether any noncompliant discharge would manifest as a measurable impact to the alluvial groundwater downgradient of Outfall 051.

B. Solar Evaporation Tanks ("SET")

i. Monitoring System

Draft DP-1132 sets forth a comprehensive monitoring system for the SET. The draft permit requires LANS to submit a work plan (per permit condition #30) that will propose a moisture monitoring approach for monitoring potential leaks beneath the SET. The moisture monitoring approach is an additional way of monitoring for releases. Draft DP-1132 also requires leak detection within the SET. *See* Draft DP-1132, Condition 31.The concept behind moisture monitoring beneath the SET is to provide a means for early detection of a "wetting front" that may form and advance downward beneath the tanks. This type of monitoring would be in place in the event that a leak occurs and is not detected by leak-detection systems in the SET. The moisture monitoring would be conducted in a series of borings angled beneath the SET. The monitoring would be able to detect small increases in moisture content within the rock layers beneath the SET. Specifics of the moisture monitoring system (including number of borings, monitoring frequency, etc.) are all subject to approval from NMED following LANL's submission of the moisture monitoring work plan within 120 days of when NMED issues the final DP-1132.

This redundant monitoring approach for the SET ensures groundwater protection. As described in my previous testimony, if any noncompliant release from the SET were to reach the regional aquifer, it would be expected to reach the regional aquifer after decades of traveling to the regional aquifer (if it were to reach the regional aquifer at all). Monitoring using the moisture monitoring system will provide detection within months to years, if the release is sufficient to develop into a recognizable wetting front.

C. Mechanical Evaporation System ("MES")

i. Monitoring Wells

Draft DP-1132 sets forth groundwater monitoring for the mechanical evaporation system (MES), at the main RWLTF, through the use of four regional aquifer monitoring wells located downgradient of the facility. *See* Draft DP-1132, Condition 36. The wells serve as belts-and-suspenders monitoring, which provides defenses in depth to the extensive engineering and administrative controls that will be in place for the MES, including volumetrically significant secondary containment and operational alarms for various leak-related triggers. As described earlier in my testimony, the location of the facility, on a dry mesa, is such that any noncompliant discharges that were not somehow captured or detected by the engineering and administrative controls would potentially take decades or longer to reach the regional aquifer. The regional groundwater monitoring wells in the permit were neither identified for early detection, nor expected to provide early detection.

ii. Monitoring Frequency and Suite

The regional aquifer monitoring wells will be sampled annually for a "full suite" of constituents that include a large list of organic compounds, metals, and general inorganic compounds, including perchlorate. *See* Draft DP-1132, Condition 36. The full suite is determined pursuant to the requirements set forth at 20.6.2.3103 NMAC and 20.6.2.7 NMAC. The proposed frequency and suite are appropriate for the regional aquifer given the extremely long travel times for a potential release and contaminant to reach the aquifer.

V. Quality Of Monitoring Wells

Existing groundwater monitoring wells are all constructed in accordance with NMED construction and design guidelines. These guidelines address monitoring-well attributes such as

well diameter, well materials, and the type and width of construction materials surrounding the well. The new alluvial groundwater monitoring wells are subject to approval by NMED, and will be constructed in accordance with NMED's guidelines. *See* Draft DP-1132, Condition 33. Groundwater samples will be collected under strict industry-standard protocols that ensure that the data from samples are representative of the groundwater conditions in the aquifer surrounding the well. These protocols involve purging sufficient water from the well and aquifer and collection of real-time field data of water quality (e.g., dissolved oxygen and pH) to guide sample collection.

VI. Draft DP-1132 Requirements for Exceedances

Draft DP-1132 requires monitoring of treated water for each of the three discharge points (MES, Outfall 051, and SET). Treatment at RLWTF occurs at batch scale and can be distributed to any of the three permitted discharge points with valving that exists between the treated-water container and the piping to each of the three discharge points. In practice, monitoring for each of the three discharge points will be conducted from a single port. Draft DP-1132 provides that if a future exceedance is identified from compliance sampling of treated water and if a groundwater quality standard is exceeded in one or more of the monitoring wells in the permit due to a future noncompliant discharge from Outfall 051, the SET or the MES, Draft DP-1132 Condition 37 specifies that the NMED may determine that an investigation work plan is required. Again, Draft DP-1132 only contemplates regulation of future noncompliant discharges and is not intended to regulate pre-existing groundwater conditions at LANL. *See* DP-1132, Condition 37.

VII. Pre-Existing Groundwater Conditions

All three groundwater zones that will be monitored under the draft discharge permit by existing and proposed new wells currently have contamination (e.g., nitrate) present, including

some constituents that are associated with past releases from Outfall 051. The RLWTF permit is forward-looking, meaning that it only addresses potential new releases from the permitted facilities (MES, Outfall 051, and SET). *See* DP-1132, Condition 37. Monitoring at the existing and proposed new wells under this permit will provide a baseline understanding of the pre-existing condition so that future potential noncompliant discharges can be more accurately discerned from monitoring data.

Existing contamination from past releases related to the RLWTF is being addressed under a separate regulatory framework, the Consent Order dated June 2016. It is important to recognize and understand that the Consent Order is not tied to and is completely distinct from Draft DP-1132. Under the Consent Order, investigations and remediation are conducted for groups of solid waste management units ("SWMUs") within "aggregate areas." The investigation and remediation of SWMUs is based on conditions at the site, and prioritization is negotiated with the NMED on an annual basis following a process in the Consent Order. Outfall 051, which is RCRA SWMU number 50-006(d), is part of a group of SWMUs within what is called the Upper Mortandad Canyon Aggregate. The Consent Order places SWMUs like Outfall 051 that are active operational facilities into a deferred status. Deferred status sites will be brought into the investigation and remediation mode once active operations are terminated. Seven facilities at RLWTF are SWMUs. Accordingly, remediation of existing contamination at Outfall 051 and all other SWMUs will be conducted in accordance with the Consent Order. *See* Draft DP-1132, Condition 46.

VIII. Conclusion

In conclusion, the groundwater monitoring requirements proposed in Draft DP-1132 are robust and provide defenses-in-depth as a redundant form of monitoring. They are an additional

monitoring safeguard to the extensive and protective engineered and administrative controls that are also proposed in the draft discharge permit. The monitoring strategy recognizes and is tailored to the complex hydrogeologic setting at LANL. The strategy ensures that early detection can be achieved, and that the extent of impact from any noncompliant discharges can be adequately assessed.

This concludes my direct testimony in this matter.

Danny Katzman

FIGURES

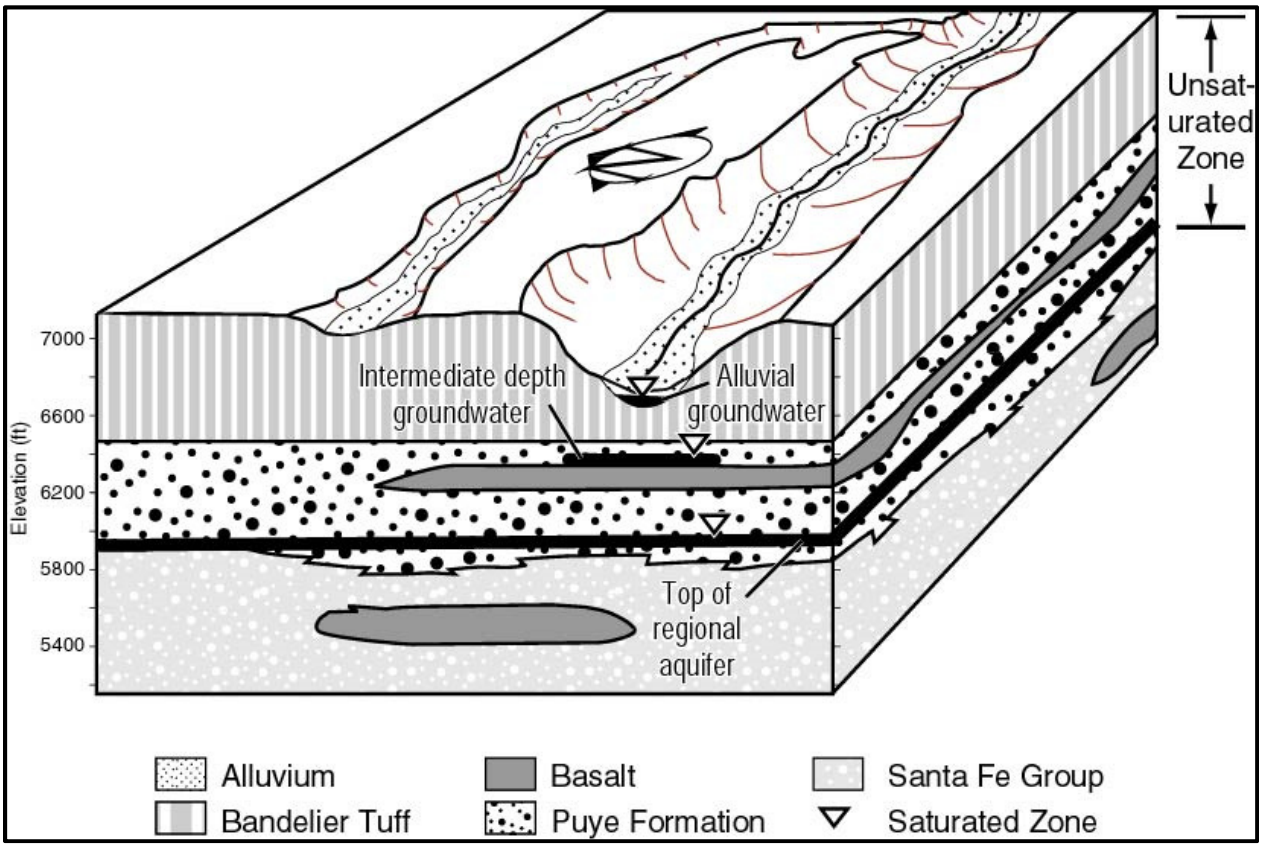


Figure 1. Simplified diagram of the subsurface hydrogeology beneath Los Alamos National Laboratory. Three groundwater zones are depicted: alluvial, perched-intermediate, and regional.

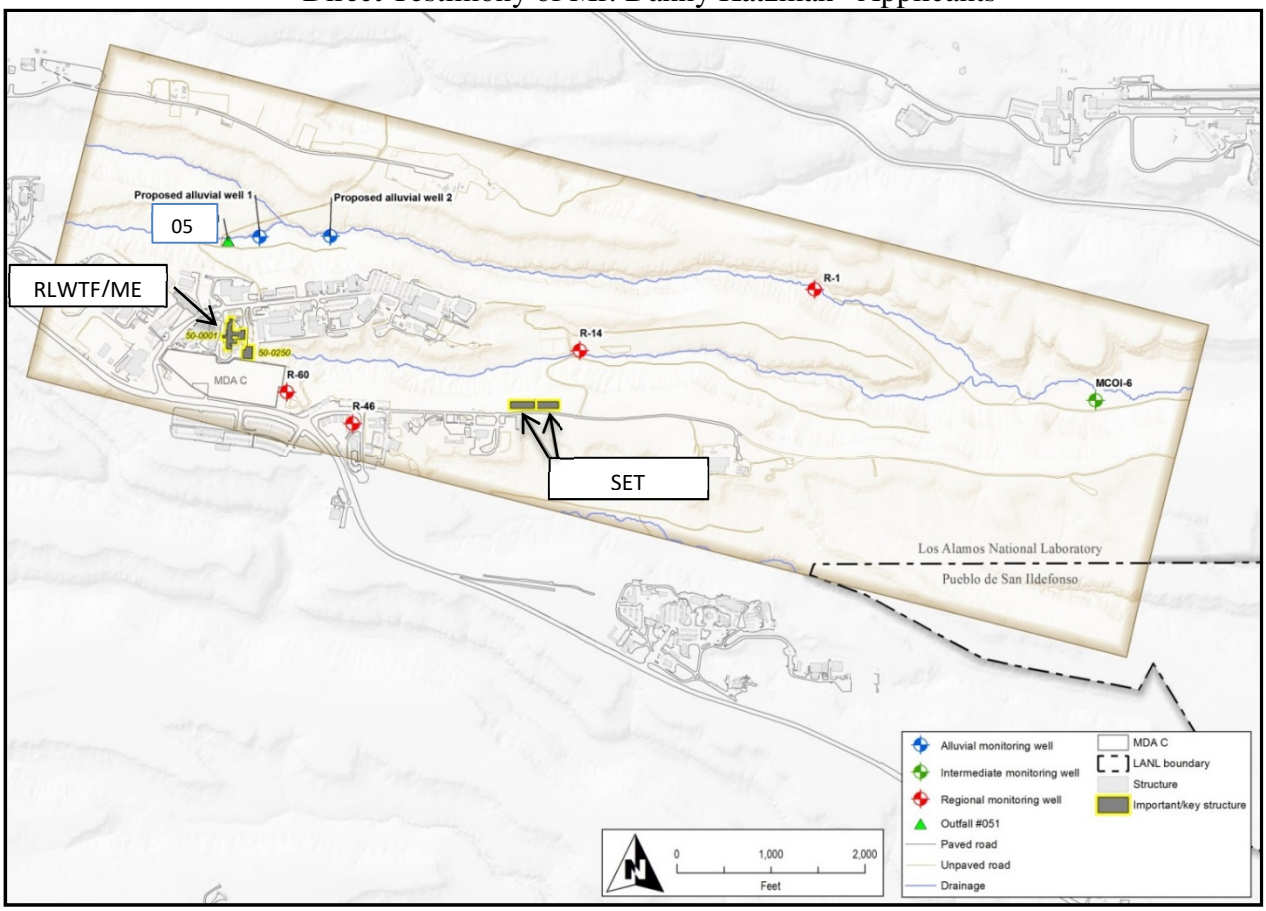


Figure 2. Map view showing the three RLWTF facilities (MES, Outfall 051, and SET) subject to DP-1132 and the groundwater monitoring network included in the draft permit. The MES is located with the building labeled 50-0001. The groundwater monitoring network consists of two proposed alluvial wells, one existing perched-intermediate well, and four existing regional aquifer wells.

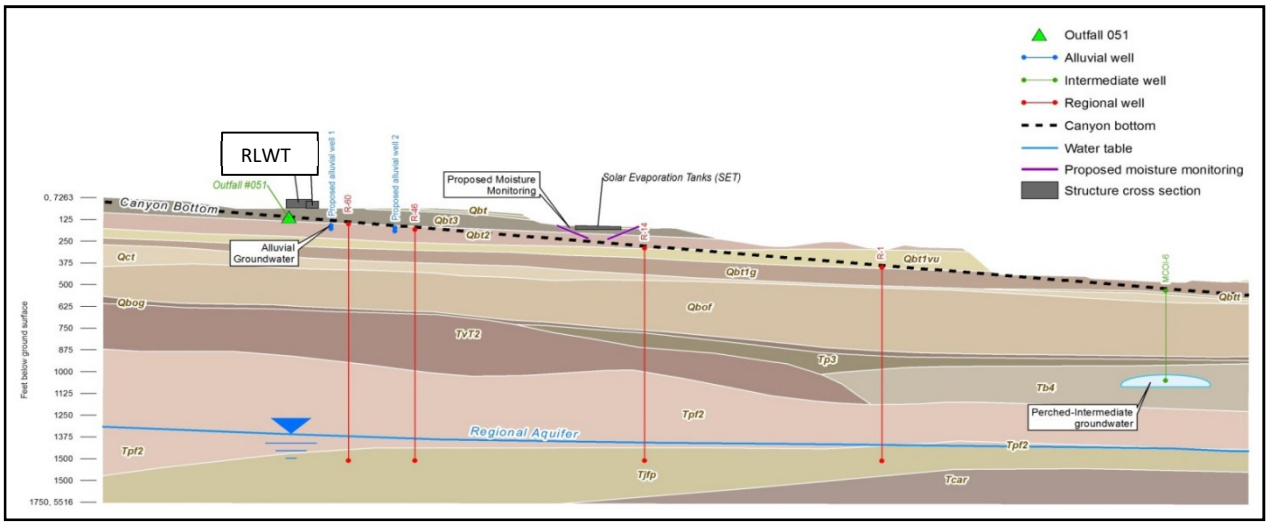


Figure 3. Cross section showing the geology and groundwater occurrences in related to the RLWT facilities.

REFERENCES

Birdsell, Kay H., Newman, Brent, D., Broxton, Dave E., and Robinson, Bruce A., 2005. "Conceptual Models of Vadose Zone Flow and Transport beneath the Pajarito Plateau, Los Alamos, New Mexico", in Vadose Zone Journal, A Special Section of Vadose Zone Journal, August 2005, V.4, Issue 3.

LANL (Los Alamos National Laboratory), 2006. "Mortandad Canyon Investigation Report," Los Alamos National Laboratory document LA-UR-06-6752, Los Alamos, New Mexico. (LANL 2006, 094161).

Danny Katzman
Los Alamos National Laboratory
Los Alamos, New Mexico 87545
505 667-6333 (O), 505 699-1042 (C)

EDUCATION

M.S., Geology (Honors), University of New Mexico, 1991
B.S., Geology, University of Texas, 1985

OVERVIEW OF EXPERIENCE

I have 24 years of experience working with multidisciplinary teams implementing innovative environmental site investigations and remediation. My focus has been on groundwater investigations, groundwater program development and management, fate and transport analysis, conceptual model development, geomorphic and geologic studies, development of innovative analytical techniques for expedited field characterization and remediation, decision analysis, waste management, and EVMS baseline management. I have a strong track record of successfully providing short-term and long-term vision for strategic project implementation and completion. I also function as a lead interface for routine and complex regulatory negotiations, client (DOE) support, Pueblo relations, and Program Office representative for media inquiries, public meetings, tours, and outreach.

During two years with the New Mexico Environment Department, performed technical and regulatory review of facility groundwater programs and RFI Work Plans and Reports and served as key technical and programmatic contact for the Environmental Restoration Programs at Los Alamos and Sandia National Laboratories. Represented NMED on key technical issues with the USEPA Region VI.

SPECIFIC WORK HISTORY

Los Alamos National Laboratory (1998 - Present)
Los Alamos National Laboratory Environmental Restoration Project

Lead Scientist for LANL's Environmental Management Division (ADEM) - Environmental Restoration Program Office. Responsibilities include technical program management and guidance, regulatory strategy, customer interface, and oversight for groundwater and soils investigations across the Program. Emphasis is on investigation and development of remedial alternatives strategies for chromium and RDX contamination in groundwater, and interim mitigation of the chromium plume. This also involves leadership of multi-agency (LANL, NMED, DOE) technical working groups for the chromium and RDX projects, and substantial effort on outreach to public and stakeholder groups and DOE Headquarters, The Lead Scientist role also involves development of programmatic direction on data assessment and data management protocols and automated tools to support assessments. Additional responsibilities include representing ADEM on the LANL's Environmental Sampling Board, lead author for the Annual Environmental (Surveillance) Report, and groundwater SME for the current assessment phase of the NRDA case at LANL.

Group Leader for the LANL's Environmental Investigations Group within the Environmental Program Directorate's Engineering and Technology Division. This position involved direct line management of technical resources and the oversight of the technical aspects of site investigations within the LANL Environmental Programs. Emphasis is on technical innovation, integration across the DOE complex, and ensuring consistency in approach particularly within complex vadose zone and groundwater investigations. Key focus areas include groundwater fate and transport in complex hydrogeologic settings, and vadose zone vapor-phase plume characterization.

LANS/DOE
Exhibit 8

Program Manager for LANL's Water Stewardship Program. Managed a large multidisciplinary technical team and led implementation of multiple complex watershed investigations and associated reports. Also led implementation of a $50 million drilling program to advance LANL's groundwater monitoring well network.

Project Leader for the Canyons Investigations. Managed annual budgets of $3-6 million, managed and coordinated large technical teams focused on complex watershed-scale assessments of contamination in sediment, surface water, shallow alluvial groundwater, vadose zone, and regional groundwater. The composition of the technical teams included expertise in geology, geochemistry, hydrology, drilling, geomorphology, modeling, and risk assessment. The role also included a substantial component of integration across other related projects including the FFCA storm water program, the Interim Facility-wide groundwater monitoring program, and Material Disposal Areas.

Team Leader for Canyons Investigations. Managed annual budgets of $1-2 million; managed and coordinated subcontractor personnel supporting the LANL team; developed technical and regulatory strategies for Canyons and PRS investigations and reports; prepared work plans, sampling plans, and RFI reports; developed safety plans; managed large data sets; and had extensive interactions with regulators, Indian tribes, and other stakeholders. The focus of the technical work was on watershed-scale systems and risk assessments. Responsibilities also include preparation of statements of work and contract management. Consistently managed projects within budget and on schedule. The role also included working with the negotiation team on the Compliance Order.

Led the development and implementation of a $5 million/3-year project to characterize potential impacts of the Cerro Grande fire. Key issues pertained to flood transport of legacy contaminants, characterization of potential perturbations to the watershed systems related to elevated concentrations of radiological and non-radiological constituents in ash, and risk assessments. Initiated and participated in an Inter-Agency Flood Risk Assessment Team that included the New Mexico Environment Department, the New Mexico Department of Health, and San Ildefonso Pueblo.

Recipient of numerous LANL performance awards.

Environmental Resources Management, Inc. (1993 - 1998)
Los Alamos National Laboratory Environmental Restoration Project
Senior Project Manager/Senior Geologist

Provided project management, field team management, and field team leadership for site characterization projects for the Environmental Restoration Project at LANL. Emphasis was on geologic, geomorphic, and hydrogeologic characterization and remediation. Managed up to 18 staff during larger remediation projects.

Demonstrated experience in planning, coordinating, and implementing competitively-bid field characterization and remediation projects at RCRA hazardous and radioactively-contaminated sites. Responsible for regulatory compliance and implementation of field work and waste management under applicable regulations including OSHA standards, LANL procedures and standards, DOE regulations, NMED and EPA regulations, and Department of Transportation regulations.

