Los Alamos NATIONAL LABORATORY EST 1943

COPY

GROUND WATER
MAY 0 1 2018
BUREAU

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, MS A316
Los Alamos, New Mexico, 87544
(505) 667-5105/Fax (505) 667-5948

Date: MAY 0 1 2018
Symbol: EPC-DO: 18-187
LA-UR: 18-23218
Locates Action No.: *N/A*

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

Subject: **Discharge Plan DP-1132 Quarterly Report, First Quarter 2018, TA-50 Radioactive Liquid Waste Treatment Facility**

This letter from the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) is the first quarter 2018 Discharge Plan DP-1132 report for the Technical Area (TA)-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Since the first quarter of 1999, DOE/LANS have provided the New Mexico Environment Department (NMED) with voluntary quarterly reports containing analytical results from effluent and groundwater monitoring.

During the first quarter of 2018, no effluent was discharged to either National Pollutant Discharge Elimination System (NPDES) Outfall 051 or to the solar evaporative tank system (SET) at TA-52; all effluent was evaporated on-site at the mechanical evaporator system (MES).

Quarterly Monitoring Results, Mortandad Canyon Alluvial Groundwater Wells

Table 1.0 (attached) presents the analytical results from sampling conducted at Mortandad Canyon alluvial wells MCO-6 and MCO-7 during the first quarter of 2018. No sample was collected from alluvial well MCO-4b because there was insufficient water in the well. No sample was collected from alluvial well MCO-3 because the well was damaged beyond repair during a flood event in September 2013. Samples were submitted to GEL Laboratories LLC for analysis. All results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Intellus New Mexico environmental monitoring data web site (http://www.intellusnmdata.com).

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Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

Subject: **Discharge Plan DP-1132 Quarterly Report, First Quarter 2018, TA-50 Radioactive Liquid Waste Treatment Facility**

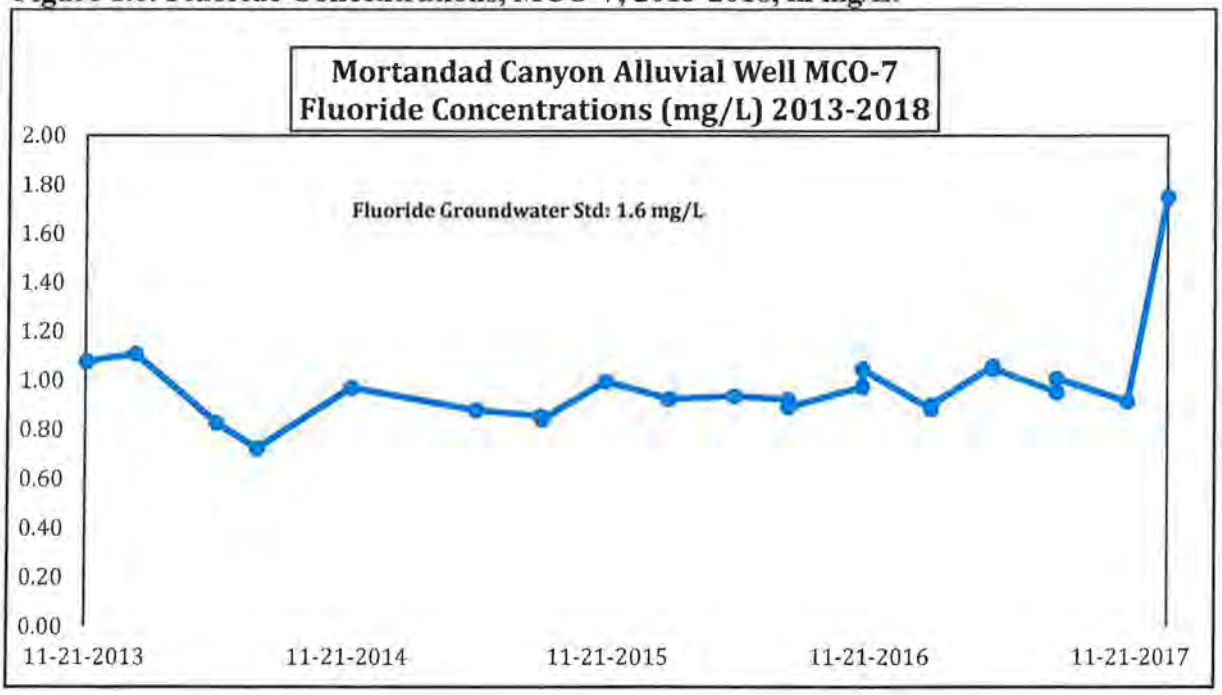
This letter from the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) is the first quarter 2018 Discharge Plan DP-1132 report for the Technical Area (TA)-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Since the first quarter of 1999, DOE/LANS have provided the New Mexico Environment Department (NMED) with voluntary quarterly reports containing analytical results from effluent and groundwater monitoring.

During the first quarter of 2018, no effluent was discharged to either National Pollutant Discharge Elimination System (NPDES) Outfall 051 or to the solar evaporative tank system (SET) at TA-52; all effluent was evaporated on-site at the mechanical evaporator system (MES).