Worked as a member of multi-disciplinary teams writing and preparing numerous RCRA RFI Plans and Reports, including Voluntary Corrective Action and Interim Action plans and reports. Also served as sole or chief author on numerous regulatory documents, including VCA Plans and Reports and responses to Notices of Deficiency.

Demonstrated success in project management working under budget and schedule constraints while maintaining exceptional quality assurance.

Led and supported numerous geomorphic-based characterization projects.

New Mexico Environment Department (1991 - 1993)
Santa Fe, NM
Geologist III

Worked as hydrogeologist responsible for technical and regulatory review of Los Alamos and Sandia National Laboratories Environmental Restoration Projects. Responsible for review of RCRA Facility Investigation Work Plans and Reports for technical adequacy and regulatory compliance. Evaluated groundwater, sediment and surface-water monitoring systems, fault/fracture studies, radionuclide/ sediment transport studies, and site-wide background-concentration studies.

Prepared RFI document reviews that were incorporated into USEPA Region VI Notices of Deficiency and submitted to the DOE and LANL.

Provided technical liaison to the Department of Energy-Los Alamos Area Office, and LANL and Sandia Project Leaders and technical staff. The role included field participation in LANL and Sandia sampling campaigns, and involvement with project managers and technical staff at the facilities on programmatic issues including surface water quality, site characterization plans, geologic and hydrologic characterization pertinent to the Pajarito Plateau, ground-water monitoring waiver applications, closure plans, and site ranking systems.

Provided oversight of the Environmental Surveillance Program and waste management activities at LANL.

Community Involvement

- Los Alamos County Environmental Sustainability Board Member
- Volunteer at Los Alamos County public schools

Publications and References available upon request

LANS/DOE
Exhibit 9

Draft Discharge Permit 1132

Danny Katzman
Technical Program Lead
Associate Directorate for Environmental Management

Public Hearing
April 19, 2018

Qualifications

EDUCATION M.S., Geology (Honors), University of New Mexico, 1991
B.S., Geology, University of Texas, 1985

Los Alamos National Laboratory (1998 - Present)
Los Alamos National Laboratory Environmental Restoration Project

- Lead Scientist for LANL's Environmental Management Directorate (ADEM)
- Group Leader for the LANL's Environmental Investigations Group within the Environmental Program Directorate's Engineering and Technology Division.
- Program Manager for LANL's Water Stewardship Program.
- Project Leader for the Canyons Investigations.
- Team Leader for Canyons Investigations.

Environmental Resources Management, Inc. (1993 - 1998)

Los Alamos National Laboratory Environmental Restoration Project
Senior Project Manager/Senior Geologist

New Mexico Environment Department (1991 - 1993)

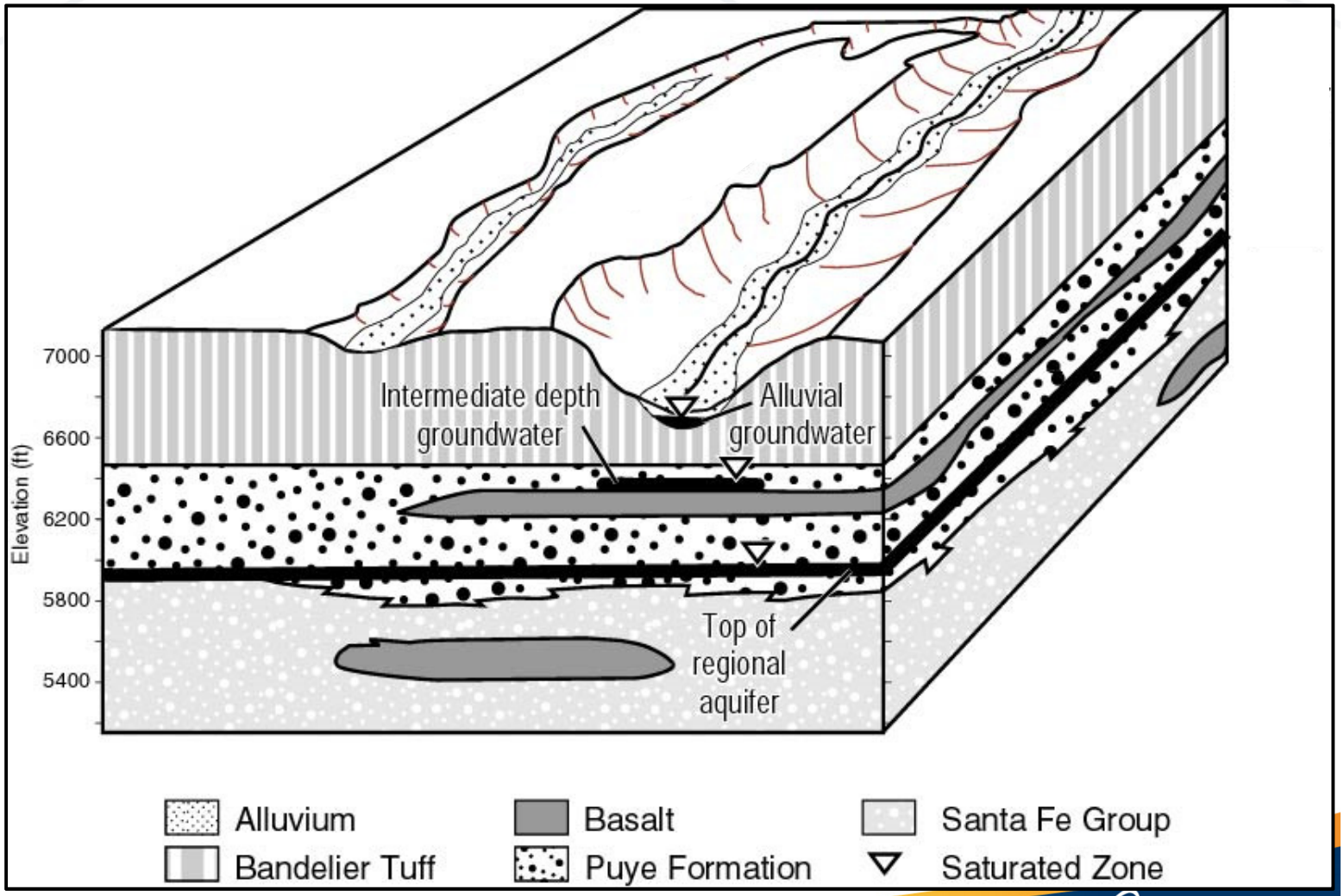
Presentation Overview

- Site hydrogeologic setting
  - Geologic setting
  - Faults and fractures
- Groundwater monitoring for RLWTF
  - Objective
    - ✓ Early detection of any future noncompliant releases
    - ✓ Additional safety net to support extensive administrative and engineering controls
    - ✓ Monitoring to characterize extent of groundwater effected by noncompliant discharge
  - Monitoring well locations
  - Monitoring suite and frequency
  - Quality of wells
  - Defenses in depth – groundwater monitoring coupled with use of engineering controls and visual inspections

General Groundwater Setting

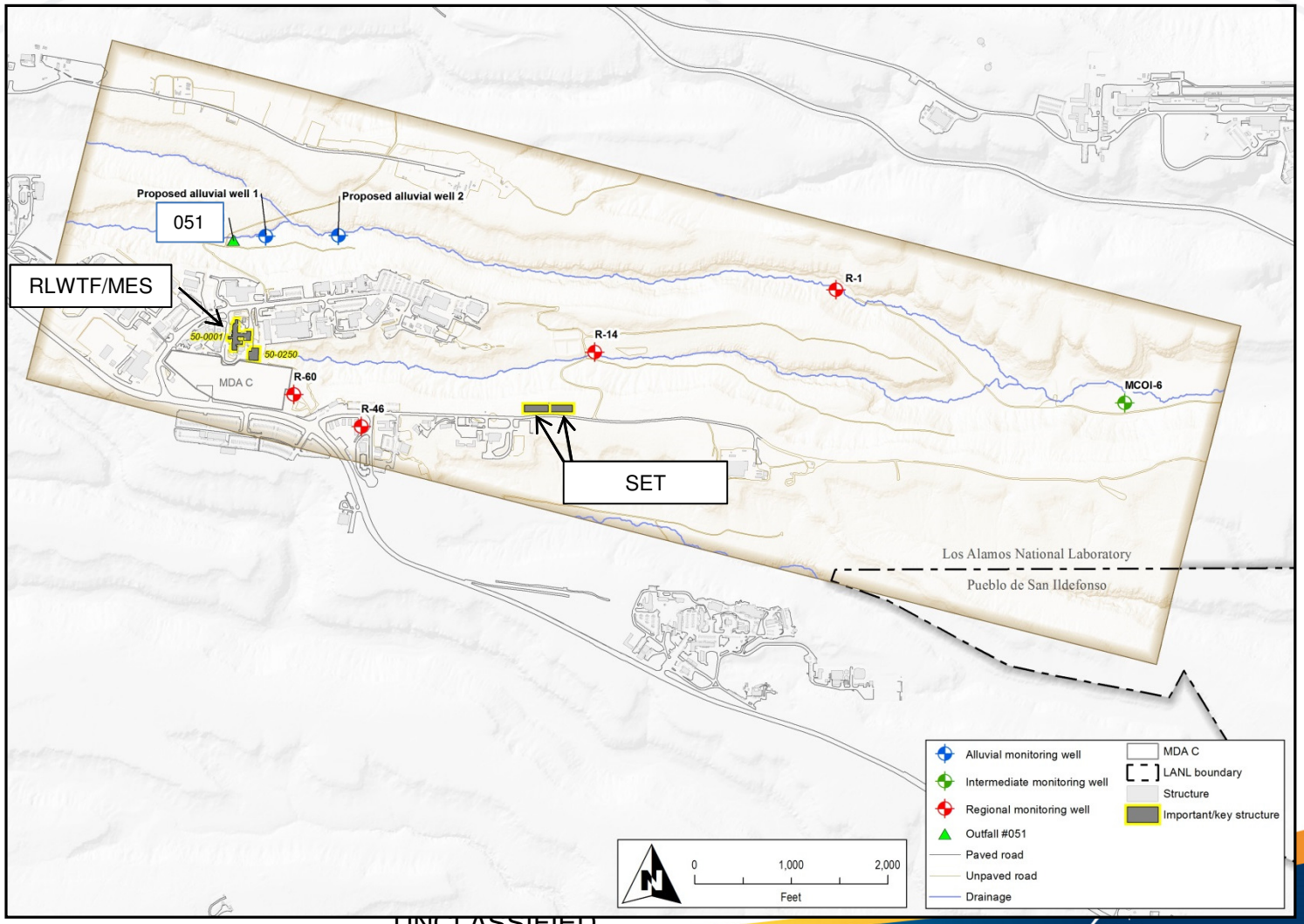
3 groundwater zones
- Alluvial
- Perched-intermediate
- Regional

Contaminant pathway to regional only under very unique conditions
- Large amount of mobile contaminant
- Lots of water (millions of gallons)

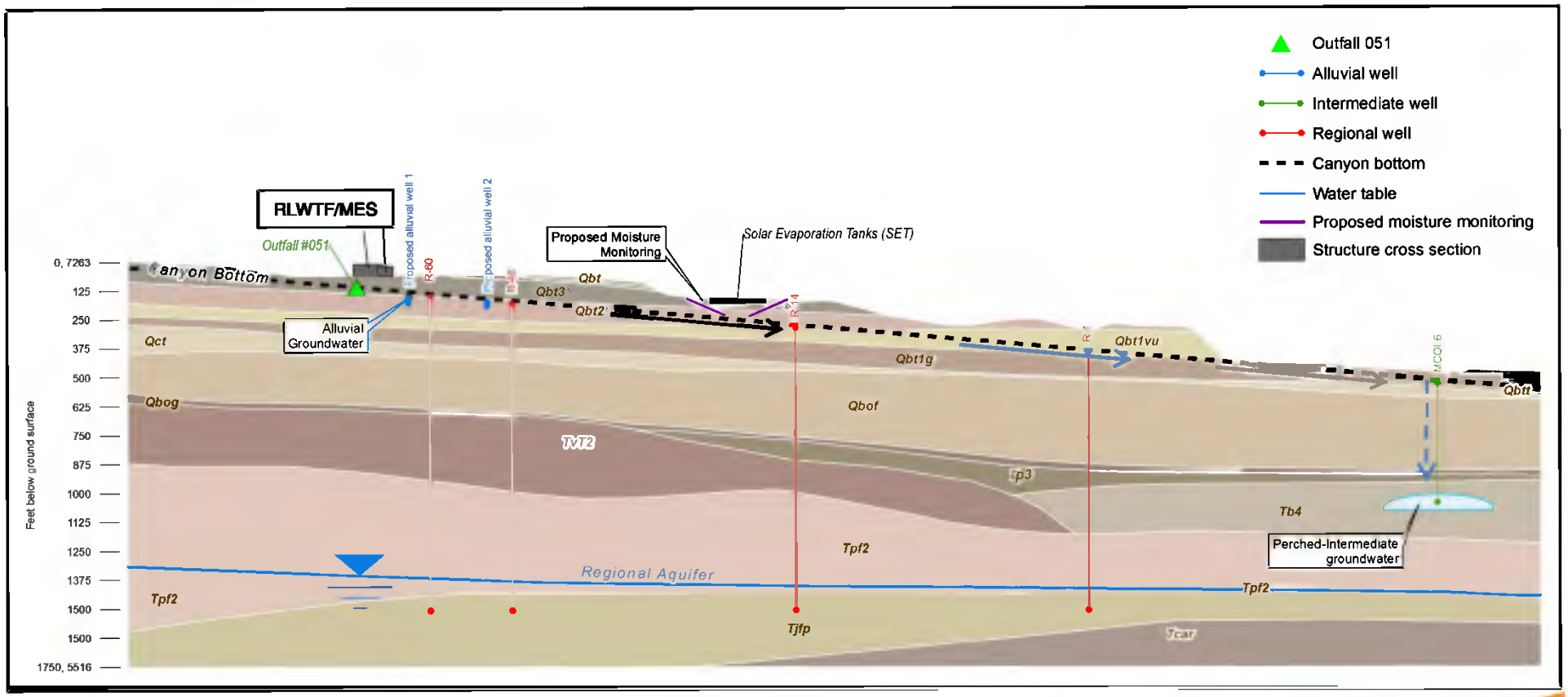


Groundwater Monitoring Network

- 2 alluvial wells
- 1 perched-intermediate well (MCOI-6)
- 4 regional aquifer wells (R-60, R-46, R-14, R-1)

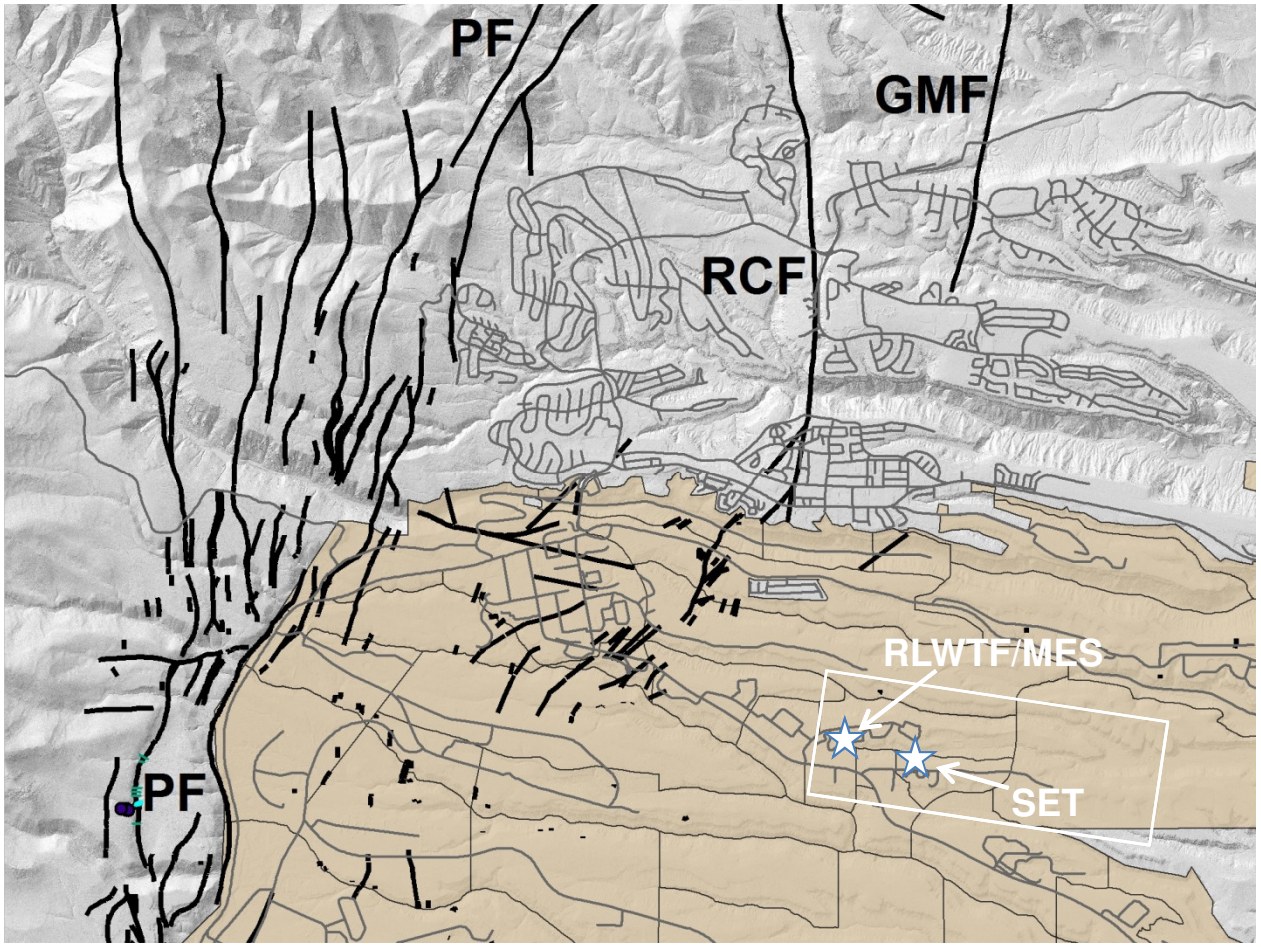


Geology


Outfall 051
Alluvial well
Intermediate well
Regional well
Canyon bottom
Water table
Proposed moisture monitoring
Structure cross section
RLWTF/MES
Outfall #051
Proposed alluvial well 1
Proposed alluvial well 2
R-60
R-14
Proposed Moisture Monitoring
Solar Evaporation Tanks (SET)
Canyon Bottom
Alluvial Groundwater
Qbt
Qbt3
Qbt2
Qct
Qbt1g
Qbt1vu
Qbtt
Qbog
Qbof
Tvt2
Tp3
Tb4
Tpf2
Regional Aquifer
Tjfp
Tcar
MCOI 6
Perched-Intermediate groundwater
Feet below ground surface
0, 7263
125
250
375
500
625
750
875
1000
1125
1250
1375
1500
1500
1750, 5516

Faults and Fractures

- Faults are mapped for the Laboratory's seismic hazards program
- No known faults are located near RLWTF and associated facilities



Groundwater Monitoring

Groundwater Monitoring Objectives

- Early detection of any future noncompliant releases
- Additional safety net to support extensive administrative and engineering controls
- Monitoring to characterize extent of groundwater effected by noncompliant release

- 2 alluvial wells
  - ✓ Located in watercourse just downstream of RLWTF Outfall 051
  - ✓ Supplement monitoring at outfall for early detection and characterization of extent of potential environmental effect of non-compliant release from outfall

- 1 perched-intermediate well
  - ✓ Supplement monitoring at Outfall 051 and at alluvial wells to characterize extent of potential environmental effect of non-compliant release from Outfall 051
  - ✓ Located in the perched-intermediate groundwater zone beneath Mortandad Canyon, along infiltration pathway to regional aquifer
  - ✓ Environmental effect would still likely take years (greater than 2-3) to manifest in perched zone

- 4 regional aquifer wells
  - ✓ Monitor regional aquifer downgradient of main RLWT facility
  - ✓ Provides additional monitoring “safety net” within the regional aquifer
  - ✓ Environmental effect of release from facility would likely take decades to reach the regional aquifer

Monitoring Suite and Frequency

- Alluvial and Perched-Intermediate Wells
  - Quarterly
  - TKN, Nitrate, TDS, Chloride, Fluoride
- All Wells (incl. alluvial, perched, and regional)
  - Annually
  - “Full Suite” of permitted constituents listed in 20.6.2.3103 NMAC and 20.6.2.7

Robust Monitoring

- ✓ All existing wells in the draft permit meet NMED construction and design guidelines
- ✓ All existing wells in the draft permit produce high-quality, representative data
- ✓ NMED-approved Interim Facility-Wide Groundwater Monitoring Plan recognizes these wells as providing representative data

Defenses in Depth

- ✓ Wells provide robust environmental protection to complement administrative and engineered controls
- ✓ Engineered and administrative controls provide most protective early-warning systems

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION OF THE UNITED STATES DEPARTMENT OF ENERGY AND LOS ALAMOS NATIONAL SECURITY, LLC FOR A GROUND WATER DISCHARGE PERMIT (DP-1132) FROM THE RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

No. GWB 17-20(P)

PRE-FILED TECHNICAL TESTIMONY OF MS. KAREN E. ARMIJO, A WITNESS ON BEHALF OF THE UNITED STATES DEPARTMENT OF ENERGY

I. Introduction to My Testimony

My name is Karen E. Armijo. I am testifying on behalf of the United States Department of Energy ("DOE") as an expert witness in support of the New Mexico Environment Department's ("NMED") draft discharge permit 1132 ("Draft DP-1132") in this proceeding. DOE would be a co-permittee with Los Alamos National Security, LLC ("LANS") if Draft DP-1132 is issued (LANS and DOE are collectively referred to herein as "Applicants"). This testimony begins with an overview of my credentials. I will then go on to respond to public comments received from Communities for Clean Water ("CCW") relating to signage in the general vicinity of the Radioactive Liquid Waste Treatment Facility ("RLWTF") and the potential involvement of Pueblo representatives on Los Alamos National Laboratory's ("LANL") Emergency Operations Center.

II. Statement of My Qualifications and Relevant Experience

My Resume is attached as LANS/DOE Exhibit 11. I have a Bachelor of Science degree from New Mexico State University in Environmental Science, with Minors in Environmental

Chemistry and Waste Management. I also have a Masters in Environmental Policy and Management from the University of Denver.

I am currently employed as Physical Scientist by the National Nuclear Security Administration ("NNSA"), a semiautonomous agency within DOE, and have served in this position since May 2016. As a Physical Scientist, I oversee environmental compliance programs for water quality management and hazardous and radiological waste management. I am a technical subject matter expert for environmental management, including water resources and waste management. I also provide contract oversight of LANS performance on environmental compliance. I oversee environmental compliance programs on behalf of DOE, including hazardous waste management and groundwater discharges. Prior to my current position, I served as a Project Manager for Environmental Services with JG Management Systems, Inc., a technical and professional services firm offering services to government and private sector clients nationwide in a variety of areas such as Nuclear Professional Services, Engineering Design & Analysis, Environmental Compliance & Management, and Energy Management.

Prior to these positions, I have served as an Environmental Scientist for TetraTech, Inc. TetraTech is a leading provider of consulting and engineering services and supports government and commercial clients in the areas of water, environment, infrastructure, resource management, energy, and international development. I have also served in a number of positions with the New Mexico State Legislature, Molzen-Corbin & Associates, New Mexico State University, Los Alamos National Laboratory, the New Mexico Environment Department, and numerous research positions over the course of my professional career.

III. CCW Comments Relating to Multi-Language Signage

In October 2014, there were communications in which CCW requested multi-language signage downstream of the RLWTF, to include Tewa, the native language of some residents of the Pueblo of San Ildefonso. See LANS/DOE Exhibit 12. The eastern boundary of the Pueblo of San Ildefonso is approximately three miles to the west of the western boundary of the LANL facility in question. Under Draft DP-1132, the permittees are required to post bilingual warning signs (in English and Spanish) at all gates and perimeter fences, where present, around the Facility. The signs must be posted in sufficient numbers to be visible at all angles of approach as well as from a distance of at least 25 feet. The Facility is defined in the draft permit as the RLWTF, which is situated interior to the LANL boundary. The Facility is located within the security perimeter, which limits LANL access to badge holders. The RLWTF is not accessible to the general public, nor does the Facility share a boundary with any Pueblo. Additionally, the Permittees are required to include on the signs the following or an equivalent warning: DANGER – UNAUTHORZED PERSONNEL KEEP OUT (PELIGRO – SE PROHIBE LA ENTRADA A PERSONAS NO AUTORIZADAS).

Applicants determined the Tewa language versions of the above language that were proposed by CCW would be inappropriate. One proposed sign would translate as "dangerous, harmful, death causing water." The water is not dangerous or harmful, nor death-causing - to post such a sign would be inaccurate and would cause unnecessary alarm. The other sign translates as "do not enter." Because the RLWTF is interior to LANL and does not share a border with the Pueblo of San Ildefonso, Applicants determined that it would be sufficient to have the signage in English and Spanish only, as required by Draft DP-1332. In addition, because LANL does not have similar signs in similar locations interior to the LANL campus

prohibiting entrance, we felt this might be seen as discriminatory against Pueblo residents. In a May 20, 2015 letter to NMED, with our comments on a draft of the permit, DOE proposed language for signage, and the letter was copied to one of CCW's constituent organizations. See LANS/DOE Exhibit 13. This correspondence provided notice that DOE would not be utilizing the CCW proposal.

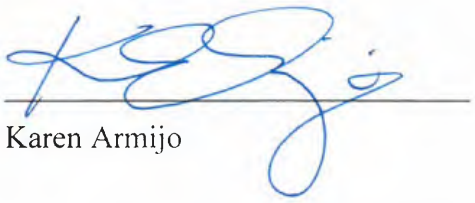
IV. CCW Comments Relating to Participation in the Emergency Operations Center

CCW also suggested including representatives of potentially effected Pueblos in emergency planning and providing designated seats for the representatives on LANL's Emergency Operations Center ("EOC") during preparatory drills and actual emergencies. Draft DP-1132 defines the standards for emergency response procedures. Among these is a requirement to provide a written summary of the emergency response procedures to NMED within 120 days of the effective date of this permit if the permit issued. The permit does not specifically dictate emergency response procedures or designate seats on the EOC.

The functions of the LANL EOC, as well as the structural organization of the related Emergency Response Organization ("ERO"), are defined in DOE Order 151.1D. See Exhibit 5. Under DOE Order 151.1 D, personnel staffing the ERO must possess the requisite authority to implement emergency management plans for LANL, which precludes non-LANL personnel from a direct role in the EOC. The DOE Order does, however, does establish offsite response interfaces that require LANL to maintain interfaces with local, state, tribal, and federal organizations responsible for emergency response. It is through this mechanism the Pueblo representatives may participate in EOC activities. This participation could include such events as familiarization with potential event-specific conditions and hazards, participation in drills or exercise, and provisions for communication of emergency information. Under the terms of Draft

DP 1132, participation in this manner would be acceptable and, I am of the opinion that such participation should be sufficient to address the substance of CCW's EOC-related comment.

This concludes my testimony in this matter.



Karen Armijo

EXPERIENCE SUMMARY

Mrs. Armijo (also known as Karen Browne) is an environmental scientist with 18 years experience in environmental and natural resources work in the public and private sector. She has demonstrated a mastery of environmental science, and specializes in natural resources management, water resources, and regulatory compliance. Mrs. Armijo is a technical subject matter expert for environmental management, including water resources and waste management. She oversees environmental compliance programs for water quality management (WQM), hazardous and radiological waste, and environmental restoration activities. She has knowledge and familiarity with the Clean Water Act (CWA), Safe Drinking Water Act (SDWA), National Pollutant Discharge Elimination System (NPDES) programs, and laboratory and field water quality assessment techniques. Mrs. Armijo has experience evaluating environmental compliance for waste management activities, including hazardous materials management, Resource Conservation Recovery Act (RCRA) and Federal Hazardous and Solid Waste Amendments (HSWA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Hazardous Materials Transportation Act (HMTA), and various environmental health and safety regulations.

Mrs. Armijo has experience with tasks related to natural resources management and planning, data collection and analysis, *National Environmental Policy Act* (NEPA) documentation, public outreach, project management and project planning, and administration of fiscal resources. She is experienced in developing and managing relationships with Federal, State, local governments, New Mexico tribes and organizations to support environmental management activities, including natural resources management and environmental documentation services. Mrs. Armijo has managerial experience for small and large teams, including program/ project management, staff supervision, management of tasks, resources, schedule and budgets. Mrs. Armijo has a Master's Degree in Environmental Policy and Management, a Bachelor's Degree in Environmental Science with minors in environmental chemistry and waste management. She is a member of Connect New Mexico, a Master Gardener for Santa Fe County, and an active volunteer in her community.

WORK EXPERIENCE

NATURAL RESOURCES/PROJECT MANAGEMENT

U.S. Department of Energy/ National Nuclear Security Administration (DOE/NNSA), Los Alamos Field Office (05/2016 to present)—Mrs. Armijo perfoms oversight of the management and operating contractor (M&O) responsible for implementation of the NNSA mission at Los Alamos National Laboratory (LANL). Mrs. Armijo is responsible for management and oversight of the Resource Conservation and Recovery Act (RCRA) facility-specific hazardous waste permit and compliance with surface, storm and ground water protection regulations. In this capacity, she performs technical analysis and provides expertise to the DOE/NNSA Los Alamos Field Office (NA-LA) Field Office Manager and staff on environmental laws and regulatory requirements. Mrs. Armijo reviews site operations on a routine basis to evaluate and assure the adequacy of contractor environmental compliance and protection (ECP) programs, including the coordination/preparation of reports for regulatory agencies, and serves as the primary interaface with regulatory agency staffs for these programs. As the technical subject matter expert for ECP at NA-LA, Mrs. Armijo defines objectives, policies and requirements to ensure compliance (and to restore compliance) with environmental protection regulations and laws.

JG Management Systems, Inc- Albuquerque/Los Alamos Offices (04/2010 to 05/2016)—Mrs. Armijo was a Project Manager for Environmental Services. In this capacity, she supported the Environmental Services Program with leadership and technical expertise. Mrs. Armijo routinely managed small and large teams for project execution, which required supervision of staff, management of tasks, schedule and budget ranging from $48K to $1M. Additionally, Mrs. Armijo conducted business development activities, including membership in professional organizations, networking, research and development for teaming relationships, business strategy and proposal development. Mrs. Armijo served on the Leadership Committee as the Deputy Chair, and was a

DOE/NNSA Los Alamos Field Office | Phone: (505) 665-7314 | Email: karen.armijo@nnsa.doe.gov

principal author on the Leadership Plan for JGMS to support and encourage employee growth and development. Mrs. Armijo held two (2) positions with JGMS, each are detailed below.

Project Manager for Los Alamos Site Office (LASO), Environmental Projects Office (EPO) (01/2011 to 03/2015)/ Environmental Management Los Alamos Field Office (EM-LA) (03/2015 to 05/2016), subcontractor to Project Time and Cost, LLC (PT&C)— Mrs. Armijo was responsible for performing project management and technical analysis in support of the DOE Environmental Management mission at EM-LA/Environmental Projects Office for NNSA. Mrs. Armijo provided technical subject matter expertise for implementation of the National Pollutant Discharge Elimination System (NPDES) Individual Permit for Stormwater (IP), Nitrate Salt Waste Management Resumption Activities, Tribal Programs Support, and Assessment Program implementation. NPDES activities include negotiations with regulatory agencies and stakeholders for IP renewal permit and regulatory compliance evaluations. Nitrate Salt Waste Management Resumption Activities include oversight of contractor-led teams, evaluation of deliverables and contractor processes addressing corrective actions related to the Consent Order with the State of New Mexico. Tribal Programs Support include development of Tribal Program Implementation Plan, tracking of Tribal Permits and Data Reviews, development of messaging and training materials, and delivery of training to contractor audiences. From FY2012 to FY2015, Mrs. Armijo supervised one direct employee supporting PT&C/LASO.

Deputy Team Leader for the Business Development (07/2010 to 01/2011)—As Proposal Manager, Mrs. Armijo was responsible for identification of business opportunities, development of proposal strategy and formation of proposals. In this role, Mrs. Armijo led a 4-member team, organized bid and proposal response, facilitated the development of bid and proposal strategies, and managed resources to support business development. Mrs. Armijo has been integral in developing proposal strategies, formalizing group processes and improving tracking procedures for business development tasks. Mrs. Armijo contributed to the development of procedures and organization of team roles and responsibilities to streamline the process and improve the effectiveness of proposal opportunities.

Tetra Tech, Inc.- Santa Fe Office/Alexandria Operations Center (07/2005 to 01/2010)—Mrs. Armijo served as an Environmental Scientist II and as the Office Operations Manager for the local office, demonstrating service-oriented and successfully managing multiple programs and priorities.

Office Operations Manager (10/2006 to 01/2010)—In addition to her responsibilities as an Environment Scientist, Mrs. Armijo also served as the Office Operations Manager for the Santa Fe, New Mexico, Office. In this capacity, Mrs. Armijo was responsible for the day-to-day functionality of the location. She managed several contractors including cleaning services, IT support, support and maintenance contractors, and temporary employees. In this position, Mrs. Armijo was responsible for cost effective and efficient management of office resources, coordination with site personnel, management of contractors and services, and IT support. Mrs. Armijo provided primary support for the development of proposals, coordinated resources in support of proposals and marketing pursuits, and participated in several marketing initiatives on behalf of the Santa Fe Office.

Environmental Scientist II (07/2005-01/2010)—Mrs. Armijo routinely managed small and large teams for project execution, which required supervision of staff, management of tasks, schedule and budget ranging from $25K to $1.5M. As Project Manager or Deputy Project Manager, her responsibilities included team and client communication, management and oversight of technical information, management of project schedule and expenses. As a Team Member, Mrs. Armijo served as a Technical Subject Matter Expert for Natural Resources (e.g., Water, Air, Biological, Soils, Infrastructure, Emergency Response, etc.). Her role included environmental sampling and analysis, development of technical analysis, public education and outreach, and project planning and coordination. Mrs. Armijo's skills include technical editing, document integration, and quality control/quality assurance review.

DOE/NNSA Los Alamos Field Office | Phone: (505) 665-7314 | Email: karen.armijo@nnsa.doe.gov

Roles and projects are listed below:

- Deputy Project Manager, Los Alamos Biosafety Laboratory Level 3 (BSL-3) Facility Operations Environmental Impact Statement (EIS), U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA), Los Alamos, NM (11/2005 to 01/2010)
- Public Outreach Support Staff, Global Nuclear Energy Partnership (GNEP) Programmatic EIS, U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA), New Mexico (06-12/2008)
- Project Manager, Watershed Study on Pueblo Lands Related to Plutonium and Sediment Transport, Environmental Office, Pueblo de San Ildefonso, New Mexico (05-12/2008)
- Project Manager, Indoor Air Quality Analysis of Goddard High School, Roswell, New Mexico, Keers Remediation, Inc. (03-06/2008)
- Document Review and Integrator/Comment Response Team Member, National Bio and Agro-Defense Facility (NBAF) EIS, U.S. Department of Homeland Security (03-12/2008)
- Technical Author, Colorado Sanchez Reservoir Mercury Total Maximum Daily Load (TMDL), Sources Assessment Update, Environmental Protection Agency- Region 8 (02-03/2008)
- Project Manager, Indoor Air Quality Analysis of the Neil Mertz Judicial Complex, Estancia, New Mexico, B&D Industries/Torrance County (11/2007 to 02/2008)
- Project Manager, Non-Point Source Assessment Report and Management Program Plan, Pueblo of Santa Ana Water Resources Division (09-12/2007)
- Project Manager, Environmental Assessment (EA) for the Geological Characterization of White Sands Missile Range and Nevada Test Site, Interim Action for the Complex Transformation Supplemental Programmatic EIS, DOE/NNSA (05/2007 to 03/2009)
- Team Logistics Coordinator/ Field Team Member, National Lakes Assessment- New Mexico Field Crew, EPA (05-09/2007)
- Deputy Project Manager, University of Hawaii Pacific Regional Biocontainment Laboratory (PacRBL) EA, National Institutes of Health (NIH)/ National Institute of Allergy and Infectious Diseases (NIAID), Honolulu, Hawaii (04/2007 to 01/2010)
- Field Team Member, New Mexico Task Force-1 Urban Search and Rescue Full Scale Exercise, New Mexico Department of Homeland Security and Office of Emergency Management (04-10/2007)
- Project Manager, Tufts University Regional Biocontainment Laboratory EA, NIH/NIAID, Grafton, Massachusetts (10/2006 to 09/2007)
- Water Resources Technical Author, Complex Transformation Supplemental Programmatic EIS, DOE/NNSA (10/2006 to 10/2008)
- Surface Water Resources Lead Technical Author, FutureGen EIS, DOE/NNSA (09/2006 to 09/2007)
- Deputy Project Manager, Non-Point Source Assessment Report and Management Program Plan, Pueblo of Taos Environmental Office (04-12/2006)
- Technical Author, Quality Assurance Project Plan/ Sample Analysis Plan Documents, Environmental Office, Pueblo de San Ildefonso, New Mexico (11/2005 to 01/2006)
- Team Logistics Coordinator/Field Team Member, Colorado Sanchez Reservoir Clean Mercury Sampling, EPA- Region 8 (11/2005 to 01/2006)
- Field Team Member, Watershed Assessment, Valles Caldera Trust/U.S. Forest Service (10/2005 to 09/2008)
- Water Resources Technical Author, Sandia Site-Wide EIS Supplemental Analysis, DOE (10/2005 to 02/2006)
- Emergency Responder, Hurricane Katrina START EPA-Region 6 Responder (09-10/2005)
- Technical Author, Utah Duchesne River Watershed TMDL, EPA- Region 8 (08-12/2005)

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- Project Support, Recreation Document, Salton Sea Authority, Salton Sea, California (07/2005 to 01/2006)
- Project Support, Buckman EIS Administrative Record, U.S. Forest Service, Santa Fe National Forest, Española District Office, Española, New Mexico (07/2005 to 12/2006)

ADMINISTRATIVE EXPERIENCE

New Mexico State Legislature, Secretary, Santa Fe, New Mexico (01/2010 to 02/2010)—Mrs. Armijo provided administrative support to the Majority Whip for the New Mexico House of Representatives, Representative Sheryl Williams Stapleton, for the 2010 Regular Session. filing and organization of information, coordination with the public affairs office, and general housekeeping. In addition, Mrs. Armijo provided administrative support to other members of the majority party in the House of Representatives.

Molzen-Corbin & Associates, Grants Administrator, Multiple Projects, Albuquerque, New Mexico (05/2003 to 07/2005)—In this position, Mrs. Armijo participated in the management and coordination of community development projects; for local governments in New Mexico. She was responsible for preparing and administering funding grants on behalf communities to support engineering projects.

New Mexico State University, Alumni Relations Associate Director, Santa Fe, New Mexico (03/2002-05/2003)—In this position, Mrs. Armijo was responsible for organizing, building the and strengthening the alumni support in northern New Mexico on behalf of New Mexico State University. Her responsibilities included generating new contacts, coordination of campus resources to support the development of new alumni clubs, coordination of resources to support alumni events.

Hazardous Materials Emergency Response Technician, Los Alamos National Laboratory, Los Alamos, New Mexico (01/2001 to 03/2002)—Mrs. Armijo participated as a hazardous materials emergency responder, serving in various positions during response activities ranging from support staff to safety officer to entry team leader. She managed the training of the Auxiliary HazMat Team. Mrs. Armijo assisted in the preparation and execution of the annual HazMat Challenge to demonstrate skills, knowledge, and ability to mitigate hazardous situations such as damaged hazardous materials containers, malfunctioning pipes, explosive chemicals, confined spaces, etc.

Total Maximum Daily Load (TMDL) Outreach, New Mexico Environment Department – Surface Water Quality Bureau, Santa Fe, New Mexico (06/2000 to 01/2001)—Mrs. Armijo established a public outreach program for water quality issues in New Mexico, which included communications with Federal, State, local and tribal agencies and community organizations and environmental groups to encourage participation in water quality management at the local/regional level and the statewide level.

RESEARCH POSITIONS

Agricultural Pesticide Research, Hispanic Association of Colleges and Universities-USDA (08/1999 to 12/1999)—Mrs. Armijo assisted in water, soil, and air sampling and analysis to support on-going projects related to pesticide movement in the atmosphere. Mrs. Armijo also assisted in the analysis of vegetable samples for residue on agricultural products from small farms application of pesticide.

Administrative Aide/Work Study, NMSU (08/1998 to 05/2000) — Mrs. Armijo supported the Academic Dean's Office as a student intern. Her responsibilities included general administrative support, student programs implementation, performance analysis and metrics tracking, and legislative initiatives. She directly supported the College's Academic Dean and the Colleges Legislative Liaison with administrative tasks.

Aquatic Toxicology of Heavy Metals, NMSU (08/1995 to 05/1999)—Mrs. Armijo participated in the sample and data analysis of water and soil samples in support of on-going mercury contamination research. As a Waste-management Education Research Consortium (WERC) Student Fellowship award recipient, she designed, coordinated and conducted independent research of aquatic toxicology of depleted uranium contamination and mercury contamination. Project 1: The Hematological Response of Waterborne Lead on

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Rainbow Trout; Project 2: The Effects of Depleted Uranium on Larval Fathead Minnows; Project 3: Determining the Toxicity of Depleted Uranium Using the Microtx Model 500 Analyzer.

EDUCATION/TRAINING

M.S., Environmental Policy and Management, University of Denver, 2005
B.S., Environmental Science, Minor in Environmental Chemistry, Minor in Waste Management, New Mexico State University, 2000
Certified, Environmental Compliance, Techical Qualifications Program, DOE/NNSA, February 2018
Completed, Technical Management Program, University of California Los Angeles, September 2017
Certified, Inspector of Sediment and Erosion Control (CISEC), Certificate #2207, September 15, 2017
Completed, RCRA Fundamentals/Advanced RCRA Topics et.al (McCoy and Associates, 2016)
Completed, Core Program, Leadership New Mexico, 2015
Completed, 38-hour Army Corps of Engineers Wetland Delineation & Management Training Program (Richard Chinn Environmental Training, Inc., 2006)
Certified, Basic Field Techniques to Determine Stream Morphology (Watershed Conservation Resource Center, 2006)
Certified, 40-Hour HAZWOPER (ACME Environmental Inc., Certificate #092305-11, 2005)
Certified, HazMat Technician (California Specialized Training Institute [CSTI], Certificate #T793, 2001)
Certified, HazMat First Responder Operations Decon (CSTI, Certificate #OR166321, 2001)
OSHA 29 CFR 1910.96 Radiological Worker II (LANL 1999)
Certified, National Incident Management Systems Certified, Various Courses

PUBLICATIONS/PRESENTATIONS

Armijo, K., Bronson, K., "Watershed Integration" (October 2015), 2015 New Mexico Infrastructure Finance Conference—Mrs. Armijo and Ms. Bronson presented information on watershed management and planning to mitigate impacts to built infrastructure. Mrs. Armijo moderated a panel of state and local government professionals to address funding and implementation of watershed improvement projects.

Armijo, K., "NEPA Implementation: Mitigation Planning and Monitoring Strategies"(February/April 2015), 2015 National Association of Environmental Professionals—Mrs. Armijo developed a paper and presentation to address mitigation action tracking, and demonstrates an overview of metrics to support effective monitoring of applied mitigation strategies.

Armijo, K., "Planning for Changing Environments" (October 2014), 2014 New Mexico Infrastructure Finance Conference—Mrs. Armijo presented infrastructure planning activities for community infrastructure projects. The presentation provided an overview of adaptive management strategies, monitoring and mitigation techniques, and risk management tools to effectively utilize environmental planning for community activities.