Quarterly Monitoring Results, Mortandad Canyon Alluvial Groundwater Wells
Table 1.0 (attached) presents the analytical results from sampling conducted at Mortandad Canyon alluvial wells MCO-6 and MCO-7 during the first quarter of 2018. No sample was collected from alluvial well MCO-4b because there was insufficient water in the well. No sample was collected from alluvial well MCO-3 because the well was damaged beyond repair during a flood event in September 2013. Samples were submitted to GEL Laboratories LLC for analysis. All results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Intellus New Mexico environmental monitoring data web site (http://www.intellusnmdata.com).

As shown in the attached Table 1.0, the reported fluoride concentration at monitoring well MCO-7 on January 11, 2018 was 1.75 mg/L, greater than the New Mexico Water Quality Control Commission (NMWQCC) Regulation 3103 ground water standard of 1.6 mg/L. A review of fluoride concentrations at MCO-7 over the past 5 yrs—presented in Figure 1.0 below—shows that the reported concentration of 1.75 mg/L is not consistent with the previous 22 sample results. The average fluoride concentration at MCO-7 over the 5-yr review period is 0.95 mg/L. As you may be aware, DOE/LANS has not discharged to NPDES Outfall 051 since November 2010. Monitoring well MCO-7 will be resampled in the 2nd quarter of 2018 and the results reported to NMED in the August 1, 2018, monitoring report.

Figure 1.0. Fluoride Concentrations, MCO-7, 2013-2018, in mg/L.



TA-50 RLWTF Effluent Monitoring Results

No final weekly composite (FWC) samples were collected during the first quarter of 2018 because no effluent was discharged to Mortandad Canyon.

No final monthly composite (FMC) samples were collected during the first quarter of 2018 because no effluent was discharged to Mortandad Canyon.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this report.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager

ARG:KEA:MTS:RSB/eim

Cy: Shelly Lemon, 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)
Jody M. Pugh, NA-LA, (E-File)
Karen E. Armijo, NA-LA, (E-File)
Craig S. Leasure, PADOPS, (E-File)
William R. Mairson, ADESH, (E-File)
Benjamine B. Roberts, EPC-DO, (E-File)
Randal S. Johnson, DESHF-TA55, (E-File)
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Michael T. Saladen, EPC-CP, (E-File)
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Ellena I. Martinez, EPC-CP, (E-File)
adeshrecords@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

Table 1.0. Mortandad Canyon Alluvial Well Sampling, 1st Quarter 2018.

Sampling Location	Sample Field Prep (F/UF)[1]	Sample Date	Perchlorate (µg/L)	NO_3+NO_2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3		Damaged[4]	Damaged[4]	Damaged[4]	Damaged[4]	Damaged[4]	Damaged[4]	Damaged[4]
MCO-4B	F	1/25/2018	Dry[5]	Dry[5]	Dry[5]	Dry[5]	Dry[5]	Dry[5]
MCO-6	F	1/25/2018	6.8	0.90	0.20	0.12	250	0.88
MCO-7	F	1/11/2018	6.5	1.65	0.06	0.04	284	1.75
NM WQCC 3103 Groundwater Standards			***NA*** [2]	***10 mg/L*** [3]	***NA*** [2]	***NA*** [2]	***1000 mg/L***	***1.6 mg/L***

Notes:

[1]F means the sample was filtered. UF means the sampled was not filtered.

[2]NA means that there is no NM WQCC 3103 standard for this analyte.

[3]The NM WQCC 3103 Groundwater Standard is for NO_3-N.

[4]Damaged means that the well was damaged beyond repair during a flood event in Mortandad Canyon in September 2013.

[5]Dry means there was not sufficient water for sampling.

J flag indicates an estimated value.

U flag means the result was less than the analytical laboratory's Method Detection Limit (MDL).

Environmental Protection & Compliance Division
Environmental Compliance Programs
PO Box 1663, K490
Los Alamos, New Mexico 87545

Date: MAY 22 2018
Symbol: EPC-DO: 18-209
LAUR: 18-23836
Locates Action No.: NA

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

SUBJECT: Notification of Pre-Start Surrogate Water Test, Radioactive Liquid Waste Treatment Facility Upgrade Project, DP-1132

In April 2014, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) submitted to the New Mexico Environment Department (NMED) the 90% design plans and specifications for the Radioactive Liquid Waste Treatment Facility Upgrade Project (RLWTF UP). The RLWTF UP is the replacement of the low-level radioactive liquid waste treatment capability currently provided in the existing RLWTF (TA-50-001). As such, the RLWTF UP will not result in any change to the (1) location of the discharge, (2) quantity or quality of the discharge, or (3) the character of water contaminants received, treated, or discharged. With construction of the RLWTF UP essentially complete, the next activity leading towards startup is a surrogate test of the RLWTF UP treatment units. This letter provides NMED with notification of the planned surrogate test within the next 45 days.

Approximately ten thousand gallons of tapwater containing non-radioactive salts will be introduced to the RLWTF UP. The concentration of salts will be formulated in such quantities as to imitate the constituents in the design basis influent stream. Enclosure 1 provided a list of the 15 constituents that will be monitored during the surrogate test. Neodymium, samarium and cerium—non-radioactive metals—will be used as surrogate elements for plutonium, americium and uranium.

The surrogate test water will be fed to each RLWTF UP treatment process. Samples will be collected from the process streams and analyzed for each of the 15 constituents listed in Enclosure 1. Chemical analyses of these samples will determine if the treatment process removes contaminants as per the design requirements.