Armijo, K., "Planning for Changing Environments" (October 2013), 2013 New Mexico Infrastructure Finance Conference—Mrs. Armijo developed a presentation focusing on supporting local communities to implement planning and infrastructure improvements that would adapt to changes in the natural environment.

Browne, K. and K. M. Dors, "Water Resources Infrastructure Planning" (October 2008), 2008 New Mexico Infrastructure Finance Conference—Mrs. Armijo presented and co-developed a presentation focusing on water resources planning to effectively manage or prevent surface water contamination.

Tsatsaros, J., K. Browne, and R. Pava, "Water Quality Dynamics on the Valles Caldera" (March 2008), 2008 Jemez Mountains Science Symposium—Mrs. Armijo co-authored a paper and presentation summarizing the water quality assessment program on the Valles Caldera. The paper explored early trends in water quality data and its impact on management of the watershed by the Valles Caldera Trust.

Browne, K., "Disaster Preparedness Planning: A Review of the Hurricanes Katrina/Rita Response by Tetra Tech" (October 2006), 2006 New Mexico Infrastructure Finance Conference—Mrs. Armijo

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provided an overview of emergency response and planning requirements, Federal and State resources, large-scale disaster relief efforts, and mutual aid coordination with Federal, State, and local agencies.

Browne, Karen, "Improving Oversight and Compliance with Federal and State Environmental Regulations for New Mexico's Community Development Block Grant Program" (May 2005) University of Denver Master's Project—Mrs. Armijo designed, planned, and executed research to assess the current management practices employed by the State of New Mexico in implementing Federal and State environmental regulations.

Browne, Karen, "Use of Acceptable Knowledge in Characterization of Waste Streams at Los Alamos National Laboratory" (August 1998) Los Alamos National Laboratory Student Symposium—Mrs. Armijo authored technical report reviewing the use of acceptable knowledge in waste disposal practices. It was presented at the annual Student Symposium hosted by Los Alamos National Laboratory and published in the symposium proceedings.

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	PgNo	Description	Remaining Issues
1	6	§II.W. Secondary Containment	Before the pipeline between the RLWTF and the SET is operated, the pipeline must have secondary containment.
2	10	§V. Description of SET	We still don't know if the SET is an "**unsealed** subgrade concrete structure with a single double-lined synthetic liner, and a leak detection system within the synthetic liner." At the 10/9/14 meeting, NNSA staff said they would get back to us on this issue. We have not received that information. If it is unsealed, we need to know how the thickness of the concrete structure. It would be helpful to have an engineering diagram of the concrete structure, as well as the leak detection system.
3	11	§1. Annual Update - Posting to EPRR	Posting to the Electronic Public Reading Room (EPRR) must be enforceable. We suggest a stepwise approach. If a document is found to not be posted, the Permittees have 14 days to post it to the EPRR. If it is not posted within that time frame, then it shall be enforceable under NMAC 20.6.2.1220. Below is the language from the 2010 HazWaste Permit, which may be helpful to include in the permit: **1.13 PUBLIC NOTIFICATION VIA ELECTRONIC MAIL (E-MAIL)** The Permittees shall notify individuals by e-mail of submittals as specified in this Permit. The Permittees shall maintain a list of individuals who have requested e-mail notification and send such notices to persons on that list. The notice shall be sent within seven days of the submittal date and shall include a direct link to the specific document to which it relates. The Permittees shall provide a link on the internet on the Permittees' environmental home page (http://www.lanl.gov/environment) whereby members of the public may submit a request to be placed on the e-mail notification list. In the event that the environmental home page stops operation, the Permittees shall use their best efforts to fully restore the page and its operation as soon as possible. *** Where a Permittee submittal and NMED response is required to be posted to the EPRR, the language needs to be clarified so that it is clear that the Permitees must post the submittal when it is submitted to NMED. We are concerned that the language could be interpreted to read that the Permittees may post their submittal when they receive NMED's response. For example, §12

			Freeboard.
4	11	§1. Website	CCW accepts the Permittees' proposal to establish a website six months from the effective date of the permit. A wonderful example is the Permittee's Stormwater website at: http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/individual-permit-stormwater/index.php
5	14	§5. Restricting Entry	We are concerned that Permittees cannot restrict entry into the area around the Outfall 051.
6	15	§6. Signs	Did NMED conduct government-to-government consultation with the Tribes about the signage? Signs are only required to be in English and Spanish. The requirement should include a requirement for a visual sign – one without words. Below is language from 2010 HazWaste Permit, which may be helpful in the discussions: 2.5.1 Warning Signs The Permittees shall post bilingual warning signs (in English and Spanish) at all gates and perimeter fences, where present, around the permitted units (see 40 CFR § 264.14(c)). Signs shall be posted in sufficient numbers to be visible at all angles of approach as well as from a distance of at least 25 feet. The Permittees shall include on the signs the following or an equivalent warning: DANGER – UNAUTHORIZED PERSONNEL KEEP OUT (PELIGRO – SE PROHIBE LA ENTRADA A PERSONAS NO AUTORIZADAS) The Permittees shall post warning signs in the appropriate dialect of Tewa in a manner equivalent to the bilingual warning signs in English and Spanish along shared boundaries with the Facility's permitted units and the Pueblo of San Ildefonso (PO WHO GEH). The Permittees shall post signs requested by Santa Clara Pueblo (Kha-'Po). The Permittees shall include on the signs the following warning: Wi-i ts'uni pi' – (DO NOT ENTER)
7	15	§7. Verification of Secondary Containment	Permittees must verify that systems and units that carry **untreated** liquid or semi-liquid waste streams meet requirements for secondary containment in §8 below. Permit gives LANL 180 days to verify. The permit should require verification within 30 days of the effective date of the permit. Are the Permittees verifying secondary containment now?
8	15	§8. Water Tightness	Testing for water tightness should begin within 30 days of the effective date of the permit. Are

		Testing	the Permittees testing for water tightness now?
9	23	§17. Calibration of Flow Meters	LANL has stated that is should not be held to flow meter accuracy greater than +/- 10%. However, "ISO 17025-certified meters can achieve +/- 0.05 percent accuracy." Moreover, modern flow meters--of the type one would expect to be used at an advanced laboratory such as LANL-- are even more accurate. "[M]easuring uncertainties of +/- 0.1% of rate are achievable with modern flowmeters." Jerry Stevens & Jason Pennington, "Flowmeter Calibration, Proving, & Verification Ensuring the accuracy & repeatability of your flow measurements (September 26, 2010). Online at: http://www flowcontrolnetwork.com/articles/calibration-proving-verification Additionally, it is important to note that the ISO/TEC 17025 General Requirements are the doormat for competent testing and calibration laboratories, so one would expect that LANL observes these standards in calibration and measurement. The standard is described as follows: ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories is the main ISO standard used by testing and calibration laboratories. In most major countries, ISO/IEC 17025 is the standard for which most labs must hold accreditation in order to be deemed technically competent. In many cases, suppliers and regulatory authorities will not accept test or calibration results from a lab that is not accredited. Originally known as ISO/IEC Guide 25, ISO/IEC 17025 was initially issued by the International Organization for Standardization in 1999. There are many commonalities with the ISO 9000 standard, but ISO/IEC 17025 is more specific in requirements for competence. And it applies directly to those organizations that produce testing and calibration results. Since its initial release, a second release was made in 2005 after it was agreed that it needed to have its quality system words more closely aligned with the 2000 version of ISO 9001. The standard was first published in 1999 and on 12 May 2005 the alignment work of the ISO/CASCO committee responsible for it was completed with the issuance of the reviewed standard. The most significant changes introduced greater emphasis on the responsibilities of senior management, and explicit requirements for continual improvement of the management system itself, and

			particularly, communication with the customer. The ISO/IEC 17025 standard itself comprises five elements that are Scope, Normative References, Terms and Definitions, Management Requirements and Technical Requirements. The two main sections in ISO/IEC 17025 are Management Requirements and Technical Requirements. Management requirements are primarily related to the operation and effectiveness of the quality management system within the laboratory. Technical requirements include factors which determines the correctness and reliability of the tests and calibrations performed in laboratory. Laboratories use ISO/IEC 17025 to implement a quality system aimed at improving their ability to consistently produce valid results. It is also the basis for accreditation from an accreditation body. Since the standard is about competence, accreditation is simply formal recognition of a demonstration of that competence. A prerequisite for a laboratory to become accredited is to have a documented quality management system. The usual contents of the quality manual follow the outline of the ISO/IEC 17025 standard. On line at: http://en.wikipedia.org/wiki/ISO/IEC_17025 (emphasis added).
10	26	§22. Discharge Volumes	Flow meters don't have to be installed until 180 days after the effective date of the permit. How will the discharge volumes be determined in the interim? Is there a flow meter on the discharge pipe that leaves TA-50, Bldg. 2 that splits to go to the Outfall and SET?
11	26	§23 (b). Waste Tracking	The permit must require waste tracking for both conveyance and discharge of TRU and LLW waste streams. These numbers may be helpful if there is a problem with either conveyance or discharge. Also, see comments to §31 below about Settled Solids Removal.
12	27	§25. Soil Moisture Monitoring System for SET	It is not clear whether Permittees will be permitted to discharge to SET before the baseline conditions are established. Within 120 days following effective date of DP, Permittees are required to submit a workplan for the moisture monitoring system with neutron moisture probes.

			After the effective date of the permit, it is foreseeable that a year could go befor the installation of the soil moisture monitoring system. The baseline must be established before discharges to the SET begin. We suggest an interim system should be in place before discharge so that a baseline may be promptly established. We need baseline numbers before operations.
13	29	§26, et al., Groundwater Provisions.	Permittees agreed to provide CCW, Gilkeson & Sanchez with letter confirming commitment to allowing us to witness drilling of new alluvial wells. We have not received it. We appreciate that NMED is requiring replacement of two alluvial wells. We remain concerned about the use MCOI-6 and the regional wells for ground water monitoring purposes. They should also be replaced. We reference the detailed comments of Robert H. Gilkeson, found in Appendix A, "Deficiencies in Ground Water Protection in the Draft Ground Water DP-1132 Permit, by Independent Registered Geologist Robert H. Gilkeson," to the CCW, Gilkeson and Sanchez December 12, 2013 comments for the DP-1132 draft permit. Gilkeson has provided detailed comments about why MCOI-6 and the regional wells need to be replaced. In addition, NMED has stated that the wells "were not installed for contaminant detection or groundwater monitoring." We quote from page 31 in the NMED November 2010 General Response to Comments on the LANL RCRA Renewal Permit: "The NAS report [National Academy of Sciences 2007 Final Report] references wells that were installed as part of LANL's groundwater characterization efforts that wer conducted in accordance with their Hydrogeologic Work Plan (1998).... These [characterization] wells were not installed for contaminant detection or groundwater monitoring. Therefore, these wells have limited relevance to groundwater protection goals set forth by the March 1, 2005 Consent Order."
14	34	§31. Settled Solids Removal	We are concerned that there is no public participation requirement for the submittal of the settled solids removal workplan. Because the RLWTF is unlike any other facility in NM, we urge NMED to require the workplan now to be part of the permit that is released for public comment. Additionally, reporting on the nature and amount of solids, timing of disposal at WIPP should be a matter of course, as LANL's "Supplemental Information for Discharge Permit Application DP-

			1132, Radioactive Liquid Waste Treatment Facility (RLWTF) and Zero Liquid Discharge (ZLD) Solar Evaporation Tanks," ENV-RCRA-12-0173, LAUR-12-21591 (August 10, 2012, as revised) ("Supplement") states at A-8, page 1: "(2) Transuranic RLW treatment consists of influent collection and storage, treatment of the transuranic RLW, and sludge treatment. Treated water is not discharged; it either receives additional treatment (secondary reverse osmosis) or is sent to storage tanks in Building 50-248 for disposition as bottoms. Sludge from the treatment process is concentrated, solidified with cement, and shipped to the Waste Isolation Pilot Project as a solid transuranic waste." It is, thus, clear that LANL has records of settled solid accumulation and removal which could be share with the public. Additionally, it is clear that these records include the volumes of material being accumulated and processed, which means LANL also can provide this information. In fact, the Supplement goes on to state at B-12, page 2: "Transuranic influent is received in batches from TA-55, with influent collected in either the acid tank or caustic tank in Building 50-66. Level probes for these tanks are linked electronically to the RLWTF control room. Operators monitor and record tank level changes during each influent batch transfer. Influent volumes are calculated from the difference between beginning and ending tank levels." Similar data collection applies separately to Low Level Waste, as the Supplement states further that: "Low-level RLW influent volumes will be determined by monitoring and recording the change in level of Tank 5 and Tank 6 in the Waste Management and Risk Management (WMRM) Facility. While radioactive liquid waste (RLW) is being fed to the treatment process from one of these two influent tanks (e.g. Tank 5), the fresh influent will be received in the other influent tank (e.g. Tank 6). In this illustration, the change in the level of Tank 6 from one day to the next will reflect the volume of the influent received." *Id.* It is difficult to imagine that given LANL keeping such records of the influent, they are failing to do so for the treated effluent Low-level RLW. Thus, it is reasonable for LANL to make the input-output date for both Low-level RLW and Transuranic RLW and solidified material available to the NMED and the public.
15	41	§41. Cessation of Operation of Specific Units	We support retention of 75,000 gallon concrete influent storage tank for emergency storage for LLW liquid waste. Should this specific condition be moved to another section, or have its own condition?
16	42	§42. Closure Plan	The draft permit that is released for public comment must include the Closure Plan. There is no schedule for closure.

17		Financial Assurance	CCW, et al., request financial assurance be required in the GWDP.
18	47	§52. Extensions of Time	The Permittees submittal must be posted to the EPRR. The NMED response must be posted to the EPRR.
19			CCW, et al., reserve the right to object or comment on issues raised or identified by CCW, et al.
20			CCNS received the DOE/LANL response to its November 2013 FOIA request. We are reviewing the documents and may have additional comments as a result. Did the Permittees calculate emissions to the air from the MES and SET for constituents other than the radionuclides? If so, please provide to us.

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Date: MAY 20 2015
Symbol: ENV-DO-15-0137
LA-UR: 15-23614
Locates Action No.: N/A

Ms. Phyllis Bustamante, Acting Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

GROUND WATER
MAY 20 2015
BUREAU

Dear Ms. Bustamante:

Subject: **Draft Discharge Permit DP-1132 – Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility**

This letter provides the responses of the United States Department of Energy and Los Alamos National Security, LLC (DOE/LANS) regarding issues identified during the April 16, 2015, meeting among representatives of the New Mexico Environment Department, Ground Water Quality Bureau (NMED), Citizens for Clean Water (CCW), Concerned Citizens for Nuclear Safety (CCNS), and DOE/LANS. In addition, this letter forwards a red-lined revision of the February 20, 2015, draft of DP-1132. The red-lined revision is attached to this letter as Enclosure 1. The attached red-lined revision (labelled 05/12/15 DOE/LANS REVISION) reflects the following proposed changes: (1) the language changes DOE/LANS had proposed on April 2, 2015, to Condition 24 (Waste Tracking), Condition 36 (SET Moisture Detection System Exceedance), Condition 43 (Stabilization of Individual Systems and Units), Condition 44 (Closure Plan); (2) the proposed new Conditions 47 (Integration with Consent Order) and 49 (Electronic Posting) DOE/LANS proposed on April 2, 2015; (3) a reorganization of certain conditions; and (4) some minor clarifications and typographic corrections.

Exhibit 13 LANSDOE

Responses to issues from the April 16, 2015, meeting are set forth below.

1. Signage: At the April 16 meeting, representatives of CCW raised a question about the location and content of signs they would like to have posted in the area below Outfall 51. DOE/LANS propose revising Condition 6 of the February 20, 2015, draft permit to provide as follows:

   > Condition 6. Signs – *The permittees shall post bilingual warning signs (in English and Spanish) at all gates and perimeter fences, where present, around the Facility. Signs shall be posted in sufficient numbers to be visible at all angles of approach as well as from a distance of at least 25 feet, Permittees shall include on the signs the following or an equivalent warning: DANGER – UNAUTHORZED PERSONNEL KEEP OUT (PELIGRO – SE PROHIBE LA ENTRADA A PERSONAS NO AUTORIZADAS). The permittee shall post warning signs in the appropriate dialect of Tewa in a manner equivalent to the bilingual warning signs in English and Spanish along shared boundaries with the Facility and the Pueblo of San Ildefonso.*

2. SET Liner System and Ultraviolet (UV) Resistance: Enclosure 2 provides the manufacturer's product data sheets for the following five components of the SET liner and moisture detection system: (1) primary liner (GSE Smooth Geomembrane–60 mil), (2) secondary liner (GSE Smooth Geomembrane–40 mil), (3) geonet drainage material between the primary and secondary liners (GSE Hypernet–250 mil), (4) geotextile material between the secondary liner and the concrete floor (GSE Nonwoven Geotextile–NW12), and (5) leak detection system between the primary and secondary liners (HYDRO-TEMP™ Early Warning Alarm (EWA) System).

   DOE/LANS contacted the manufacturer of the primary liner, GSE ENVIRONMENAL™, for information on the liner's UV resistance. GSE ENVIRONMENAL™ directed DOE/LANS to a 2011 white paper published by the Geosynthetic Institute, Folsom, PA, titled "Geomembrane Lifetime Prediction: Unexposed and Exposed Conditions." A copy is attached as Enclosure 3 of this letter. Page 24 of the above-referenced white paper states, "HDPE geomembranes (per GRI-GM13) are predicted to have lifetimes greater than 36 years; testing is ongoing."

3. Settled Solids. The February 20, 2015, Draft of DP-1132 addresses Settled Solids in two separate permit conditions, Condition 9 (Settled Solids) and Condition 31 (Settled Solids Removal). As reflected in the DOE/LANS proposal to revise the draft of DP-1132 so that settled solids and settled solids removal are addressed in a single condition that appears as Condition 10 in the red-lined revision attached as Enclosure 1 to this letter.

4. "Likely to affect structural integrity of a unit or system" under Condition 11: The second paragraph of Condition 11 (Maintenance and Repair) in the February 20, 2015, Draft Permit states: "In the event that routine maintenance and repair reveal significant damage likely to affect the structural integrity of a unit or system or any of its associates components, or its ability to function as designed, the Permittees shall implement the contingency plan set forth in this Discharge Permit. "

The direction to "implement the contingency plan" is ambiguous since the "contingency plan" in the February 20, 2015, draft includes ten different numbered paragraphs covering a variety of subjects. Therefore, DOE/LANS have proposed language revisions and a reorganization of the draft permit, as reflected on Enclosure 1. The reorganization attempts to place related paragraphs together.

For example, Condition 13 (Maintenance and Repair) now provides that if routine maintenance and repair reveal "significant damage likely to affect the structural integrity of a unit or system or any of its associated components, or its ability to function as designated, the Permittee shall implement the requirements of Condition 14 (Damage to Structural Integrity) of this Discharge Permit."

5. SOP for Maintenance and Repairs: DOE/LANS have determined that it is not reasonable or appropriate to provide Standard Operating Procedures (SOPs) for maintenance and repairs of all equipment and systems at the RLWTF. The SOPs are voluminous and are subject to regular updating and revision.

6. Notification Under Condition 16 (Emergency Procedures): DOE/LANS believe that the revisions NMED made to the lettered subparagraphs of Condition 16 (Emergency Procedures) in the February 20, 2015, draft of DP-1132 are appropriate and that NMED should not reinstate the language of subparagraphs c through f as they appeared in the October 28, 2014, draft of DP-1132.

7. Measurement of TRU Waste Flow into the RLWTF: Condition 22 of the February 20, 2015, draft of DP-1132 accurately describes how TRU influent volumes to the RLWTF currently are measured. As that condition states, "permittees shall estimate the volume of TRU influent wastewater being conveyed to the Facility using electronic sensors which measure tank levels in both the acid waste and caustic waste influent tanks." Volumes "shall be determined by calculation using the head change and tank size. Operators shall record changes in influent tank levels whenever a batch of TRU wastewater is conveyed to the facility. The total daily and monthly volumes of TRU influent received by the facility shall be submitted to NMED in quarterly monitoring reports . . . ." This permit language was specifically negotiated and agreed to by NMED more than two years ago.

8. Flow Meter Accuracy Requirements: DOE/LANS have previously demonstrated that the language in Condition 18 of the February 20, 2015, draft of DP-1132 that "flowmeters shall be calibrated to within plus or minus ten percent of actual flow, as measured under field conditions" is consistent with NMED flow calibration policy. That policy provides that "flow measurement devices be calibrated in place, under actual operating conditions (field calibration) to within +/- 10% of the actual flow." *See* NMED Flow Meter Calibration (prepared by Robert George, NMED-GWQB) attached hereto as Enclosure 4. As DOE and LANS have further demonstrated, the plus or minus ten percent standard is also consistent with USEPA wastewater flow measurement procedures. *See* Operating Procedure, Wastewater Flow Measurement (August 12, 2001) Region 4, USEPA Science and Ecosystem Support Division (attached hereto as Enclosure 5).

9. Closure Plan: DOE and LANS will submit a closure plan to be included as a part of the permit. DOE and LANS currently anticipate that the plan will be submitted to NMED by December 31, 2015.

Please call Robert Beers at (505) 667-7969 if you have questions regarding this information.