The performance of the surrogate test will take approximately 7 days. Each daily activity is identified below.

- Day 1: Development of surrogate water.
- Day 2: Pre-filling and pre-dosing operational tanks.
- Day 3: Feed surrogate water to the RLWTF UP and collect/analyze samples.
- Day 4: Operate the low pressure / low temperature evaporator and produce a drum of evaporator concentrate.
- Day 5: Operate the rotary filter press and produce a drum of sludge.
- Day 6: Analyze analytical data.
- Day 7: Prepare written surrogate test report.

Following completion of the test, the surrogate water will be stored in the 75,000-gal. influent tank, blended with low-level influent to the RLWTF, treated, and discharged to the mechanical evaporator system (MES).

Please contact Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this notification.

Sincerely,

Taunia Van Valkenburg
Group Leader

TVV:KEA:MTS:RSB:kr

Enclosure: 1) Surrogate Test Water Quality Parameters

Cy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
John E. Kieling, NMED/HWB, Santa Fe, NM, (E-File)
Jody M. Pugh, NA-LA, (E-File)
Karen E. Armijo, NA-LA, (E-File)
Darlene Rodriguez, NA-LA, (E-File)
Craig S. Leasure, PADOPS, (E-File)
William R. Mairson, ADESH, (E-File)
John C. Bretzke, ADESH, (E-File)
Enrique Torres, EPC-DO, (E-File)
Denise C. Gelston, TA-55-RLW, (E-File)
Alvin M. Aragon, TA-55-RLW, (E-File)
John C. Del Signore, TA-55-RLW, (E-File)
Vincent P. Worland, TA-55-RLW, (E-File)
Randal S. Johnson, DESHF-TA55, (E-File)
Taunia Van Valkenburg, EPC-CP, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
Ellena I. Martinez, EPC-CP, (E-File)
adesh-records@lanl.gov, (E-File)
locatesteam@lanl.gov, U1700075, (E-File)
epc-correspondence@lanl.gov, (E-File)

ENCLOSURE 1

Surrogate Test Water Quality Parameters

EPC-DO: 18-209

LA-UR-18-23836

Date: MAY 2 2 2018

SURROGATE TEST WATER QUALITY PARAMETERS

Fifteen non-radioactive water quality parameters will be monitored during the surrogate test. The criteria for success of the surrogate test will be judged by determining both the overall removal of constituents by the entire process and by determining of the removal of constituents by each of the TA-50-LLW treatment units. The pH of the solutions will be monitored; it is not a parameter that is removed by treatment.

Cerium and Samarium will serve as non-radioactive surrogate constituents for Plutonium and Americium; Neodymium will serve as a non-radioactive surrogate for Uranium.

The fifteen water quality parameters are listed below:

1. pH
2. Nitrate-Nitrogen, NO_3-N
3. Nitrite-Nitrogen, NO_2-N
4. Ammonia-Nitrogen, NH_3-N
5. Perchlorate, ClO_4
6. Fluoride, F
7. Copper, Cu
8. Zinc, Zn
9. Silica, SiO_2
10. Total Dissolved Solids, TDS
11. Total Suspended Solids, TSS
12. Chemical Oxygen Demand, COD
13. Cerium, Ce
14. Samarium, Sm
15. Neodymium, Nd

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

National Nuclear Security Administration
Los Alamos Field Office, A316
3747 West Jemez Road
Los Alamos, New Mexico, 87545
(505) 667-5105/Fax (505) 667-5948

Date: JUL 27 2018
Symbol: EPC-DO: 18-258
LA-UR: 18-26025
Locates Action No.: *NA*

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

Subject: **Discharge Plan DP-1132 Quarterly Report, Second Quarter 2018, TA-50 Radioactive Liquid Waste Treatment Facility**

This letter from the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) is the second quarter 2018 Discharge Plan DP-1132 report for the Technical Area (TA)-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Since the first quarter of 1999, DOE/LANS have provided the New Mexico Environment Department (NMED) with voluntary quarterly reports containing analytical results from effluent and groundwater monitoring.

During the second quarter of 2018, no effluent was discharged to either National Pollutant Discharge Elimination System (NPDES) Outfall 051 or to the solar evaporative tank system (SET) at TA-52; all effluent was evaporated on-site at the mechanical evaporator system (MES).

Quarterly Monitoring Results, Mortandad Canyon Alluvial Groundwater Wells

Due to Stage II and III fire restrictions at Los Alamos National Laboratory, access to Mortandad Canyon alluvial groundwater monitoring wells MCO-4B, MCO-6, and MCO-7 was restricted until June 29, 2018. No samples were collected from alluvial wells MCO-4B and MCO-6 because there was insufficient water in the wells. Samples collected from MCO-7 on June 29, 2018, were submitted to GEL Laboratories LLC for analysis. Analytical results from MCO-7 were not available at the time this report was prepared and will be submitted to NMED in the quarterly monitoring report due on November 1, 2018.

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Intellus New Mexico environmental monitoring data web site (http://www.intellusnmdata.com).

TA-50 RLWTF Effluent Monitoring Results

No final weekly composite (FWC) samples were collected during the second quarter of 2018 because no effluent was discharged to Mortandad Canyon.