Sincerely,

Alison M. Dorries
Division Leader
Environmental Protection Division
Los Alamos National Security LLC

Sincerely,

Gene E. Turner
Environmental Permitting Manager
National Security Missions
Los Alamos Field Office
U.S. Department of Energy

AMD:GET:RSB/ms

Enclosure: (1) Red-lined revision of the February 20, 2015, draft of DP-1132
(2) SET liner and leak detection system product data sheets
(3) Geomembrane Lifetime Prediction, Geosynthetic Institute White Paper #6
(4) NMED Flow Meter Calibration (prepared by Robert George, NMED-GWQB)
(5) USEPA wastewater flow measurement procedures

Cy: James Hogan, NMED/SWQB, Santa Fe, NM, (E-File)
John E. Kieling, NMED/HWB, Santa Fe, NM, (E-File)
Stephen M. Yanicak, NMED/DOE/OB, (E-File)
Jennifer Hower, NMED/OGC, Santa Fe, (E-File)
Jonathan Block, CCW, Santa Fe, (E-File)
Lindsay Lovejoy, CCNS, Santa Fe, (E-File)
Joni Arends, CCNS, Santa Fe, (E-File)
Hai Shen, EM-SG, (E-File)
Gene E. Turner, NA-LA, (E-File)
Kirsten Laskey, EM-LA, (E-File)
Michael A. Lansing, PADOPS, (E-File)
Amy E. De Palma, PADOPS, (E-File)
Michael T. Brandt, ADESH, (E-File)
Raeanna Sharp-Geiger, ADESH, (E-File)
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STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION OF THE UNITED STATES DEPARTMENT OF ENERGY AND LOS ALAMOS NATIONAL SECURITY, LLC FOR A GROUNDWATER DISCHARGE PERMIT (DP-1132) FOR THE RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

No. GWB 17-20 (P)

NEW MEXICO ENVIRONMENT DEPARTMENT'S
NOTICE OF FILING OF THE ADMINISTRATIVE RECORD

Pursuant to the Environment Department's Permit Procedures, 20.1.4.200.A(2) NMAC, the New Mexico Environment Department ("Department") notifies the parties that the Administrative Record has been filed with the hearing clerk. The Administrative Record Index, NMED Exhibit 6 to its Statement of Intent to File Technical Testimony, filed on April 9, 2018, is included with this notice. Electronic copies of the Administrative Record will be sent to all counsel no later than April 13, 2018.

Respectfully submitted,

NEW MEXICO ENVIRONMENT DEPARTMENT
OFFICE OF GENERAL COUNSEL

By: */s/ John Verheul*

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CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing was filed with the Hearing Clerk and was served on the following via electronic mail on April 12, 2018:

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John Verheul

ADMINISTRATIVE RECORD INDEX

LOS ALAMOS NATIONAL LABORATORY

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

DP-1132

Date	Bates No.	From	To	Format	Subject
11/01/1994	00002-00012	Dennis McQuillan, NMED	Michael Dale, NMED GWPRB AIP/LANL	Fax	Response to NMED Letter of November 1, 1994 Re: Technical Area (TA)-50 Radioactive Liquid Waste Treatment Plant
04/03/1996	00013-00015	Marcy Leavitt, NMED	Tom Baca, LANL	Letter	Re: Discharge Plan Required for TA-50, Liquid Radioactive Waste Treatment Facility
04/18/1996	00016-00018	David Moss, LANL	Tori George, LANL	Memorandum	Re: Posting of Mortendad Canyosow all taxt in a table cokumnn
04/1996	00019-00074	N/A	N/A	Abstract/Report	Ecotoxicological Screen of Potential Release Site 50-006(D) of Operable Unit 1147 of Mortandad Canyon and Relationship to the Radioactive Liquid Waste Treatment Facilities Project

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
N/A	00075-00098	NMED	LANL	Letter attachment	Request for Additional Information on Technical Area 50 Potential Release Sites 50- 006(a, c) 50-007, and 50-008
05/20/1996	00099-00106	N/A	N/A	Agenda, sign-up sheet, and Meeting Notes	May 20, 1996, Field Trip by NMED to the TA-50 Radioactive Liquid Waste Treatment Facility: Agenda, sign-up sheet, and Meeting Notes
07/13/1996	00107-00109	LANL	NMED	Acknowledgment of Receipt	Copy of Check No. 743204 $50.00
08/05/1996	00110-00111	Thomas E. Baca, LANL	Marcy Leavitt, NMED	Letter	Re: a request for a short deadline extension for submittal of the ground water discharge plan.
08/16/1996	00112-00532	LANL	NMED	Application	Ground Water Discharge Plan Application for the TA-50 Radioactive Liquid Waste Treatment Facility
08/16/1996	00533-00535	G. Thomas Todd, DOE, LANL	Dale Doremus, NMED	Letter	Re: Ground Water Discharge Plan Application, TA-50 RLWTP

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
08/26/1996	00536-00537	Dale M. Doremus, NMED	James Bearzi, NMED	Memorandum	Re: New Discharge Plan for DP-1132 LAN/TA-50 RLWTF
10/02/1996	00538-00539	Courte Voorhees, NMED	Phyllis Bustamante, NMED	Memorandum	Re: DP1132 LANL/TA-50
11/12/1996	00540-00542	Phyllis Bustamante, NMED	file	Field Trip Report	Evaluation of Proposed Discharge Plan. Inspection of Facilities
11/15/1996	00543-00544	LANL	NMED	Affidavit of Publication	Public Notice of proposed discharge plans for DP-1132, LANL, RLWTF TA-50 in the Los Alamos Monitor paper
11/17/1996	00545-00546	N/A	N/A	Affidavit of Publication	Public Notice DP-1132, LANL, RLWTF TA- 50 in the Albuquerque Journal
11/19/1996	00547-00554	Dale Doremus, NMED	Tom Todd, DOE, LANL	Letter	Public Notice forwarded
11/18/1996	00547-00554	Dale Doremus, NMED	Lawry Mann, LANL	Letter	Public Notice forwarded
11/19/1996	00547-00554	Dale Doremus, NMED	Board of County Commissioners, Los Alamos County	Letter	Public Notice forwarded
12/17/1996	00555-00556	Douglas Meiklejohn, NMELC	NMED	Letter	Re: Proposed ground water discharge plan 1132 requesting NMED to conduct a

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					public hearing on the proposed plan
12/13/1996	00557-00561	Phyllis Bustamante, NMED	Doug Meiklejohn, NMELC	Fax	Requests for hearing for DP-1132 from Susan Diane; Kathy Sanchez, Pi'ee Qµiyo Inc.; and Joey Natseway, Tewa Women United
12/06/1996	00562-00568	N/A	N/A	Workplan	Hydrogeologic Workplan LANL Draft Revision 1
12/19/1996	00569-00572	Phyllis Bustamante, NMED	Jay Cogman, CCWNS	Fax	Appendix C/What You, as a Requestor of Records, Should Know
01/1997 – 12/1997	00573-00574	Unknown	Unknown	Data Table	TA-50 WM-1 Radionuclide Summary Jan. 1997 through Dec. 1997
01/30/1997	00575-00577	Dale Doremus, NMED	Susan Diane	Letter	Re: DP 1132 for LANL RLWTF public hearing
01/30/1997	00578-00580	Dale Doremus, NMED	Joey Natseway Tewa Women United	Letter	Re: DP 1132 for LANL RLWTF public hearing
01/30/1997	00581-00583	Dale Doremus, NMED	Kathy Sanchez, Pi'ee Quiyo Inc.	Letter	Re: DP 1132 for LANL RLWTF public hearing
01/30/1997	00584-00611	N/A	N/A	List	Potential Release Sites

Date	Bates No.	From	To	Format	Subject
02/11/1997	00612-00615	Jorg Jansen, LANL/ER; and Theodore J. Taylor, DOE/LAAO	Benito Garcia, NMED-HRMB	Letter	Re: Response to Request for Additional Information for RFI Report on TA-50 (PRSs 50-006(a,c), 50-007, and 50-008
04/20/1997	00616-00623	Steve Yanicak, LANL	Mat Johansen, DOE	Draft Letter	Re: Review of LANL's Ground Water Discharge Plan Application for the TA-50 RLWTF (08/16/1996)
04/21/1997	00624-00632	Phyllis Bustamante, NMED	Tom Todd, LANL	Letter	Re: Request for Additional Information, LANL RLWTF (TA-50), DP-1132
06/04/1997	00633-00636	N/A	N/A	RLWTF Survey Results	RLWTF Survey Results – Accelerator-Produced Isotopes
07/21/1997	00637-00639	Robert Dinwiddie, NMED	Tom Todd, LANL and Sigfried Hecker, LANL	Letter	Re: Change in Status of the Technical Area (TA) 53 Surface Impoundments LANL NM0890010515
04/24/1997	00640-00643	Tom Todd, LANL	Dale Doremus, NMED	Letter	Re: Revisions to LANL Ground Water Discharge Plan Application for RLWTF at TA-50

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					– Phase I Upgrades
06/13/1997	00644-00741	Jorg Jansen, LANL/ER; and Theodore J. Taylor, DOE/LAAO	Benito Garcia, NMED-HRMB	Letter	Re: Response to the Request for Supplemental Information to the NOD Response for RFI Report for PRSs 50-004(a, c) and 50-011(a) in TA-50 (Former OU 1147)
06/23/1997	00742-00763	Tom Todd, LANL	Dale Doremus, NMED	Letter	LANL's response to 4/21/1997 request for clarification and/or additional information on the RLWTF TA-50 Application, DP-1132
07/03/1997	00764-00772	Steven Rae, LANL	Sam Coleman, US EPA	Letter	Notice of Changed Conditions at NPDES Outfall 051- change of waste streams
N/A	00773-0777	N/A	N/A	Permit excerpts	Permit No. NM.0028355 Outfall 051
08/01/1997	00778-00779	Dale Doremus, NMED	Douglas Meiklejohn, NM ELC	Letter	Response to request for public hearing for DP- 1132 for LANL RLWTF
08/01/1997	00780-00782	Michael Dale, DOE OB, NMED	Phyllis Bustamante, NMED	Internal Memo	Suggestions or recommendations

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					concerning LANL's response to GWPR's review for the TA-50 discharge plan
09/1997	00783-00785	N/A	N/A	Maps/Figures from Mortandad Canyon Workplan, Sept. 1997	Figure 3.3.1-2, Preliminary Isopach map of the alluvium in lower Mortandad Canyon and Figure 3.7.2.4 recent elevations of alluvial groundwater in lower Mortandad Canyon
09/29/1997	00786-00787	Douglas Meiklejohn, NMELC	Marcy Leavitt, NMED	Letter	IPRA request re: DP-1132 LANL RLWTF
09/30/1997	00788-00790	Phyllis Bustamante, NMED	N/A	Field Trip Report	Evaluation of Proposed DP-1132, Inspection of facilities or construction Phase 1 & 2 upgrades to system
10/16/1997	00791-00792	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	LANL's work plan for Mortandad Canyon – LA-UR-97-3291 work plan not included
12/11/1997	00793-00797	N/A	N/A	Figures 3 - 6	Figures 3 – 6, Mortandad Alluvial Nitrate

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					Concentrations: 1962-1996
12/22/1997	00798-00802	Herman Le-Doux, DOE	Dale Doremus, NMED	Letter	LANL's response to comment number 6.b.1 of NMED's request for additional information, LANL RLWTF TA-50, DP-1132
12/30/1997	00803-00806	Tom Todd, LANL	Dale Doremus, NMED	Letter	Re: Revisions to LANL RLWTF at TA 50 for Phase I and Phase II
03/28/1997	00807-00809	N/A	N/A	Report	LANL Waste Profile System WPF #22921
03/24/1998	00810-00838	Alex Puglisi, LANL	Janice Archuleta, NMED	Letter	Transmittal of TA-50 Sampling and Analysis Plan
04/01/1998	00839-00840	P. Bustamante, NMED	Doug Meiklejohn, NMELC	Telephone conversation	TA-50 DP Application
04/09/1998	00841-00843	Phyllis Bustamante, NMED	Bob Beers, LANL	Letter	Follow Up-Meeting April 1, 1998, LANL RLWTF, DP-1132
04/27/1998	00844-00845	Douglas Meiklejohn, NMELC	Phyllis Bustamante, NMED	Letter	Proposed ground water discharge plan 1132 Pueblo of San Ildefonso wishes to withdraw request for public hearing on proposed DP 1132

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
05/29/1998	00846-00848	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Re: Status of Phase I and II Upgrades, LANL Ground Water Discharge Plan Application for the RLWTF at TA 50
05/12/1998	00849-00850	N/A	N/A	Map	Large Color Plot Map Proposed Regional Wells
05/12/1998	00851	N/A	N/A	Map	Large Color Plot Map Proposed Alluvial and Intermediate Wells
06/01/1998	00852-00858	Steven Rae, LANL	Phyllis Bustamante, NMED	Letter	Request for Additional Information, Ground Water Discharge Plan Application for the RLWTF, DP-1132
07/10/1998	00859-00861	Distribution	Dennis Erickson, Tom Baca, LANL	Memorandum	Radioactive Liquid Waste Zero Discharge Project
08/06/1998	00862-00863	Phyllis Bustamante, NMED	Bob Beers, LANL	Certified Letter	Effluent Quality and Ground Water Monitoring Data, LANL, RLWTF, DP-1132
08/06/1998	00864-00865	Phyllis Bustamante, NMED	Bob Beers, LANL	Telephone Conversation	Asking for more information on the biological treatment.

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Date	Bates No.	From	To	Format	Subject
06/1998	00866-00933	N/A	N/A	Report, LA-13452-MS	Elimination of Liquid Discharge to the Environment from the TA-50 Radioactive Liquid Waste Treatment Facility
08/10/1998	00934-00935	Phyllis Bustamante, NMED	Bob Beers, LANL	Telephone Conversation	Sending a letter on compliance for the discharge.
08/25/1998	00936-00938	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Request for additional information, Ground Water Discharge Plan Application for the RLWTF, DP-1132– effluent & ground water well data for 1997 and 1998
01/1997-06/1998	00939-00943	N/A	N/A	Monitoring Data	Att. C to 8/25/98 LANL letter - NPDES Monitoring Data for Outfall 051
01-1997-12/1997	00944-00951	N/A	N/A	Analysis Results	Att. D to 8/25/98 LANL letter - RLWTF Influent Monitoring: Semivolatile Organic Compounds and Volatile Organic Compounds

Date	Bates No.	From	To	Format	Subject
09/03/1998	00953-00956	Steven Rae, LANL	Phyllis Bustamante, NMED	Letter	Summary of July 31, 1998 Meeting at LANL and Status Report on RLWTF Upgrades
09/17/1998	00957-00959	Dale Doremus, NMED	David Gurule, LANL	Certified Letter	Letter of Non-Compliance, LANL, RLWTF, DP-1132
10/08/1998	00960-00964	Steven Rae, LANL	Dale Doremus, NMED	Letter	Response to Letter of Non-Compliance, LANL, RLWTF, DP-1132
1997	00965-01081	N/A	N/A	Annual Report	EM/RLW Environmental Management Radioactive Liquid Waste Group Annual RLWTF Report
1997	01082-01228	N/A	N/A	Annual Report	EM/RLW Environmental Management Radioactive Liquid Waste Group Annual RLWTF Report
11/20/1998	01229-01237	Thomas Baca, LANL	Dale Doremus, NMED	Letter	Re: a short-term proposed operational plan
12/23/1998	01238-01240	Thomas Baca, LANL	Dale Doremus, NMED	Letter	Follow up to 11/20/98 letter re mechanical

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					evaporation as the preferred process for the long-term treatment of (RO) reject stream
02/26/1999	01241-01244	Dale Doremus, NMED	Susan Diane	Certified Letter	Response to questions submitted with request for public hearing in DP-1132 for LANL RLWTF
02/26/1999	01245-01248	Dale Doremus, NMED	Joey Natesway, Tewa Women United	Certified Letter	Response to questions submitted with request for public hearing in DP-1132 for LANL RLWTF
02/19/1999	01249-01256	Phyllis Bustamante, NMED	David Gurule, DOE	Certified Letter	Re: Additional information or clarification needed on Discharge Plan Application LANL RLWTF TA-50 DP-1132
02/26/1999	01257-01260	Dale Doremus, NMED	Kathy Sanchez, Pi'ee Quiyo Inc.	Certified Letter	Response to questions submitted with request for public hearing in DP-1132 for LANL RLWTF
03/12/1999	01261-01273	Dennis Erickson, LANL	Phyllis Bustamante, NMED	Letter	Response to NMED GWQB Request for Additional Information,

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					Ground Water Discharge Plan Application for the TA-50 RLWTF, DP-1132 without Att. 1.0 – 11.0
03/16/1999	01274-01275	Phyllis Bustamante, NMED	Kathy Sanchez, Pi'ee Quiyo Inc.	Telephone Conversation	TA-50 DP-1132
03/18/1999	01276-01277	Phyllis Bustamante, NMED	Bob Beers, LANL	Telephone Conversation	Status of Phase I and Phase II
03/19/1999	01278-01280	Dale M Doremus, NMED	David Gurule, DOE	Certified Letter	Re: extension of time in which LANL may discharge without an approved discharge permit for an additional 20 days
03/22/1999	01281-01282	Phyllis Bustamante, NMNED	Suzanne Westerly, CCNS	Telephone Conversation	Public Hearing
03/29/1999	01283-01285	N/A - Meeting with Joey Natseway, Tewa Women United; Gilbert Sanchez,	N/A Tribal Env'l Watch Alliance, Kathy Sanchez, Teresa Juarez, and Ron Rundstrom	Agenda	To provide concerned citizens with adequate information to determine if concerns on the discharge from the RLWTF are Water Quality Control Commission issues and determine if a

Date	Bates No.	From	To	Format	Subject
					public hearing is needed
03/23/1999	01286-01292	Dennis Erickson, LANL Thomas Baca, LANL	Phyllis Bustamante, NMED	Letter	Installation of Mechanical Evaporator, Ground Water Discharge Plan Application for the TA- 50 RLWTF, DP-1132
04/09/1999	01293-01295	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	NMED Sampling and Analysis of Effluent from the Laboratory's RLWTF at TA-50
04/13/1999	01296-01302	N/A	N/A	Sign-up sheet, Agenda	NMED Site Visit at RLWTF
04/14/1999	01303-01307	Bob Beers, LANL	Phyliss Bustamante, NMED	Fax	Letter forwarding a detailed project schedule for installation and start-up of the proposed mechanical evaporator for the LANL RLWTF at TA-50
04/14/1999	01308-01309	Bob Beers, LANL	Phyllis Bustamante, NMED	Email	RLWTF Effluent Tank Discharge
04/13/1999	01310-01314	DOH, Scientific Laboratory Division	Phyllis Bustamante, NMED	Analytical Results	Analytical results of sample of effluent collected on 04/13/99
04/13/1999	01315-01317	DOH, Scientific Laboratory	NMED	Analytical Results	Analytical results

Date	Bates No.	From	To	Format	Subject
		Division			
04/13/1999	01318-01322	DOH, Scientific Laboratory Division	Phyllis Bustamante, NMED	Analytical Results	Analytical results of sample of effluent collected on 04/13/99
05/06/1999	01323-01327	Bob Beers, NMED	Phyllis Bustamante, NMED	Letter	RLWTF, Ground Water Discharge Plan DP- 1132 Quarterly Report, January 1-March 31, 1999
05/12/1999	01328-01338	Steve Yanicak, NMED	Jay Coghlan, CCNS	Letter with Att. 1 through 6	Status of Current and planned Upgrades at the TA-50 RLWTF and the Ground Water Discharge Plan DP-1132 Application
07/21/1999	01339-01344	Marcy Leavitt, NMED	Kathy Sanchez, Pi'ee Quiyo Inc.,	Letter	Public Hearing, LANL RLWTF, DP-1132 – no cover sheet begins
06/30/1999	01345-01348	Marcy Leavitt, NMED	David Gurule, DOE	Letter	Public Hearing, LANL, RLWTF, DP-1132
07/21/1999	01349-01350	Marcy Leavitt, NMED	Susan Diane	Letter	Public Hearing, LANL, RLWTF, DP-1132
07/21/1999	01351-01352	Marcy Leavitt, NMED	Douglas Meiklejohn, NMELC	Letter	Public Hearing, LANL, RLWTF, DP-1132
07/21/1999	01353-	Marcy Leavitt,	Kathy Sanchez,	Letter	Public Hearing,

Date	Bates No.	From	To	Format	Subject
	01354	NMED	Pi'ee Quiyo Inc.		LANL, RLWTF, DP-1132
07/21/1999	01355-01356	Marcy Leavitt, NMED	Joey Natseway, Tewa Women United	Letter	Public Hearing, LANL, RLWTF, DP-1132
07/23/1999	01357-01368	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	RLWTF, Ground Water Discharge Plan DP- 1132, Quarterly Report, April 1 – June 30, 1999 – no cover sheet begins
08/06/1999	01369-01370	Douglas Meiklejohn, NMELC	Marcy Leavitt, NMED	Letter	Law Center no longer representing San Ildefonso Pueblo
10/04/1999	01371-01373	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Re: a process modification at the TA-50 RLWTF- replacement of TUF tubes
10/29/1999	01374-01379	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	LANL's Ground Water Discharge Plan DP- 132 report for the RLWTF at TA-50 from July 1 – September 30, 1999
12/22/1999	01380-01384	Steve Yanicak, NMED	Steve Rae, LANL	Letter	Radioactive Effluent Quality at NPDES Outfall 051, TA-50, Building 1, October,

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					1999; (ESH-18/WQ&H:99-0467)
01/25/2000	01385-01391	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	RLWTF, Ground Water Discharge Plan DP- 1132, Quarterly Report, Fourth Quarter, 1999
02/18/2000	01392-01397	Bob Beers, LANL	Barbara Hoditschek, NMED	Letter	Monthly Status Report, RLWTF at TA-50 for January 2000
03/20/2000	01398-01400	Bob Beers, LANL	Barbara Hoditschek, NMED	Letter	Monthly Status Report for February 2000, RLWTF at TA-50
03/12/1999	01401-01430	N/A	N/A	Attachment 7.0	Effluent Canyon Surface Water Monitoring – Summary Table of Results – Assaigai Analytical Laboratories, Inc. Report
01/31/2000	01431-01433	Maura Hanning, NMED	David Gurule, DOE	Certified Letter	Status Update on the Discharge Permit Application for the LANL, RLWTF, DP-1132
02/18/2000	01434-01438	Steven Rae, LANL	Maura Hanning, NMED	Letter	Status Update on the Ground Water Discharge Permit Application, LANL,