No final monthly composite (FMC) samples were collected during the second quarter of 2018 because no effluent was discharged to Mortandad Canyon.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this report.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager

TVV/KEA/MTS/RSB:kr

Cy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
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William R. Mairson, ADESH, (E-File)
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John C. Del Signore, TA-55-RLW, (E-File)
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locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)
adesh-correspondence@lanl.gov, (E-File)

Los Alamos NATIONAL LABORATORY EST. 1943

Environment, Safety, & Health Associate Directorate
Los Alamos National Laboratory
PO Box 1663, K491
Los Alamos, NM 87545
505-667-4218

NNSA National Nuclear Security Administration

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico 87544
(505) 667-5105/Fax (505) 667-5948

Date: SEP 12 2018
Symbol: ADESH-18-066
Locates Action No.: N/A

GROUND WATER
SEP 12 2018
BUREAU

Michelle Hunter, Bureau Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building
1190 Saint Francis Drive
Santa Fe, NM 87502

Subject: Transfer Notice for Ground Water Discharge Permit No. 1132 (DP-1132)

Dear Ms. Hunter:

Los Alamos National Security, LLC (LANS) provides this written notice to the New Mexico Environment Department (NMED) that LANS is transferring its permit responsibilities under Ground Water Discharge Permit 1132 (DP-1132) to Triad National Security, LLC (Triad) effective November 1, 2018. Although LANS is the transferor, the United States Department of Energy, National Nuclear Security Administration (DOE/NNSA) joins in this notification as co-permittee. The United States Department of Energy will remain a co-permittee under DP-1132. This notice is submitted pursuant to 20.6.2.3111 NMAC.

The purpose of this transfer is to facilitate a contract change for the DOE/NNSA management and operating (M&O) contractor at Los Alamos National Laboratory (LANL). On November 1, 2018, Triad will become the DOE/NNSA M&O contractor at LANL. As of November 1, 2018, LANS will no longer have control of activities or facilities as the LANL M&O contractor, including activities and facilities subject to the requirements of DP-1132. Accordingly, DP-1132 is being transferred to Triad.

Pursuant to 20.6.2.3111 NMAC, LANS as transferor provided written notification to Triad of the existence of DP-1132. DOE/NNSA joined in the notification as co-permittee. Also pursuant to this regulation, Triad provided written certification that it received notice of the existence of DP-1132 from LANS and DOE/NNSA. Copies of both documents are enclosed.

If you have any questions, please do not hesitate to contact Robert Beers at (505) 667-7969 (bbeers@lanl.gov) or Karen Armijo at (505) 665-7314 (karen.armijo@nnsa.doe.gov). Prior to November 1, 2018, Triad may be reached via Michael Hazen, ALD-ESHQS, Triad National Security, LLC; Building 1400; Los Alamos, NM 87545; (505) 500-8498 (mhazen@lanl.gov).

Sincerely,

William R. Mairson
Associate Director
LANS

Sincerely,

Karen E. Armijo
Permitting and Compliance Manager
DOE/NNSA

MM/WRM/lm

Enclosure(s): 1) Notification of Existence of Groundwater Discharge Permit No. 1132, dated September 11, 2018.
2) Certification Acknowledging Receipt of Notification of Existence of Groundwater Discharge Permit No. 1132, dated September 11, 2018.

Copy: William S. Goodrum, DOE-NNSA, (E-File)
Silas DeRoma, DOE-NNSA, (E-File)
Karen Armijo, DOE-NNSA, (E-File)
Jody M. Pugh, DOE-NNSA, (E-File)
Kelly Beierschmitt, Triad Deputy Director of Operations, (E-File)
Michael W. Hazen, Triad ALD-ESHQSS, (E-File)
Drew Fuller, Triad, (E-File)
Bart Lounsbury, Triad, (E-File)
Kevin Amery, Triad, (E-File)
Enrique "Kiki" Torres, LANS-EPC, (E-File)
Taunia Van Valkenburg, LANS-EPC, (E-File)
Michael Saladen, LANS-EPC, (E-File)
Robert Beers, LANS-EPC, (E-File)
Maxine McReynolds, LANS-OGC, (E-File)
Adesh-record@lanl.gov

ENCLOSURE 1

Notification of Existence of Groundwater Discharge
Permit No. 1132, dated September 11, 2018

ADESH-18-066

Date: SEP 1 2 2018

Los Alamos NATIONAL LABORATORY EST. 1943

Environment, Safety, & Health Associate Directorate
Los Alamos National Laboratory
PO Box 1663, K491
Los Alamos, NM 87545
505-667-4218

NNSA National Nuclear Security Administration

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico 87544
(505) 667-5105/Fax (505) 667-5948

Date: SEP 1 1 2018
Symbol: ADESH-18-064
Locates Action No.: N/A

Mr. Michael W. Hazen
ALD-ESHQSS
Triad National Security, LLC
Building 1400
Los Alamos, NM 87545

Subject: Notification of Existence of Ground Water Discharge Permit No. 1132, (DP-1132)

Dear Mr. Hazen:

On November 1, 2018, Triad National Security, LLC (Triad) will assume management and operation of Los Alamos National Laboratory (LANL) on behalf of the National Nuclear Security Administration (NNSA).

Los Alamos National Security, LLC (LANS), pursuant to 20.6.2.3111.A NMAC, provides this written notification (Notification) to Triad that LANL facilities and activities are subject to a ground water discharge permit (DP-1132 or Permit) issued by the New Mexico Environment Department (NMED). Although LANS is the transferor, NNSA joins in this notification as co-permittee.

Permit DP-1132 will be transferred from LANS to Triad effective November 1, 2018. To meet the Permit transfer requirements, please sign the enclosed Certification acknowledging receipt of this Notification and return it to our attention. LANS and NNSA will then complete the Permit transfer process by sending NMED a copy of this Notification with the signed Certification.

Permit transfer regulations require that Triad, upon receipt of this Notification, inquire into all provisions and requirements contained in the Permit. *See* 20.6.2.3111.B NMAC. LANS and NNSA are available to respond to any questions Triad may have relating to this inquiry. For your convenience, a copy of the final decision for DP-1132 is enclosed for reference.

If you have any questions, please do not hesitate to contact Robert Beers at (505) 667-7969 (bbeers@lanl.gov) or Karen Armijo at (505) 665-7314 (karen.armijo@nnsa.doe.gov).

Sincerely,

William R. Mairson
Associate Director
Environment Safety and Health

Sincerely,

Karen E. Armijo
Permitting and Compliance Manager
DOE/NNSA

MM/WRM/lm

Enclosure(s): 1) Certification for DP-1132
2) Copy of Final Decision for DP-1132

Copy: William S. Goodrum, DOE-NNSA, (E-File)
Silas DeRoma, DOE-NNSA, (E-File)
Karen Armijo, DOE-NNSA, (E-File)
Jody M. Pugh, DOE-NNSA, (E-File)
Kelly Beierschmitt, Triad Deputy Director of Operations, (E-File)
Michael W. Hazen, Triad ALD-ESHQSS, (E-File)
Drew Fuller, Triad, (E-File)
Bart Lounsbury, Triad, (E-File)
Kevin Amery, Triad, (E-File)
Enrique "Kiki" Torres, LANS-EPC, (E-File)
Taunia Van Valkenburg, LANS-EPC, (E-File)
Michael Saladen, LANS-EPC, (E-File)
Robert Beers, LANS-EPC, (E-File)
Maxine McReynolds, LANS-OGC, (E-File)
Adesh-records@lanl.gov

ENCLOSURE 1

Certification for DP-1132

ADESH-18-064

Date: SEP 1 1 2018

CERTIFICATION

I, Michael W. Hazen, hereby certify the correspondence described below was delivered by Los Alamos National Security, LLC (LANS), to Triad National Security, LLC (Triad), and was received by Triad:

- Letter dated September 11, 2018, from William R. Mairson, LANS Associate Director, Environment, Safety, and Health and Karen E. Armijo, NNSA Los Alamos Field Office Permitting and Compliance Manger, to Michael Hazen, Triad ALD-ESHQSS; Subject: Notification of Existence of Ground Water Discharge Permit No. 1132 (DP-1132).

_____ _____

Michael W. Hazen
ALD-ESHQSS
Triad National Security, LLC

Date

ENCLOSURE 2

Copy of Final Decision for DP-1132

ADESH-18-064

Date: SEP 1 1 2018

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)

FINAL DECISION PURSUANT TO 20.6.2.3110(L) NMAC

This matter comes before the Secretary of the New Mexico Environment Department ("Secretary") for a final decision pursuant to 20.6.2.3110(L) NMAC following a public hearing held before the appointed Hearing Officer in accordance with 20.6.2.3110 NMAC at the Fuller Lodge in Los Alamos, New Mexico on April 19, 2018. Los Alamos National Security, LLC ("LANS") and the United States Department of Energy ("DOE" and jointly "Applicants") seek approval of a ground water discharge permit ("DP-1132") for Los Alamos National Laboratory ("LANL"). The Ground Water Quality Bureau of the New Mexico Environment Department ("Department") supports approval of the ground water discharge permit with sixty (60) proposed conditions reasonable and necessary to ensure compliance with the Water Quality Act and applicable regulations, considering site-specific conditions. Communities for Clean Water ("CCW") opposes the issuance of the permit.

The Secretary considered the entire record proper, which includes the Hearing Officer's Report Pursuant to 20.6.2.3110(K) NMAC filed with the Hearing Clerk on July 12, 2018. The Hearing Officer recommended approval of the ground water discharge permit with the sixty (60) proposed conditions and with the changes proposed by Applicants.

The Secretary hereby adopts the Hearing Officer's recommended findings of fact and conclusions of law, and approves the ground water discharge permit for the reasons therein. The

Secretary further approves the ground water discharge permit as submitted by the Department as Attachment 1.