Date	Bates No.	From	To	Format	Subject
					RLWTF, DP-1132
04/26/2000	01439-01445	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, First Quarter, 2000
07/31/2000	01446-01450	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, Second Quarter, 2000
10/27/2000	01451-01455	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, Third Quarter, 2000
08/18/2000	01456-01457	Bob Beers, LANL	Phyllis Bustamante	Letter	Ground Water Discharge Plan DP-1132, RLWTF at TA-50, additional information
12/01/2000	01458-01459	Phyllis Bustamante, NMED	Jody Arends, CCNS	Telephone Conversation	LANL – TA-50 – Public Hearing
12/08/2000	01460-01462	Bob Beers, LANL	Joni Arends, CCNS	Letter	LANL, Ground Water Discharge Plan Application for the TA-50 RLWTF
08/15/2001	01463-01502	N/A	N/A	Report	RLWTF Annual Report for 2000, AR-RLW- 2000 Vol. 1,R

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
01/30/2001	01503-01508	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, Fourth Quarter, 2000
02/08/2001	01509-01510	Joni Arends, CCNS	Marcy Leavitt, NMED	Letter	IPRA Request Groundwater Discharge Plan for the LANL RLWTF TA-50 DP-1132
03/20/2001	01511-01513	Steven Rae, LANL	Joni Arends, CCNS	Letter w/no Attachments	Request for information, Ground Water Discharge Plan Application for the RLWTF at TA-50
Post-May 2001	01514-01533	N/A	N/A	Study	Radioactive Liquid Wastewater Treatment Facility Influent Minimization Study
04/24/2001	01534-01538	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter LA-UR—01-5353	Ground Water Discharge Plan DP-1132, Quarterly Report, First Quarter, 2001
06/21/2001	01539-01541	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	June 11, 2001 Tour of Mortandad Canyon and the RLWTF at TA-50 – w/no Attachments
07/23/2001	01542-01548	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Request for Change in Procedure, Total Dissolved

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					Determination
07/25/2001	01549-01553	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, Second Quarter, 2001
09/17/2001	01554-01560	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Withdrawal of Request for Change in Procedure, Total Dissolved Determination
10/29/2001	01561-01565	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, Third Quarter, 2001
11/2001	01566-01582	N/A	N/A	Diagrams/ PowerPoint	The Radioactive Liquid Waste Treatment Facility at LANL Technical Area-50 Building 01
11/13/2001	01583-01586	N/A	N/A	Agenda	NMED-GWQB Tour
11/26/2001	01587-01590	David McInroy, LANL	John Young, NMED	Letter ER2001-0915	Notification of Geotechnical and Waste Characterization Sampling at TA-50
12/07/2001	01591-01596	N/A	N/A	Report – Att. 7.0	Derived Concentration Guideline Monthly Report for the TA-

Date	Bates No.	From	To	Format	Subject
					50 RLWTF-Sept. 2001
08/15/2001	01597-01702	N/A	N/A	Report	RLWTF Annual Report for 2000, AR-RLW- 2000 Vol. 2,R.
CY 2001	01703-01706	N/A	N/A	Sample Results – Att. 2.0	LANL TA-50 RLWTF Weekly Composite Effluent Sample Results N03/N02-N, NH-3, TKN, F, TDS
01/10/2002	01707-01709	N/A	N/A	Field Trip Report	TA-55 Plutonium Processing Plant, DP-1132
01/16/2002	01710-01712	Curt Frischkorn, NMED	Bob Beers, LANL	Certified Letter	Request for Additional Information, DP-1132, LANL, RLWTF TA-50
01/25/2002	01713-01717	Bob Beers, LANL	Phyllis Bustamante, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, Fourth Quarter, 2001
01/31/2002	01718-01720	Steven Rae, LANL	Samuel Coleman, US EPA, Region 6	Letter	Notice of Planned Change at NPDES Outfall 051, NPDES Permit No. NM0028355– Perchlorate Removal
02/04/2002	01721-01724	Bob Beers, LANL	Phyllis Bustamante	Letter	LANL, RLWTF, Ground Water

Date	Bates No.	From	To	Format	Subject
					Discharge Plan DP-1132, Minor Modification – Perchlorate Treatment Upgrade
02/12/2002	01725-01726	Curt Frischkorn, NMED	Bob Beers, LANL	Email	Direct all correspondence related to DP-1132 to Curt Frischkorn and delete Phyllis Bustamante from mailing list.
02/22/2002	01727-01742	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	Response to Request for Additional Information RLWTF at TA-50
03/18/2002	01743-01749	N/A	N/A	Meeting Notes	LANL-RLWTF Meeting with Joni Arends, CCNS; Brian Shields and Linda Fair, Amigos Bravos; Coila Ash, NM Toxics Coalition
04/2002	01750-01874	N/A	N/A	Report	RLWTF Annual Report for 2001 – Volume 1
04/24/2002	01875-01880	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, First Quarter 2002

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
07/25/2002	01881-01885	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	Ground Water Discharge Plan DP-1132, Quarterly Report, Second Quarter 2002
11/2002	01886-01966	N/A	N/A	Report LA-UR-02-7108	Pilot Scale Membrane Filtration Testing at the LANL RLWTF
11/27/2002	01967-01971	Steven Rae, LANL	Samual Coleman, US EPA Region 6	Letter	Notice of Planned Changes at TA-50 RLWTF, NPDES Permit No. NM0028355– Influent Tank Farm (300,000 gal.) and RO Pilot Units
12/10/2002	01972-01975	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	RLWTF, Ground Water Discharge Plan DP- 1132, Minor Modification – Influent Tank Farm (300,000 gal.) and RO Pilot Units
01/29/2003	01976-01989	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, Fourth Quarter 2002
04/02/2003	01990-02007	N/A	N/A	Report	Field Trip Report LANL RLWTF TA-50 Facility Inspection (GWB),

NMED Exhibit 9

Date	Bates No.	From	To	Format	Subject
					preparation for issuance of DP-1132
04/30/2003	02008-02012	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, First Quarter 2003
06/09/2003	02013-02135	Bob Beers, LANL	Curt Frischkorn, NMED	Letter and Report LA-UR-03-2728	Forwarding RLWTF Annual Report for 2002
06/24/2003	02136-02139	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132, Minor Modification– Cross-country pipeline from TA-21-257 to TA-50
08/01/2003	02140-02146	Maura Hanning, NMED	Ralph Erickson, US DOE	Letter	Notice of Public Hearing
07/30/2003	02147-02152	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, Second Quarter 2003
08/11/2003	02153-02158	Maura Hanning, NMED	Kathy Sanchez, Pi'ee Quiyo Inc.; Susan Diane; Douglas Meiklejohn, NM ELC; Joey Natseway, Tewa	Letter	Notice of Public Hearing

Date	Bates No.	From	To	Format	Subject
			Women United; Joni Arends, CCNS		
08/04/2003	02159-02161	N/A	N/A	Affidavit	Affidavit of Publication Notice DP-1132, LANL, RLWTF
09/03/2003	02162-02163	Joni Arends, CCNS	Maura Hanning, NMED	Letter	Request for a public hearing on LANL RLWTF DP-1132
09/03/2003	02164-02166	Joni Arends, CCNS	Maura Hanning, NMED	Email	DP-1132 – RLWTF proposed permit. Request for public hearing on draft discharge permit
09/06/2003	02167-02168	Kathleen Sanchez, Tewa Women United	Maura Hanning, NMED	Letter	LANL, RLWTF DP-1132. Request for public hearing on draft discharge permit.
08/11/2003	02169-02171	Maura Hanning, NMED	Susan Diane	Letter	Public Notice pertaining to proposed ground water discharge permit for LANL, RLWTF
09/04/2003	02172-02198	David McInroy, LANL; David Gregory, DOE	John Young, NMED	Letter	Status of Mortandad Canyon Sediment Investigations
09/17/2003	02299-02201	Bob Beers, LANL	Curt Frischkorn, NMED	Letter enclosing *Ground Water Wells in the Mortandad Canyon Area* (LA-UR-03-4596, July	Request for additional information, TA-50 RLWTF, Ground Water Discharge

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
				2003	Plan DP- 1132
10/20-22/2003	02202-02219	N/A	N./A	Report/Powerpoint	NM Environmental Health Conference re Radioactive Liquid Waste Treatment Facility at LANL
10/31/2003	02220-02221	NMED	LANL	Invoice	Assessments Ground Water PRD200330002, 341 Discharge Fee $3,450.00
11/10/2003	02228-02320	Bob Beers, LANL	NMED; CCNS; Tewa Women United	Presentation and Meeting Sign-in List	TA-50 Radioactive Liquid Waste Treatment Facility Ground Water Discharge Plan History
12/23/2003	02321-02327	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	Response to request for additional information for TA-50 RLWTF, Ground Water Discharge Plan DP-1132 re unanswered questions at 11/10/03 presentation
03/04/2004	02328-02329	Curt Frischkorn, NMED	Steven Rae, LANL	Letter	Request for Additional Information, DP-1132, LANL – exceedances &

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					detections in wells
04/05/2004	02330-02340	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	Response to request for additional information for TA-50 RLWTF, Ground Water Discharge Plan DP-1132 – well data
04/20/2004	02341-02467	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	RLWTF Annual Report For 2003
04/28/2004	02468-02474	Bob Beers, LANL	Curt Frischkorn, NMED	Letter	TA-50 RLWTF, Ground Waste Discharge Plan DP-1132 Quarterly Report, First Quarter 2004
05/13/2004	02475-02479	Steven Rae, LANL	Ed Wilmot, NNSA; Joseph Vozella, NNSA	Letter	Radioactive Effluent Quality at NPDES Outfall 051, TA-50, February 2004 and March 2004
07/13/2004	02480-02503	N/A	N/A	Assessment Powerpoint	Assessment of potential contaminant pathways through saturated zone in the vicinity of Mortandad Canyon
07/13/2004	02504-02517	N/A	N/A	Presentation Powerpoint	Historical Contaminant Impact on Groundwater at

Date	Bates No.	From	To	Format	Subject
					LANL
07/28/2004	02518-02523	Beverly Ramsey, LANL	Curt Frischkorn, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, Second Quarter 2004
08/18/2004	02534-02536	Christina Kelso, NMNED	Bob Beers, LANL	Email	Re: letter requesting the closure plan for TA- 50
08/18/2004	02537-02539	George Schuman, NMED	Steven Rae, LANL	Letter	Request for Additional Information, DP-1132 for NMED to complete its technical evaluation of the application: a closure plan
08/27/2004	02540-02542	Robert Beers, LANL	Christina Kelso, NMED	Email	Draft Closure Plan RLWTF DP-1132
08/30/2004	02543-02544	Christina Kelso, NMED	Bob Beers, LANL	Email	Draft Closure Plan RLWTF DP-1132
08/30/2004	02545-02548	Beverly Ramsey, LANL	George Schuman, NMED	Letter	Request for Additional Information, DP-1132, RLWTF Closure Plan
11/03/2004	02549-02551	Christopher Vick, NMED	Bob Beers, LANL	Letter	Request for Additional Information, DP-1132 for NMED to complete its technical evaluation

Date	Bates No.	From	To	Format	Subject
					of the application: a closure plan
11/19/2004	02552-02570	N/A	N/A	CD	Photographs NMED Tour of RLWTF LA-UR-04-8540 LANL 12/04
01/25/2005	02571-02576	Bob Beers	Christopher F. Vick	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, Fourth Quarter 2004
03/01/2005	02577-02851	N/A	N/A	CO	Compliance Order on Consent In the Matter of the United States Department of Energy and the Regents of the University of California Los Alamos National Laboratory
04/05/2005	02852-02855	Bob Beers, LANL	Christopher F. Vick	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132, Minor Modification– well MCA-5 installed to replace MCO-3
04/11/2005	02856-02878	William Olson, NMED	Edwin Wilmott, NNSA; Regents of the University of	Certified Letter	Notice that Ground Water Discharge Permit DP-1132,

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
			California		LANL has been proposed for approval.
04/27/2005	02881-02902	William Olson, NMED	Edwin Wilmott, NNSA; Regents of the University of California	Letter	Re-issuance of Public Notice Draft Discharge Permit, DP-1132, LANL RLWTF
04/29/2005	02903-02908	Bob Beers, LANL	Christopher Vick, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, First Quarter 2005
06/06/2005	02909-02910	Douglas Meiklejohn, NM ELC	William Olson, NMED	Letter	Draft Discharge Permit DP-1132 – requesting a 30-day extension to file comments and request public hearing.
06/10/2005	02911-02919	William Olson, NMED	Edwin Wilmott, NNSA; Regents of the University of California	Letter	Draft Discharge Permit DP-1132 – re-issuing public notice
06/30/2005	02920-02925	Diana Sandoval, NMED	Joni Arends, CCNS; Kathleen Sanchez, Tewa Women United; Peggy Prince, Peace Action New Mexico; George Rice, CCNS; Brian Shields, Amigos Bravos	Letter	Discharge Permit Application Proposed for Approval, DP-1132 – notifying interested parties of 30 days after publication to receive written

Date	Bates No.	From	To	Format	Subject
					comments, and to request a public hearing
06/30/2005	02930-02935	Diana Sandoval, NMED	Brian Shields, Amigos Bravos; George Rice, CCNS; Peggy Prince, Peace Action New Mexico; Kathleen Sanchez, Tewa Women United; Joni Arends, CCNS	Letter	Discharge Permit Application Proposed for Approval, DP-1132 – notifying interested parties of 30 days after publication to receive written comments, and to request a public hearing
06/29/2005	02936-03053	Bob Beers, LANL	Christopher Vick, NMED	Letter	TA-50 RLWTF, Annual Report for 2004 - Ground Water Discharge Plan DP-1132
07/26/2005	03054-03059	Bob Beers, LANL	Christopher Vick, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, Second Quarter 2005
08/04/2005	03060-03064	Steven Rae, LANL	William Olson, NMED	Letter	Review Comments, Draft Discharge Permit DP-1132, TA-50 RLWTF
08/04/2005	03065-03075	Douglas Meiklejohn, NMELC	William Olson, NMED	Letter	Application for renewal of discharge permit DP-1132 – request

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					public hearing and submitting comments
08/04/2005	03076-03093	Joni Arends, CCNS	William Olson, NMED	Letter with Att. 3 by George Rice	Draft Ground Water Discharge Permit, DP- 1132 – submitting comments and requesting public hearing
02/02/2005	03094-03097	George Schuman, NMED	Edwin Wilmott, NNSA; Robert Kuckuck, University of California	Letter	Request for Additional Information, DP-1132
01/12/2006	03098-03232	N/A	N/A	Letters, Reports, Work Plans, Logs, and Data	TA-50-RLWTF Ground Water Discharge Plan (DP-1132) Response to NMED Information Request of 12/2/05
N/A	03249-03392	N/A	N/A	CD	Environmental Stewardship Division, Solid Waste Regulatory Compliance (ENV-SWRC) Sampling and Analysis Plan
03/08/2010	03393-03395	Bob Beers, LANL	William Olson, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan (DP-1132), Upgrade Project 60% Design for

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					new RLWTF
04/25/2006	03396-03402	Bob Beers	Christopher Vick, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan (DP-1132) Quarterly Report, First Quarter 2006
06/19/2006	03403-03406	Richard Watkins, LANS, LLC	Ron Curry, NMED; Richard Greene, EPA	Letter	Delegation of Authorized Representative for the Solid Waste Disposal Act, the New Mexico Solid Waste Act, the Resource Conservation and Recovery Act, the New Mexico Hazardous Waste Act, and the Toxic Substances Control Act
07/27/2006	03407-03413	Bob Beers, LANL	Christopher Vick, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Second Quarter 2006 TA-50 RLWTF (DP-1132)
N/A	03414-03546	N/A	N/A	Report	Radioactive Liquid Waste Treatment Facility Annual Report for 2005
09/28/2006	03547-	N/A	N/A	Memorandum of	LANL proposal to

Date	Bates No.	From	To	Format	Subject
	03549			Meeting	design evaporative basins for the discharge of TA-50 treated effluent
01/23/2007	03550-03555	Bob Beers, LANL	Christopher Vick, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Fourth Quarter 2006 TA-50 RLWTF (DP-1132)
04/23/2007	03556-03561	Bob Beers, LANL	Robert George, NMED	Letter	Ground Water Discharge Plan Quarterly Report, First Quarter 2007 TA-50 RLWTF (DP-1132)
06/11/2007	03562-03645	Bob Beers, LANL	Robert George, NMED	Letter	TA-50 RLWTF Annual Report for 2006
07/23/2007	03646-03652	Bob Beers, LANL	Robert George, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Second Quarter 2007 TA-50 RLWTF (DP-1132)
09/28/17	03653-03658	Anthony Grieggs, LANL	William Olson, NMED	Letter Draft	Draft of Notice of Intent to Discharge
10/23/2006	03659-03664	Bob Beers, LANL	Christopher Vick, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Third Quarter 2006 TA-50 RLWTF (DP-1132)

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
10/30/2007	03665-03671	Bob Beers, LANL	Robert George, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Third Quarter 2007 TA-50 RLWTF (DP-1132)
10/26/2007	03672-03682	James Bearzi, NMED	Donald Winchell, Jr., DOE; Richard Watkins, LANS, LLC	Letter	Information Request Regarding the Exemption Status of the Technical Area 50 RLWTF, EPA ID #NM0890010515
10/04/07	03683-03685	N/A	N/A	Telephone Conference	Update on status of permits for RLWTF and SWSH (DP-857)
10/26/2007	03686-03687	Bob Beers, LANL	Robert George, NMED; Jennifer Montoya, NMED	Email	DP-1132 Application Amendment for new RLWTF at TA-50
10/18/2005	03688-03694	Bob Beers, LANL	Christopher Vick, NMED	Letter	TA-50 RLWTF, Ground Water Discharge Plan DP-1132 Quarterly Report, Third Quarter 2005
11/06/2007	03695-03702	James Bearzi, NMED	Lindsay Lovejoy	Email	LANL RLWTF exemptions
11/01/2007	03703-03813	Anthony Grieggs, LANL	William Olson, NMED; James Bearzi, NMED	Letter	Notice of Intent to Discharge, Evaporation Tanks, TA-50, RLWTF

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
11/20/2007	03814-03822	N/A	N/A	Inspection Report	LANL, DP-1132, Facility Inspection (GWHB)
11/28/2007	03823-03827	Richard Watkins, ESH&Q LANS; Gene Turner, LANL	James Bearzi, NMED	Letter	Response to Information Request regarding the Exemption status of the Technical Area 50 RLWTF, LANL, EPA ID # NM0890010515
03/05/2008	03834-03839	George Schuman, NMED	Jennifer Fullam, NMED; Gerald Knutson, NMED	Email	Old LANL letters from HWB
04/30/2008	03840-03845	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, First Quarter 2008, TA-50 RLWTF DP-1132
06/02/2008	03846-03850	N/A	N/A	Inspection Report	LANL, DP-1132 Facility Inspection
06/11/2008	03851-03853	Jennifer Fullam, NMED	Anthony Grieggs, ENV-RCRA	Letter	Request for Additional Information, DP-1132, RLWTF
07/01/2008	03854-03855	Jennifer Fullam, NMED	George Schuman, NMED	Email	Call from Bob Beers re: TA-50 and perchlorate concentrations
07/01/2008	03856-03906	Bob Beers, LANL	Robert George, NMED	Letter	TA-50 RLWTF Annual Report for 2007

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
07/30/2008	03907-03912	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Second Quarter 2008, TA-50 RLWTF DP-1132
09/19/2008	03913 - 03914	Bill Olson, NMED	Robert George, NMED; Jennifer Fullam	Email	Listening Session Press Release and flier
10/30/2008	03915-03922	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Third Quarter 2008, TA-50 RLWTF DP-1132
01/30/2009	03923-03929	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Fourth Quarter 2008, TA-50 RLWTF DP-1132
02/11/2009	03930-03932	Robert George, NMED; Jennifer Fullam, NMED		Memorandum of Meeting or Phone Conversation	
04/30/2009	03933-03939	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, First Quarter 2009, TA-50 RLWTF DP-1132

Date	Bates No.	From	To	Format	Subject
07/30/2009	03940-03946	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Second Quarter 2009, TA-50 RLWTF DP-1132
07/09/2009	03947-03949	Marissa Bardino, NMED	Jennifer Fullam, NMED	Email	Radioactive Waste Plant at LANL Has Spill – Albuquerque Journal article
08/24/2009	03950-03952	Jennifer Fullam, NMED	Bob Beers	Email	Map Request
10/28/2009	03953-03959	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Third Quarter 2009, TA-50 RLWTF DP-1132
01/28/2010	03960-03967	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, Fourth Quarter 2009, TA-50 RLWTF DP-1132
04/28/2010	03968-03974	Bob Beers, LANL	William Olson, NMED	Letter	Ground Water Discharge Plan Quarterly Report, First Quarter 2010, TA-50 RLWTF DP-1132
03/08/2010	03975-04006	Bob Beers, LANL	William Olson, NMED	Letter	TA-50 RLWTF Ground Water Discharge Plan DP-1132 Upgrade

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					Project 60% Design for new RLWTF
07/28/0210	04007-04013	Bob Beers, LANL	William Olson, NMED	Letter	Groundwater Discharge Plan Quarterly Report, Second Quarter 2010, TA-50 RLWTF DP- 1132
08/20/2010	04014	Jake Meadows, LANL	Jennifer Fullam & Richard Powell - NMED	Email	LANL Safety Shower Test Discharge
08/25/2010	04015-04019	Anthony Grieggs, LANL	William Olson, NMED	Letter	TA-50 RLWTF, Discharge Plan DP-1132 Minor Modification to reduce copper and zinc in discharge
09/20/2010	04020-04022	Norma Perez, NMED AQB	Patricia Gallagher LANL	Certified Letter	Notice of No Permit Required authorizes LANL to operate the facility as stated in the application – LANL RLWTF, TA-50
09/27/2010	04023-04029	Anthony Grieggs, LANL	William Olson, NMED	Letter	TA-50 RLWTF Discharge Plan DP-1132, Minor Modification to reduce copper and zinc in discharge
10/28/2010	04030-04036	Bob Beers, LANL	William Olson, NMED	Letter	Groundwater Discharge Plan Quarterly Report, Third Quarter 2010,

Date	Bates No.	From	To	Format	Subject
					TA-0050 RLWTF DP- 1132
11/09/2010	04037-04038	Gerald Knutson, NMED	Jennifer Fullam, NMED	Email	LANL interested party list for TA-50 DP-1132
12/15/2010	04039-04043	Bob Beers, LANL	William Olson, NMED	Letter	TA-50 RLWTF Discharge Plan DP-1132, Minor Modification– add hardness
01/31/2011	04044-04048	Bob Beers, LANL	William Olson, NMED	Letter	Groundwater Discharge Plan Quarterly Report, Fourth Quarter 2010, TA-50 RLWTF
2010	04049-04549	N/A	N/A	CDs	LANL Environmental Report 2010 Includes Supplemental Data
03/22/2011	04550-04563	Bob Beers, LANL	William Olson, NMED	Letter	TA-50 RLWTF, Discharge Plan DP-1132, Minor Modification to install pressure media filtration and cartridge filtration capability
03/30/2011	04568-04577	George Schuman, NMED; Robert George, NMEd; Jennifer Fullam, NMED; Gerald Knutson, NMED	Bob Beers, LANL; Pete Worland, LANL; Make Saladen, LANL	Telephone Conversation	TA-50 RLWTF LANL met with NMED to discuss treatment process changes occurring at the RLWTF

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
04/19/2011	04578-04583	Bob Beers, LANL	William Olson, NMED	Letter	Groundwater Discharge Plan DP-1132 Quarterly Report, First Quarter 2011, TA-50 Radioactive Liquid Waste Treatment Facility
07/13/2011	04585-05208	N/A	N/A	4 CDs	RLWTF Zero Liquid Discharge Subproject LANL 60% Design Submittal Specifications, Calculations, Test and Inspection Plan, Master Document List and Field Change Notice Criteria Document
07/25/2011	05209-05214	Bob Beers, LANL	William Olson, NMED	Letter	Groundwater Discharge Plan DP-1132 Quarterly Report, Second quarter 2011 TA-50 RLWTF
08/11/2011	05215-05223	Anthony Grieggs, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Sixty Percent Design, Evaporation Tanks, TA- 50 RLWTF
08/30/2011	05224-05225	Bob Beers, LANL	Jennifer Fullam, NMED	Email	NMED-GWQB Inspection of the TA-50 RLWTF

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
09/08/2011	05226-05228	N/A	N/A	Field Trip Report	RLWTF at TA-50, Unauthorized Diesel Spill Site at TA-53
09/12/2011	05229-05233	Bob Beers, LANL	Jennifer Fullam, NMED	Email	NMED-GWQB Inspection of the TA-50 RLWTF NNMED inspection participant list 9/8/11
10/19/2011	05234-05236	Anthony Grieggs, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Addendum to the Notice of Intent to Discharge for the RLWTF's Evaporation Tanks
11/08/2011	05243-05252	Jim Davis, NMED	Jennifer Fullam, NMED	Email	Review of documents
11/18/2011	05253-05258	James Davis, NMED	Anthony Grieggs, LANL	Letter	Response to Notice of Intent to Discharge and Discharge Permit Required for Zero Liquid Discharge Tanks, AI 856: PRD20070004 and Updated Application Submittal Required for the RLWTF, DP-1132
12/01/2011	05259-05260	Jennifer Fullam, NMED	Bob Beers, LANL	Telephone Conversation	DP Application Required Letter
12/08/2011	05261-05269	Bob Beers, LANL	Jennifer Fullam, NMED	Email	Request for Extension to

Date	Bates No.	From	To	Format	Subject
					Submit Updated Discharge Permit Application RLWTF DP- 1132
12/07/2011	05270-05277	Anthony Grieggs, LANL	James Davis, NMED	Letter	Request for an Extension to Submit and Updated Discharge Permit Application for the RLWTF DP-1132
12/15/2011	05278-05281	Jerry Schoeppner, NMED; Clint Marshall, NMED; Robert George, NMED; Kim Kirby, NMED; Jennifer Fullam, NMED; Gerald Knutson, NMED	Bob Beers, LANL; Danny Katzman, LANL; Gene Turner, LANL	Telephone Conference	Ground Water Monitoring Program at LANL, they discussed the current monitoring program and hydrogeological conditions which exist at the facility
12/22/2011	05282-05283	Bob Beers, LANL	Jennifer Fullam, NMED	Email	NMED Inspection Report
12/30/2011	05284-05292	James Davis, NMED	Anthony Grieggs, LANL	Certified Letter	Denial of Time Extension to Submit Application, DP-1132, RLWTF
01/03/2012	05293-05294	Jennifer Fullam, NMED	Bob Beers, LANL	Telephone Conversation	Meeting/Request for Extension
01/13/2012	05295-05297	Jon Block, NM ELC	Jennifer Fullam, NMED	Email	LANL
01/24/2012	05303-05308	Allison Dorries, LANS; Gene Turner, NNSA	Jerry Schoeppner, NMED	Letter	Groundwater Discharge Plan DP-1132 Quarterly

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					Report, Fourth quarter 2011 TA-50 RLWTF
01/27/2012	05309-05321	James Davis, NMED	Anthony Grieggs, LANL	Letter	Approval of Time Extension to Submit Application DP-1132, RLWTF
02/02/2012	05322-05324	Bob Beers, LANL	Jennifer Fullam, NMED	Email	Request for a meeting with GWQB and HWB re: R-28 DP Application
02/06/2012	05326	LANL	NMED	Check	No. 251606 for $100.00, DP-1132
02/10/2012	05327-05330	Jennifer Fullam, NMED	Jerry Schoeppner, NMED	Email	LANL 2011 GWQB Status Report
02/13/2012	05331-05332	Bob Beers, LANL	Robert, George, NMED	Email	ZLD Evaporation Tank Liners
02/14/2012	05333-05335	Bob Beers, LANL	Robert George, NMED	Email	ZLD Evaporation Tank Liners
02/14/2012	05336-08003	Allison Dorries, LANS; Gene Turner, NNSA	Jerry Schoeppner, NMED	Application	Groundwater Discharge Permit DP-1132 Application for the TA-50 RLWTF and the TA-52 Zero Liquid Discharge Solar Evaporation Tanks
unknown	08005-08095	N/A	N/A	CD	RLWTF Upgrade Project Zero; ZLD Subproject PID 100761

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
02/28/2012	08096-08097	Bob Beers, LANL	Jennifer Fullam, NMED	Email	Discharge Permit DP-1132 Application – Revised Latitude/Longitude
02/28/2012	08098-08099	Jennifer Fullam, NMED	Bob Beers, LANL	Telephone Conversation	Location of Evaporators
02/29/2012	08100-08101	Gerald Knutson, NMED	Jerry Schoeppner, NMED; Marshall, Clint, NMED; Robert George, NMED Jennifer, Fullam, NMED	Email	NMED Inspection of LANL's Sanitary Effluent Reclamation Facility and the TA-52 ZLD Solar Evaporation Tanks on March 20, 2012
03/02/2012	08102-08107	Jerry Schoeppner, NMED	Kevin Smith, NNSA; Alison Dorries, LANS	Letter	Administrative Completeness Determination and Applicant's Public Notice Requirements, DP-1132, LANL
03/12/2012	08108-08113	N/A	N/A	Public Notice 1	Ground Water Discharge Permit applications have been submitted to the NMED for review
03/16/2012	08114-08115	Jennifer Fullam, NMED	Bart Vanden Plas, Santa Ana Pueblo	Telephone Conversation	Interested Party
03/19/2012	08116-08117	Jennifer Fullam, NMED	Michael Chacon, San Ildefonso Pueblo	Telephone Conversation	Interested Party

Date	Bates No.	From	To	Format	Subject
03/20/2012	08118-08119	Jennifer Fullam, NMED	Rachel Conn, Amigos Bravos	Telephone Conversation	Interested Party
03/20/2012	08120-08124	N/A	N/A	Inspection Report	LANL – RLWTF Routine inspection pre- permit discussion
03/26/2012	08125-08126	Jennifer Fullam, NMED	Rachel Conn, Amigos Bravos	Telephone Conversation	Interested Party
03/27/2012	08129-08131	Bob Beers, LANL	Jennifer Fullam, NMED	Email	NMED Inspection DP-1132 and DP-857 participant list
03/27/2012	08132-08133	Bob Beers, LANL	Jennifer Fullam, NMED	Email	Request for NMED – GWQB Inspection Report
04/02/2012	08134-08151	Alison Dorries, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Supplemental Information for Discharge Permit Application DP-1132
N/A	08175	Jennifer Fullam, NMED	Sylvia Hower	Telephone Conversation	LANL – RLWTF Interested Party
05/17/2012	08176-08201	Alison Dorries, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Affidavit of Public Notice Completion, Discharge Permit Application DP-1132, TA- 50 RLWTF and TA-52 Zero Liquid Discharge Solar Evaporation Tanks
03/02/2012	08202-08214	Jerry Schoeppner, NMED	Kevin Smith, NNSA; Allison Dorries, LANS	Letter	Administrative Completeness Determination and Applicant's Public

Date	Bates No.	From	To	Format	Subject
					Notice Requirements, DP-1132, LANL
04/26/2012	08215-08221	Alison Dorries, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, First Quarter 2012, TA-50 RLWTF
07/10/2012	08222-08234	Alison Dorries, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Response to NMED GWQB Inspection Report, DP-1132 dated 3/20/12
07/17/2012	08235-08241	Alison Dorries, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Second Quarter 2012, TA-50 RLWTF
07/25/2012	08242-08243	Bob Beers, LANL	Robert George, NMED	Email	DOE/LANS/NMED GWQB Meeting Re: ZLD Evaporation Tanks
08/10/2012	08268-08313	Alison Dorries, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Supplemental Information for Discharge Permit Application DP-1132, RLWTF and ZLD Solar Evaporation Tanks
08/22/2012	08314-08315	Bob Beers, LANL	Robert George, NMED; Jennifer Fullam, NMED; Clint Marshall, NMED; Jim Davis, NMED	Email	Correction Notice re: LANL ZLD Evaporation Tanks

Date	Bates No.	From	To	Format	Subject
10/29/2012	08323-08332	Alison Dorries, LANL; Gene Turner, LANL	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Third Quarter 2012, TA-50 RLWTF
11/14/2012	08333-08335	LANL	Jerry Schoeppner, NMED	Letter	Supplemental Information for Discharge Permit Application DP-1132, Zero Liquid Discharge (ZLD) Solar Evaporation Tanks, As-built Drawings
11/16/2012	08336-08338	Jerry Schoeppner, NMED	Governor Phillip Quintana, Pueblo de Cochiti	Letter	Notification of Proposed Ground Water Discharge Permit for LANL – RLWTF, DP- 1132
11/16/2012	08339-08341	Jerry Schoeppner, NMED	Governor Terry Aguilar Pueblo of San Ildefonso	Letter	Notification of Proposed Ground Water Discharge Permit for LANL – RLWTF, DP- 1132
11/16/2012	08342-08344	Jerry Schoeppner, NMED	Governor Walter Dasheno Pueblo of Santa Clara	Letter	Notification of Proposed Ground Water Discharge Permit for LANL – RLWTF, DP- 1132
11/16/2012	08349-08350	Jerry Schoeppner, NMED	Governor Joshua Madalena, Pueblo of Jemez	Letter	Notification of Proposed Ground Water Discharge Permit for LANL – RLWTF, DP- 1132

Date	Bates No.	From	To	Format	Subject
01/13/2014	08463-08464	Jennifer Pruett, NMED	Bob Beers, LANL; Jennifer Fullam, NMED	Email	Obtaining copies of public comments on Draft Discharge Permit DP-1132
01/17/2013	08465-08516	N/A	N/A	Report	Facility Operations Analysis and Sequence of Operations for the TA-50 RLWTF Upgrade Project Low-level Waste Subproject
04/04/2013	08636-08639	Robert George, NMED	Brian Shields, Amigos Bravos;	Email	LANL Discharge
04/04/2013	08641-08644	Brian Shields, Amigos Bravos	Robert George, NMED	Email	Requesting information re: discharge observed on February 27.
04/05/2013	08645-08649	Jennifer Fullam, NMED	Brian Shields, Amigos Bravos; Robert George, NMED	Email	LANL Discharge
04/30/2013	08680-0863	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, First Quarter 2013, TA-50 RLWTF
05/17/2013	08780-08782	Unknown	Unknown	CD	Gage Stations
06/14/2013	09062-09064	Jerry Schoeppner, NMED	Myron Armijo, Governor of Santa Ana Pueblo	Letter	Preliminary Draft Discharge Permit, DP-1132, RLWTF. Transmitting preliminary draft.

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
06/14/2013	09065-09067	Jerry Schoeppner, NMED	Terry Aguilar, Governor of San Ildefonso Pueblo	Letter	Preliminary Draft Discharge Permit, DP-1132, RLWTF. Transmitting preliminary draft.
06/14/2013	09068-09070	Jerry Schoeppner, NMED	Vincent Toya, Sr., Governor of Jemez Pueblo	Letter	Preliminary Draft Discharge Permit, DP-1132, RLWTF. Transmitting preliminary draft.
06/14/2013	09071-09073	Jerry Schoeppner, NMED	J. Leroy Arquero, Governor of Cochiti Pueblo	Letter	Preliminary Draft Discharge Permit, DP-1132, RLWTF. Transmitting preliminary draft.
06/14/2013	09074-09076	Jerry Schoeppner, NMED	J. Bruce Tafoya, Governor of Santa Clara Pueblo	Letter	Preliminary Draft Discharge Permit, DP-1132, RLWTF. Transmitting preliminary draft.
06/14/2013	09249-09251	Jerry Schoeppner, NMED	Myron Armijo, Governor of Santa Ana Pueblo	Letter	Preliminary Draft Discharge Permit, DP-1132, RLWTF. Resending preliminary draft.
07/24/2013	09267-09269	Bob Beers, LANL	Robert George, NMED	Email	Corrective Action Plan Pumping Test at Monitoring Well R-42
07/25/2013	09270-09284	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Second Quarter 2013, TA-50 RLWTF

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
08/06/2013	09375-09376	Jennifer Fullam, NMED	Rachel Conn, Amigos Bravos	Email	Second Public Notice for RLWTF DP-1132
08/13/2013	09377-09378	Bob Beers, LANL	Jennifer Pruett, NMED	Email	Requesting meeting with NMED, DOE, and LANS
09/10/2013	09394-09445	Jennifer Fullam, NMED	Gene Turner, DOE; Alison Dorries, LANS	Letter	Ground Water Discharge Permit DP-1132 has been proposed for approval
09/13/2013	09449-09450	NMED	Public Notice	Public Notice 2	Public Notice of applications that have been proposed for approval.
09/27/2013	09454-09456	Myron Armijo, Governor of Santa Ana Pueblo	Jennifer Fullam, NMED	Letter	The Pueblo of Santa Ana's Comments on the Draft Ground Water Discharge Permit (DP- 1132)
10/03/2013	09516-09565	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Request for Temporary Permission to Place New Influent Storage Tanks Into Service at LANL, DP-1132
10/09/2013	09569-09571	Jennifer Fullam, NMED	Jerry Schoeppner, NMED	Email	Permit Released Today as PN-2. Confirming Ms. Arends was sent a copy of the link

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
10/09/2013	09572-09574	Jerry Schoeppner, NMED	Jonathan Block, NMELC; Charles De Saillan, NMED; Jennifer Fullam, NMED; Jennifer Pruett, NMED; John Kieling, NMED; Joni Arends, CCNS	Email	LANL Closing. Status of discussion re: LANL document library "partly" closed
10/16/2013	09575-09576	Bob Beers, LANL	Jennifer Fullam, NMED	Email	Draft Discharge Permit DP-1132 MS Word Version. Requesting a copy.
10/17/2013	09577-09584	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Third Quarter 2013, TA-50 RLWTF
10/29/2013	09590-09595	Jennifer Pruett, NMED	John Kieling, NMED; Jerry Schoeppner, NMED; Jennifer Fullam, NMED; Dave McCoy, Citizen Action NM	Email	Missing Attachment for Draft LAN RLWTF. Providing link to monitoring well guidelines.
11/07/2013	09596-09597	Jennifer Fullam, NMED	Jerry Schoeppner, NMED; Jennifer Pruett, NMED	Email	Discussion with San Filipe Pueblo re: LANL RLWTF
N/A	09598-09599	N/A	N/A	Memorandum of Phone Conversation	Stout called Fullam to inform her that San Felipe Pueblo was planning on submitting comments

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
11/13/2013	09600-09601	Jennifer Fullam, NMED	Bob Beers, LANL	Email	Confirming dates of DP-1132 Public Comment Period
11/18/2011	09605-09615	James Davis, NMED	Anthony Grieggs, EPA	Letter	Response to Notice of Intent to Discharge and Discharge Permit Required for Zero Liquid Discharge Tanks, AI 856: PDR 20070004 and Updated Application Submittal Required for the RLWTF DP-1132
11/26/2013	09619-09626	Gene Turner, DOE; Alison Dorries, LANS	Jennifer Fullam, NMED	NMED Routing Slip	Temporary Permission WMRM
12/06/2013	09631-09655	Jonathan Block, NMELC	Jerry Schoeppner, NMED; Jennifer Fullam, NMED	Email	CCW-TWU-3 Individuals-TA-50 RLWTF Permit First Set of Comments and Hearing Request
12/06/2013	09656-09679	Jonathan Block, NMELC	Jerry Schoeppner, NMED; Jennifer Fullam, NMED	Letter	Comments and Hearing Request of the Communities for Clean Water, Tewa Women United and three individuals on the proposed permit DP-1132 to

NMED Exhibit 9

Date	Bates No.	From	To	Format	Subject
					RLWTF
12/12/2013	09683-09684	Scott Kovac, Nuclear Watch NM	Ryan Flynn, NMED; Jennifer Fullam, NMED	Email	Nuclear Watch NM Comments on Draft Discharge Permit DP-1132 – Cover email
12/12/2013	09685-09686	Jonathan Block, NMELC	Jerry Schoeppner, NMED; Jennifer Fullam, NMED; Brian Shields, Amigos Bravos; Rachel Conn, Amigos Bravos; Kathy Sanchez, Pi'ee Quiyo Inc.; J.G. Sanchez; Marian Naranjo, Honor Our Pueblo Existence (HOPE); Robert Gilkeson; Joni Arends, CCNS	Email	2nd Set of Comments and Hrg. Reg. from CCW, TWU and Individuals on DP-1132 for the RLWTF – Cover email
12/12/2013	09687-09689	Scott Kovac, Nuclear Watch NM	Ryan Flynn, NMED; Jennifer Fullam, NMED	Comments	Nuclear Watch NM Comments on Draft Discharge Permit DP-1132
12/12/2013	09685-09686	Jonathan Block, NMELC	Jerry Schoeppner, NMED; Jennifer Fullam, NMED; Brian Shields, Amigos Bravos; Rachel Conn, Amigos Bravos; Kathy Sanchez,	Comments	2nd Set of Comments and Hrg. Reg. from CCW, TWU and Individuals on DP-1132 for the RLWTF

Date	Bates No.	From	To	Format	Subject
			Pi'ee Quiyo Inc.; J.G. Sanchez; Marian Naranjo, Honor Our Pueblo Existence (HOPE); Robert Gilkeson; Joni Arends, CCNS		
12/12/2013	09769-09864	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Review Comments, Draft Discharge Permit, DP-1132, RLWTF
N/A	09865-09881	Robert Gilkeson	CCW, TWU, NMED	Public Comment and Hearing Request	Deficiencies in Ground Water Protection in the Draft Ground Water DP-1132 Permit, by Independent Registered Geologist Robert H. Gilkeson
12/12/2013	09882-09883	Kathy Sanchez, TWU	Jerry Schoeppner, NMED; Jennifer Fullam, NMED; Brian Shields, Amigos Bravos; Rachel Conn, Amigos Bravos; Kathy Sanchez, Pi'ee Quiyo Inc.; J.G. Sanchez; Marian Naranjo, HOPE; Bob Gilkeson; Joni Arends, CCNS	Email	RE: got it..[sic]2nd Set of Comments and Hrg. Reg. from CCW, TWU and Individuals on DP-1132 for the RLWTF

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
01/14/2014	09884-09890	N/A	N/A	NMED Internal Document	DP-1132 Public Comments Summary
12/12/2013	09891-09895	Jay Coghlan Nuclear Watch NM; Scott Nuclear Watch NM	Ryan Flynn, NMED; Jennifer Fullam, NMED	Letter	Submitting comments for Draft Discharge Permit DP-1132
01/07/2014	09896-09897	Bob Beers, LANL	Jennifer Fullam, NMED	Email	Comments on DP-1132 Draft Discharge Permit
01/13/2014	09898-09899	Jennifer Pruett, NMED	Bob Beers, LANL; Jennifer Fullam, NMED	Email	Comments on DP-1132 Draft Discharge Permit
01/15/2014	09900-09904	Bob Beers, NMED	Melissa Mascarenas, NMED	Email	Request for Public Records – Public Comments – DP-1132- LANL
01/15/2014	09905-09909	Melissa Mascarenas, NMED	Bob Beers, LANL	Letter	3-Day Letter Response to Request for Public Records
01/16/2014	09910-09911	Jennifer Fullam, NMED	Bob Beers, LANL	Email	Forwarding documents requested in Request for Public Records
01/16/2014	09912-09920	Diana Sandoval, NMED	Jennifer Fullam, NMED	Email	IPRA – Beers – DP – 1132 – LANL
01/21/2014	09921-09924	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Fourth Quarter 2013, TA-50 RLWT