Butch Tongate 8/29/18

Butch Tongate, Secretary
New Mexico Environment Department

NOTICE OF PROCEDURE FOR APPELLATE REVIEW

20.6.2.3112 NMAC provides that if the secretary approves, approves subject to conditions, or disapproves a proposed discharge plan, renewal or modification, or modifies or terminates a discharge permit, appeal therefrom shall be in accordance with the provisions of NMSA 1978, §§ 74-6-5(N), (O) and (P) (2009). The filing of an appeal does not act as a stay of any provision of the Act, the regulations, or any permit issued pursuant to the Act, unless otherwise ordered by the secretary or the commission.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the **Revised Hearing Officer's Report Pursuant to 20.6.2.3110(K) NMAC & Final Decision Pursuant to 20.6.2.3110(L) NMAC** was sent via the stated methods below to the following parties via email on August 30, 2018 and via U.S. mail on August 30, 2018:

Via hand delivery and Email:

John Verheul
Assistant General Counsel
New Mexico Environment Department
121 Tijeras Avenue NE, Ste
Albuquerque, New Mexico 87102
John.Verheul@state.nm.us
Counsel for the New Mexico Environment Department

Via First Class U.S. Mail and Email:

Stuart R. Butzier
Christina C. Sheehan
Modrall, Sperling, Roehl, Harris & Sisk, P.A.
P.O. Box 9318
Santa Fe, New Mexico 87504-9318
stuart.butzier@modrall.com
christina.sheehan@modrall.com
Counsel for Los Alamos National Security, LLC

Susan McMichael
Office of Laboratory Counsel
Los Alamos National Laboratory
P.O. Box 1663, MS A187
Los Alamos, New Mexico 87545
smcmichael@lanl.gov
Counsel for Los Alamos National Security, LLC

Silas R. DeRoma
Attorney
U.S. Department of Energy
National Nuclear Security Administration
1900 Diamond Drive
Los Alamos, New Mexico 87544
silas.deroma@nnsa.doe.gov
Counsel for U.S. Department of Energy

Lindsay A. Lovejoy, Jr.
Attorney at Law
3600 Cerrillos Road, Unit 1001A
Santa Fe, New Mexico 87507
lindsay@lindsaylovejoy.com
Counsel for Communities for Clean Water

Jonathan Block
New Mexico Environmental Law Center
1405A Luisa Street #5
Santa Fe, New Mexico 87505-4074
jblock@nmelc.org
Counsel for Communities for Clean Water

Ms. Joni Arends
Attorney at Law
Executive Director CCNS
P.O. Box 31147
Santa Fe, NM 87594-1147
jarends@nuclearactive.org

John Baca
John Baca, Hearing Clerk

ENCLOSURE 2

Certification Acknowledging Receipt of Notification of Existence of Groundwater Discharge Permit No. 1132, dated September 11, 2018

ADESH-18-066

Date: SEP 12 2018

CERTIFICATION

I, Michael W. Hazen, hereby certify the correspondence described below was delivered by Los Alamos National Security, LLC (LANS), to Triad National Security, LLC (Triad), and was received by Triad:

- Letter dated September 11, 2018, from William R. Mairson, LANS Associate Director, Environment, Safety, and Health and Karen E. Armijo, NNSA Los Alamos Field Office Permitting and Compliance Manger, to Michael Hazen, Triad ALD-ESHQSS; Subject: Notification of Existence of Ground Water Discharge Permit No. 1132 (DP-1132).

Michael W. Hazen
ALD-ESHQSS
Triad National Security, LLC

11 Sept 18
Date

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.env.nm.gov

BUTCH TONGATE
Cabinet Secretary

J.C. BORREGO
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

September 18, 2018

John C. Bretzke, Division Leader
Environmental Protection & Compliance Division
Los Alamos National Security LLC
PO Box 1663, K491
Los Alamos, New Mexico 87545

Cheryl L. Rodriguez, Program Manager, FPD-II
Environmental Management
Los Alamos Field Office
3747 West Jemez Road
Los Alamos, New Mexico 87544

RE: Discharge Permit, DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory

Dear Mr. Bretzke and Ms. Rodriguez:

The New Mexico Environment Department (NMED) issues the enclosed Discharge Permit, DP-1132, to the United States Department of Energy and to Los Alamos National Security, LLC (collectively the permittees) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Ground and Surface Water Protection Regulations, 20.6.2 NMAC.

The Discharge Permit contains terms and conditions that shall be complied with by the permittee and are enforceable by NMED pursuant to Section 20.6.2.3104 NMAC and NMSA 1978 §74-6-5 and §74-6-10. Please be aware that this Discharge Permit may contain conditions that require the permittee to implement operational, monitoring or closure actions by a specified deadline. Such conditions are listed at the beginning of the operational, monitoring and closure plans of this Discharge Permit.

Issuance of this Discharge Permit does not relieve the permittee of the responsibility to comply with the WQA, 20.6.2 NMAC, and any other applicable federal, state, and/or local laws, regulations, zoning requirements, and nuisance ordinances.

Pursuant to Paragraph (4) of Subsection H of 20.6.2.3109 NMAC, the term of the Discharge Permit shall be five years from the effective date. The term of this Discharge Permit will end on August 29, 2023.

NMED requests that you submit an application for renewal (or renewal and modification) at least 180 days prior to the date the Discharge Permit term ends.

An invoice for the Discharge Permit Fee of $3,450.00 is being sent under separate cover. Payment of the Discharge Permit Fee must be received by NMED within 30 days of the date the Discharge Permit is issued.

If you have any questions, please contact Andrew Romero at (505) 827-0076. Thank you for your cooperation during this Discharge Permit review.

Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

MH:AR

Encs: Discharge Permit, DP-1132
Discharge Permit Summary
Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions, Revision 1.1, March 2011

cc: Robert Italiano, District Manager, NMED District II (electronic copy)
John Romero, Office of the State Engineer (electronic copy)
Anne Keller, DWB, UOCP (electronic copy)
John Kieling, NMED/HWB (electronic copy)
Shelly Lemon, NMED/SWQB (electronic copy)
Steven Yanicak, NMED/DOEOB (electronic copy)
Bob Beers, EPC-CP, bbeers@lanl.gov (electronic copy)

Beers, Bob

From: Romero, Andrew C, NMENV <AndrewC.Romero@state.nm.us>
Sent: Thursday, September 20, 2018 2:55 PM
To: Beers, Bob
Subject: Re: DP-1132_Condition No. 29 Effluent Sampling

Bob,

NMED concurs with your assessment and will allow the postponement of the said quarterly sampling.

Thank you,

Andrew C. Romero
Environmental Scientist, Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
(505) 827-0076

From: Beers, Bob <bbeers@lanl.gov>
Sent: Thursday, September 20, 2018 1:39 PM
To: Romero, Andrew C, NMENV
Cc: Saladen, Michael Thomas; Pullen, Steve, NMENV; Armijo, Karen (CONTR) (Karen.Armijo@nnsa.doe.gov); Dors, Kristen
Subject: DP-1132_Condition No. 29 Effluent Sampling

Hi Andrew,

I would like to follow up on our telephone conversation this morning regarding DP-1132 effluent sampling (Condition No. 29).

Pursuant to Condition No. 29, effluent monitoring is required monthly and quarterly for discharges to the MES. Monthly sampling—a limited suite of TKN, NO3-N, F, Cl, TDS, and perchlorate-- is scheduled for Monday, September 24. The purpose of my telephone call was to discuss the schedule for conducting the quarterly sampling.

As I mentioned, our analytical laboratory, GEL Laboratories LLC, Charleston, SC, was forced to shut down operations during Hurricane Florence. While GEL is presently returning to full scale operations we are concerned about submitting the quarterly samples, all 20.6.2.3103 and Toxic Pollutants. We believe it would be prudent to wait a few weeks until we are assured that GEL can process our samples efficiently and within analytical hold times. That is, we would like to postpone the quarterly sampling until early to mid October.

It is my understanding that you concur with our assessment and find a short postponement acceptable.

Thank you for your time and consideration.

Regards,

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.env.nm.gov

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

BUTCH TONGATE
Cabinet Secretary

J.C. BORREGO
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

September 26, 2018

John C. Bretzke, Division Leader
Environmental Protection & Compliance Division
Los Alamos National Security LLC
PO Box 1663, K491
Los Alamos, New Mexico 87545

Cheryl L. Rodriguez, Program Manager, FPD-II
Environmental Management
Los Alamos Field Office
3747 West Jemez Road
Los Alamos, New Mexico 87544

RE: Updated Discharge Permit, DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory

Dear Mr. Bretzke and Ms. Rodriguez:

On August 29, 2018, the New Mexico Environment Department (NMED) Ground Water Quality Bureau issued a Discharge Permit (DP-1132 or Permit) to the United States Department of Energy and to Los Alamos National Security, LLC (collectively the Permittees) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Ground and Surface Water Protection Regulations, 20.6.2 NMAC.

In the version of the Permit provided to the Permittees, Condition 49 on page 45 contained an error requiring the posting of specific submittals to LANL's Electronic Public Reading Room within seven days. The Discharge Permit presented at the public hearing at Fuller Lodge in Los Alamos on April 19, 2018, requires posting of the same submittals within thirty days. The version presented at the hearing is the correct version and NMED hereby provides a replacement page for insertion into the earlier provided copy of the Permit.

Condition 49 has been corrected and now states:

> "**ELECTRONIC POSTING - MANDATORY** Commencing on the Effective Date of this Discharge Permit the permittees shall, within thirty calendar 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."

If you have any questions, please contact Andrew Romero at (505) 827-0076.

Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

MH:AR

Encs: DP-1132, replacement page 45

cc: Robert Italiano, District Manager, NMED District II (electronic copy)
John Romero, Office of the State Engineer (electronic copy)
Anne Keller, DWB, UOCP (electronic copy)
John Kieling, NMED/HWB (electronic copy)
Shelly Lemon, NMED/SWQB (electronic copy)
Steven Yanicak, NMED/DOEOB (electronic copy)
Bob Beers, EPC-CP, bbeers@lanl.gov (electronic copy)

Los Alamos NATIONAL LABORATORY EST 1943

COPY

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

National Nuclear Security Administration
Los Alamos Field Office, A316
3747 West Jemez Road
Los Alamos, New Mexico, 87545
(505) 667-5105/Fax (505) 667-5948

Date: OCT 11 2018
Symbol: EPC-DO-18-365
LA-UR: 18-29518
Locates Action No.: U1801172

GROUND WATER
OCT 15 2018
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

Subject: Discharge Plan DP-1132, Condition No. 13, Maintenance and Repair

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Condition No. 13, Maintenance and Repair, requires DOE/LANS to maintain the function and structural integrity of the RLWTF at all times except during maintenance and repair. Maintenance and repair required at a unit that could lead to an unauthorized discharge to the environment or pose a threat to human health shall be corrected as soon as possible but no later than 30 days from the date of the observed malfunction. Condition No. 13 allows NMED to approve a longer period, for good cause.