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
01/23/2014	09925-09933	Melissa Mascarenas, NMED	Jonathan Block NMELC	Letter	3-Day Letter Response to Request for Public Records
02/03/2014	09934-09936	Bob Beers, NMED	Jennifer Fullam, NMED	Email	Request for Public Records
02/06/2014	09937-09943	Jennifer Fullam, NMED	Jon Block, NMELC; Joni Arends, CCNS; Diana Sandoval, NMED; Melissa Mascarenas, NMED; Jerry Schoeppner, NMED	Email	IPRA – Block-LANL NMELC IPRA to NMED
02/07/2014	09944-09947	Jon Block, NMELC	Jennifer Fullam, NMED	Email	IPRA – Block LANL
02/07/2014	09948-10152	Jennifer Fullam, NMED	Jon Block, NMELC	Email	IPRA – Block – LANL, DP-1132 Comments from DOE-LANS; Santa Ana; Tewa Women and CCW
02/12/2014	10153-10154	Jennifer Fullam, NMED	Jon Block, NMELC	Telephone Conversation	IPRA
02/26/2014	10178-10180	Jennifer Fullam, NMED	Jerry Schoeppner, NMED; John Hall, NMED; Jennifer Pruett, NMED	Email	TP for WMRM DP-1132
03/08/2014	10183-10188	File – LANL DP-1132	Steve Pullen, NMED	Memorandum	RLWTF-UP LLW Subproject-Design Documents – 90% - January – dated March 28, 2014 – Contents of compact disc

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
04/01/2014	10190-10191	Jerry Schoeppner, NMED	Alison Dorries, LANS; Gene Turner, DOE	Letter	Temporary Permission to Discharge, WMRM Influent Storage Tanks at LANL RLWTF, DP- 1132
06/13/2014	10209-10211	Jonathan Block, NMELC	Joni Arends, CCNS; Brian Shields; Rachel Conn; Kathy Sanchez; Beata Tsosie; J. Gilbert Sanchez; Marian Naranio; Robert Gilkeson; Jennifer Pruett, NMED	Email	LANL DP-1132 PN-2 Draft Permit Withdrawal Questions about public notice
06/13/2014	10212-10217	Jonathan Block, NMELC	Jennifer Pruett, NMED	Email	LANL DP-1132 PN-2 Draft Permit Withdrawal Questions about public notice
6/2/14	10219-10225	Robert Gilkeson	Unknown	Report	LANL Characterization Wells R-16 and R-16r require replacement because they are not reliable monitoring wells for LANL contaminants in groundwater travelling to the Buckman Well Field for the City of

Date	Bates No.	From	To	Format	Subject
					Santa Fe
07/09/2014	10226-10231	NMED	N/A	Meeting Memo	Ground Water Quality Bureau Response to Issues Discussed at June 2, 2014 DP-1132 Meeting
07/17/2014	10232-10242	N/A	N/A	Notes	
07/17/2014	10243-10252	N/A	N/A	Notes	
07/22/2014	10253-10256	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Second Quarter 2014, TA-50 RLWTF
04/23/2014	10257-10262	Michael Brandt, LANS; Gene Turner, DOE	Erika Schwender, NMED	Letter	Filing of Plans and Specifications RLWTF Upgrade Project, LANL, DP-1132
07/30/2014	10270-12678	N/A	N/A	CDs	RLWTF Project LLW Subproject Design Documents Final Drawings and Specs
08/07/2014	12679-12682	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Filing of 100% Design Plans and Specifications, RLWTF Upgrade Project, DP- 1132
N/A	12683-12686	NMED	N/A	Meeting Memo	Ground Water Quality Bureau

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					Meeting with LANL/DOE August 11, 2014
08/12/2014	12687-12695	N/A	N/A	Sign-in Sheet, Agenda, notes	August 12, 2014 meeting with LANL
08/21/2014	12698-12723	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Request for Additional Information, Discharge Permit Application DP-1132 RLWTF
N/A	12724-12726	N/A	N/A	Inspection Report	DP-1132, Inspection Date August 25, 2014
08/29/2014	12727-12730	Jennifer Pruett, NMED	Bob Beers, LANL	Email	Progress on Re-draft of DP-1132
09/11/2014	12731-12751	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Corrected ENV-DO-14-0229, Request for Additional Information, Discharge Permit Application DP-1132, RLWTF
09/16/2014	12752-12757	John Kieling, NMED	Steven Huddleson, NMED; Dave Cobrain, NMED	Email	Suggested Closure Language
09/17/2014	12758-12760	Bob Beers, LANL	Steven Huddleson, NMED	Email	A Question. Response to question re: seismic standards
09/18/2014	12761-12764	Bob Beers, LANL	Steven Huddleson, NMED	Email	Reference for Sampling

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
09/18/2014	12765-12766	Steven Huddleson, NMED	Jennifer Pruett, NMED; John Hall, NMED; Jerry Schoeppner, NMED	Email	DP-1132 Latest (9-18-14 version)
09/22/2014	12767-12769	Jim Chiasson, NMED	Steven Huddleson, NMED	Email	LANL WWTF Plans and Specs Review
09/22/14	12770-12771	N/A	N/A	Summary Sheet	DOE/LANS Remaining Issues
09/26/2014	12772-12778	Jerry Schoeppner, NMED	Steven Huddleson, NMED	Email	Requesting a short meeting to discuss request for extension re: WMRM influent storage tanks
10/03/2014	12779-12781	Jerry Schoeppner, NMED	Bob Beers, LANL	Letter	Comments on 90% and 100% Design Specifications RLWTF Upgrade Project
N/A	12782-12794	N/A	N/A	Agenda, Sign-in Sheet, Notes	Meeting of October 9, 2014
N/A	12795-12800	N/A	N/A	Sign-in Sheet, Notes	Meeting of October 15, 2014
10/20/2014	12801-12819	Bill Blankenship, LANL	Steven Huddleson, NMED; Cember Hardison, NMED	Email	NPR approval for TA50 RLWTF thermal evaporator
10/20/2014	12820-12825	Joni Arends, CCNS	Chris Del Signore, LANL; Jennifer Pruett, NMED; Michael Saladen, LANL; Alison Dorries, LANS; Gene Turner, DOE;	Email	CCNS – Receipt of FOIA Request

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
			Bob Beers, LANL; Anthony Grieggs, EPA; Steven Huddleson, NMED; Jerry Schoeppner, NMED; Jonathan Block, NMELC; Jennifer Hower, NMED		
10/23/2014	12826-12828	Steven Huddleson, NMED	Bob Beers, LANL; Jennifer Pruett, NMED	Email	DP-1132 list of remaining issues
10/24/2014	12829-12836	Joni Arends, CCNS; Marian Naranjo, Honor Our Pueblo Existence; Brian Shields and Rachel Conn, Amigos Bravos; Kathy Sanchez and Beata Tsosie- Peña, TWU; Joan Brown and Marlene Perrotte, Partnership for Earth Spirituality; Robert Gilkeson, Independent Registered Geologist; J. Gilbert Sanchez, Tewa Environmental	Jennifer Pruett, NMED; Jerry Schoeppner, NMED; Steven Huddleson, NMED	Letter	CCW Comments to NMED TA-50 draft GWDP

Date	Bates No.	From	To	Format	Subject
		Watch Alliance			
10/27/2014	12837-12841	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Third Quarter 2014, TA-50 RLWTF
10/30/2014	12842-12847	Angeline Purdy, ENRD	Jonathan Block, NMELC; Joni Arends, CCNS	Email	Distributing LANL comments to CCW
10/30/2014	12848-12849	Steven Huddleson, NMED	Gene Turner, DOE	Email	Financial Assurance Question
11/12/2014	12850-12852	Gene Turner, DOE	Steven Huddleson, NMED; Jennifer Pruett, NMED	Email	Response to Financial Assurance Question
N/A	12853-12855	N/A	N/A	Summary Sheet	DOE/LANS Remaining Issues (Updated 11/12/2014
11/14/2014	12856-12863	N/A	N/A	Summary Sheet	CCW, Gilkeson and Sanchez Remaining Issues – Revised draft NMED GWDP-1132 (October 31, 2014)
N/A	12865-12877	N/A	N/A	Sign-in Sheet, Notes	November 17, 2014 CCW-LANS/DOE NMED Meeting
12/03/2014	12878-12892	N/A	N/A	Summary Sheet	CCW, Gilkeson and Sanchez Remaining Issues – Revised draft NMED GWDP-1132

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
					(October 31, 2014)
12/15/2014	12893-12896	N/A	N/A	Summary Sheet	Typographical Errors and Minor Editorial Comments, Revised Draft Discharge Permit DP-1132 (Version 12/15/2014) DOE and LANS
12/15/2014	12897-12917	N/A	N/A	Summary Sheet	Typographical Errors and Minor Editorial Comments, Revised Draft Discharge Permit DP-1132 (Version 12/15/2014) CCW, Glikeson and Sanchez
12/02/2014	12918-12920	Bob Beers. LANL	Steven Huddleson, NMED	Email	Draft Discharge Permit DP-1132, List of Other Wastestreams
01/13/2014	12921-12924	Alison Dorries, LANS; Gene Turner, DOE	Jerry Schoeppner, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Fourth Quarter 2014, TA-50 RLWTF
03/16/2015	12925-12931	Joni Arends, CCNS	Steven Huddleson, NMED; Bob Beers, LANL	Email	Agenda Items for Tuesday 3/17 Meeting
03/17/2015	12932-	CCW, Gilkeson	Steven Huddleson,	Letter	Participation in

Date	Bates No.	From	To	Format	Subject
	12934	and Sanchez	NMED		March 17, 2017 Meeting on DP-1132 between NMED and DOE/LANS
03/15/2015	12935-12940	N/A	N/A	Sign-in Sheet, Notes, Agenda	March 15, 2015 Meeting
03/16/2015	12941-12942	Bob Beers. LANL	Steven Huddleson, NMED	Email/Agenda	Agenda for March 17, 2017 meeting between NMED and DOE/LANS, plus items DOE/LANS wish to add to the agenda
N/A	12965-12971	N/A	N/A	Summary Sheet	Typographical Errors and Minor Editorial Comments, Revised Draft Discharge Permit DP-1132 (Version 12/15/2014) DOE and LANS
04/23/2015	12972-12974	Alison Dorries, LANS; Gene Turner, DOE	Phyllis Bustamante, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, First Quarter 2015, TA-50 RLWTF
N/A	12975-13035	N/A	N/A	Discharge Permit	Draft discharge permit 12/15 DOE/LANS revision
05/20/2015	13036-13198	Alison Dorries, LANS; Gene	Phyllis Bustamante, NMED	Letter	DOE and LANS responses regarding

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
		Turner, DOE			issues identified during the April 16, 2015 meeting
06/01/2015	13199-13211	Lindsay Lovejoy, CCW	Phyllis Bustamante, NMED	Letter	Responding to proposed draft permit forwarded May 21, 2015
N/A	13212-13232	N/A	N/A	Fact Sheet	NPDES Permit No. NM0028355. Prepared June 26, 2013
N/A	13233-13234	NA/	N/A	Statement	Statement by Steve Huddleson re: wells having limited relevance to groundwater protection goals
07/24/2015	13235-13236	Chiasson, Jim, NMED	Steve Huddleson, NMED	Email	Flow Meter Question
07/27/2015	13237-13238	Chris Del Signore, LANL	Steve Huddleson, NMED	Email	Pipe Diameter
07/28/2015	13239-13242	Alison Dorries, LANS; Gene Turner, DOE	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Second Quarter 2015, TA-50 RLWTF
01/20/2016	13255-13258	Alison Dorries, LANS; Jody Pugh, DOE	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Fourth Quarter 2015, TA-50 RLWTF
01/21/2016	13259-13260	John Kieling, NMED	Steve Huddleson, NMED	Email	Closure Plan. HWB has no comments

NMED Exhibit 6

Date	Bates No.	From	To	Format	Subject
01/29/2016	13261-13263	Michelle Hunter, NMED	Alison Dorries, LANL	Letter	Comments on 60% Design Plans and Specifications RLWTF – Upgrade Project Transuranic Liquid Waste Project, DP-1132
02/28/2016	13264-13267	Bob Beers, LANL	Steve Huddleson, NMED	Email	Request for Information: Former Septic System at TA-50
04/28/2016	13266-13271	Alison Dorries, LANS; Jody Pugh, DOE	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, First Quarter 2016, TA-50 RLWTF
06/03/2016	13272-13355	John McCann, LANS; Jody Pugh, DOE	Michelle Hunter, NMED	Letter	Supplemental Information for Discharge Permit Application DP-1132. RLWTF
07/06/2016	13356-13387	Michael Saladen, LANL	Steve Huddleson, NMED; Bob Beers, LANL; Chris Del Signore, LANL	Email	List of SWMU associated with RLWTF
07/19/2016	13359-13412	John McCann, LANS; Jody Pugh, DOE	Michelle Hunter, NMED	Letter	Revised Closure Plan for Draft Discharge Permit DP-1132
07/28/2016	13413-13416	Anthony Grieggs, LANS; Karen Armijo, NNSA	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Second Quarter 2016, TA-50 RLWTF

Date	Bates No.	From	To	Format	Subject
10/19/2016	13417-13420	Anthony Grieggs, LANS; Karen Armijo, NNSA	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Third Quarter 2016, TA-50 RLWTF
01/13/2017	13426-13434	Kathy Sanchez, TWU; Beata Tsosie-Pena, TWU; Marian Naranjo, HOPE; Joni Arends, CCNS; Joan Brown and Marlene Perrotte, Partnership for Earth Spirituality	Steven Huddleson, NMED; Jennifer Hower, NMED	Letter	CCW comments on October 1, 2016 final draft permit DP-1132 and revised closure plan for LANL RLWTF at TA-50
01/17/2017	13435-13437	Jon Block, NMELC	Jennifer Hower, NMED	Email	DP-1132 comments by CCW
01/18/2017	13438-13441	Anthony Grieggs, LANS; Karen Armijo, DOE	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132 Quarterly Report, Fourth Quarter 2016, TA-50 RLWTF
01/18/2017	13442-13451	Anthony Grieggs, LANS; Karen Armijo, DOE	Michelle Hunter, NMED	Letter	Filing of 90% Design Plans and Specifications, RLWTF Upgrade – Transuranic Liquid Waste Project, DP-1132
02/15/2017	13452-13472	Anthony Grieggs, LANS; Karen Armijo, DOE	Michelle Hunter, NMED	Letter	Filing of 100% Design Drawings, RLWTF, Sodium Hydroxide

Date	Bates No.	From	To	Format	Subject
					Chemical Feed System, DP-1132
03/13/2017	13473-13475	Michelle Hunter, NMED	Karen E. Armijo, NNSA; Anthony Grieggs, LANS	Letter	NMED Comments on 100% Design Specifications: Sodium Hydroxide Chemical Feed System, DP-1132
04/17/2017	13476-13479	Karen E. Armijo, NNSA; Anthony Grieggs, LANS	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132f Quarterly Report, First Quarter 2017, TA-50 RLWTF
05/05/2017	13481-13494	N/A	N/A	Public Notice 2	Groundwater Discharge Permits applications have been proposed for approval
06/05/2017	13495-13761	Communities for Clean Water	Kathryn Hayden, NMED	Letter	Comments and Hearing Request on DP-1132
06/09/2017	13762-13764	Kathryn Hayden, NMED	Steve Pullen, NMED	Email	Forwarding Comments and Hearing Request on DP-1132
07/06/2016	13765-13767	Michael Saladen	Steven Huddleson, NMED; Bob Beers, LANL; Chris Signore	Email	List of SWMU associated with RLWTF
07/12/2017	13768-13770	Steve Pullen, NMED	Bob Beers, LANL	Email	DP-1132 – Integration with the Consent Order
07/17/2017	13771-13773	Bob Beers, LANL	Steve Pullen, NMED	Email	DP-1132 – Integration with the

Date	Bates No.	From	To	Format	Subject
					Consent Order
07/20/2017	13774-13775	Bob Beers, LANL	Steve Pullen, NMED	Email	DP-1132 – Integration with the Consent Order
07/24/2017	13776-13777	Steve Pullen, NMED	Joni Arends, CCNS	Email	LANL DP-1132 – monitoring equipment
07/24/2017	13778-13781	Joni Arends, CCNS	Steve Pullen, NMED; Rachel Conn; Marian Naranjo; Kathy Sanchez; Beata Tsosie-Pena; Marlene; Joan Brown; Jon Block, NMELC; Lindsay Lovejoy	Email	CCW Comments and Hearing Request on DP-1132 – monitoring equipment
07/24/2017	13782-13786	Karen E. Armijo, NNSA; Anthony Grieggs, LANS	Michelle Hunter, NMED	Letter	Filing of 100% Design Plans and Specifications, RLWTF Upgrade – Transuranic Liquid Waste Project, DP-1132
07/26/2017	13787-13796	Joni Arends; CCNS	Steve Pullen, NMED et al.	Email	11-14-14 CCW, Gilkeson & Sanchez Comments to DP-1132
08/16/2017	13797-13803	William Honnker, US EPA	Lindsay Lovejoy; Jonathan Block, NMELC	Letter	Request to Terminate NPDES Permit #NM0028355 as to Outfall #051 for

Date	Bates No.	From	To	Format	Subject
					RLWTF
09/14/2017	13804-13810	N/A	N/A	NMED Internal Memo	Request for Hearing Determination for the draft DOE/LANS Discharge Permit, DP-1132, Radioactive Liquid Waste Management Facility – Background
09/14/2017	13811-13814	Steve Pullen, NMED	Butch Tongate, NMED	Memorandum	Request for Hearing Determination for the DOE/LANS Discharge Permit Application DP-1132, Discharges from the RLWTF
N/A	13815-13824	N/A	N/A	Table	DP-1132 Hearing Determination – Table – LANL draft DP-1132 Public Comment – CCW
10/12/2017	13825-13829	Joni Arends, CCNS	Melissa Mascarenas, NMED	Email/IPRA	File review – LANL DP-1132 for the RLWTF, No. GWB 17-20 (P)
10/19/2017	13838-13839	Melissa Mascarenas, NMED	Joni Arends, CCNS	Letter	3-Day Letter Response to IPRA
10/30/2017	13840-13843	Taunia Van Valkenburg,	Michelle Hunter, NMED	Letter	Discharge Plan DP-1132 Quarterly

Date	Bates No.	From	To	Format	Subject
		LANL			Report, Third Quarter 2017, TA-50 RLWTF
10/30/2017	13844-13850	Deborah Reade	Michelle Hunter, NMED	Email	MASE also signs on to the letter
01/27/2017	13851-13860	N/A	N/A	Summary Report	EJSCREEN ACS Summary Report
10/30/2017	13861-13862	Joni Arends, CCNS	Steve Pullen, NMED	Email	DP-1132 – Center for Public Integrity: Nuclear Negligence
10/30/201	13863-13865	Steve Pullen, NMED	Steve Pullen, NMED	Email	Request to stop the comment period for DP- 1817 and the hearing process for DP-1132
10/30/2017	13867-13869	Steve Pullen, NMED	Steve Pullen, NMED	Email	Request to stop the comment period for DP- 1817 and the hearing process for DP-1132
10/30/2017	13870-13880	Deborah Reade	Michell Hunter, NMED	Email	MASE also signs on to the letter
01/31/2000	13881-13882	Maura Hanning, NMED GWQB	Gurule/Erickson , DOE/LANS	Letter	Status update on the Discharge Permit (DP-1132)
09/15/2008	13883-13890	Anthony Grieggs, LANS	Jennifer Fullam, NMED GWQB	Letter	Response to request for additional information, DP-1132. Includes RLWTF Upgrade

Date	Bates No.	From	To	Format	Subject
					Project – 60% plans and specifications on compact disc
12/27/2013	13891-13892	Jerry Schoeppner, NMED GWQB	Dorries/Turner LANS/DOE	Letter	Temporary permission to discharge to the Waste Mitigation and Risk Management influent storage tanks – DP-1132
04/23/2014	13893-13897	Brandt/Turner, LANS/DOE	Erika Schwender, NMED RPD	Letter	DP-1132 - RLWTF Upgrade Project – 90% plans and specifications on compact disc
09/21/2016	13898-14020	Grieggs/Armijo LANS/DOE	Michelle Hunter, NMED GWQB	Letter	Revised Closure Plan and comments on the draft DP-1132
12/15/2017	14021-14028	Lochlin Farrell, NMED GWQB	ABQ Journal	Email/Notice	Public hearing notice – DP-1132 – request for placement in legal section – both English and Spanish
12/15/2017	14029-14030	NMED	Listserve	Notice	Public notice of draft discharge permit (PN2) – call for public comment

Date	Bates No.	From	To	Format	Subject
					and request for hearing – includes a link to draft permit
12/15/2017	14031-14036	NMED	NA	Notice	Copy of public notice of public hearing on DP-1132 – refers to a hearing date of January 17, 2018 and a hearing location of the UNM Los Alamos campus
12/15/2017	14037-14042	NMED	Listserve	Email/Notice	Copy of notice of public hearing on DP-1132 – refers to a hearing date of January 17, 2018, and a hearing location of the UNM Los Alamos campus – includes a link to draft permit – notice in English and Spanish
12/11/2017	14043-14044	NMED	NA	Website posting, newspaper ads, mailings to interested parties, mailings to affected government agencies, and mailings to tribes	Public hearing notice for DP-1132 – includes notice in English and Spanish – includes link to draft DP-1132
03/07/2018	14045	NMED	NA	Notice	Copy of public notice of draft

Date	Bates No.	From	To	Format	Subject
					permit DP-1132 - (PN2) – call for public comment and request for hearing – includes a link to draft permit - re-notice to provide current and correct version of the Closure Plan
03/12/2018	14046-14051	NMED	NA	Notice	Copy of notice of public hearing on DP-1132 – refers to a hearing date of April 19, 2018, and a hearing location of the Fuller Lodge – includes a link to draft permit – notice in English and Spanish
04/04/2018	14052-14111	Joni Arends, CCW	Steve Pullen, NMED-GWQB	Email	Proposed changes to the DP-1132 Administrative Record Index