Pursuant to Condition No. 13, DOE/LANS have identified seven secondary containment alarms—located in vaults and sumps—that are presently malfunctioning. Repair of these seven alarms will not be completed within 30 days from the date of observed malfunction. Table 1 below provides additional, detailed information on each alarm.

Table 1. List of RLWTF Vault and Sump Alarms Requiring Repair

Tag Name	Location	Alarm Type	Malfunction Type
PLC11_SM749	TA-03-029	RLWCS[1] vault	Communication Failure
PLC11_SM776	TA-03-029	RLWCS vault	Communication Failure
PLC14_SM758	TA-03-130	RLWCS vault	Communication Failure
PLC2_INF_16_A11	TA-50-001	Containment sump	Communication Failure
PLC2_INF_16_A41	TA-50-001	Containment sump	Communication Failure
PLC2_INF_16_A51	TA-50-001	Containment sump	Communication Failure
PLC2_SMP_34B_A1	TA-50-001	Containment sump	Communication Failure

[1]Radioactive Liquid Waste Collection System

DOE/LANS estimate that the task of identifying the root cause for each of the malfunctioning alarms will take approximately 30 days. Once the root cause is determined then DOE/LANS will provide NMED with a schedule for completing the required repairs.

In the interim, until the alarms are fully functional, DOE/LANS commit to implement the following contingencies to ensure that no unauthorized discharge occurs to the environment.

Vault Alarms

- Weekly visual inspection of the vaults with the malfunctioning alarms.
- If liquid is identified during a weekly inspection then the liquid will be sampled to confirm that the source of the liquid is infiltrated ground or storm water and not radioactive liquid waste.

Sump Alarms

- Daily visual inspection of the sumps with the malfunctioning alarms.
- Functioning tank-level alarms that respond to rapid changes in tank volumes.

In closing, DOE/LANS has identified seven secondary containment alarms that require repair; the time period to complete said repairs will extend beyond the 30-day allowable window specified in DP-1132 Condition No. 13. DOE/LANS request 30 days to determine the root cause of the malfunctioning alarms. Once the root cause is identified then a schedule for completing the repairs will be submitted to NMED. DOE/LANS request NMED approval of the proposed plan.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this report.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager

ARG:KEA:MTS:RSB/jdm

Copy: Shelly Lemon, NMED/SWQB, (E-File)
John E. Kieling, NMED/HWB, (E-File)
Jody M. Pugh, NA-LA, (E-File)
Karen E. Armijo, NA-LA, (E-File)
Kristen M. Dors, LASO-MA-LS, (E-File)
Craig S. Leasure, PADOPS, (E-File)
William R. Mairson, ADESH, (E-File)
Enrique Torres, EPC-DO, (E-File)
Randal S. Johnson, DESHF-TA55, (E-File)
Denise C. Gelston, TA-55-RLW, (E-File)
Alvin M. Aragon, TA-55-RLW, (E-File)
John C. Del Signore, TA-55-RLW, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

Los Alamos NATIONAL LABORATORY EST. 1943

COPY

GROUND WATER
OCT 18 2018
BUREAU

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87545
(505) 667-5105/Fax (505) 667-5948

Date: OCT 18 2018
Symbol: EPC-DO-18-375
LA-UR: 18-29673
Locates Action No.: U1801172

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **DP-1132, Condition No. 4, Quarterly Monitoring Report, Third Quarter 2018**

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Pursuant to permit Condition No. 4, *Monitoring Reports,* DOE/LANS is required to submit a quarterly monitoring report by November 1, 2018, for the period August 29, 2018, to September 30, 2018. The following Discharge Permit DP-1132 conditions require submittal of information in the quarterly monitoring reports:

- #10: Settled Solids; Settled Solids Removal
- #13: Maintenance and Repair
- #25: Influent Volumes RLW
- #26: Influent Volumes TRU
- #27: Discharge Volumes
- #29: Effluent Sampling
- #36: Ground Water Monitoring

Detailed information on each of these conditions is presented below.

Condition No. 10: Settled Solids; Settled Solids Removal
The Permittees shall inspect and measure the thickness of the settled solids in the SET on an annual basis.

The Solar Evaporation Tank (SET) is not yet in service. No treated effluent was discharged to the SET during the monitoring period.

Condition No. 13: Maintenance and Repair
The Permittees shall submit to NMED a summary and description of the maintenance and repair activities performed on the Facility as part of the quarterly monitoring reports.

Enclosure 1 provides a summary of the maintenance and repair activities conducted at the TA-50 RLWTF during the monitoring period.

Condition No. 25: Influent Volumes RLW
The Permittees shall measure the volume of all RLW influent waste water being conveyed to the Facility on a daily basis using the flow meter required to be installed pursuant to this Discharge Permit.

Enclosure 2 provides the daily volume of RLW influent wastewater received by the RLWTF during the monitoring period.

Condition No. 26: Influent Volumes TRU
The Permittees shall measure the daily volume of TRU influent waste water being conveyed to the Facility using electronic sensors which measure tank levels in both the acid waste and caustic waste influent tanks.

No TRU influent wastewater was received by the RLWTF during the monitoring period.

Condition No. 27: Discharge Volumes
The Permittees shall measure and record the volume of treated waste water discharged to the SET, MES and Outfall 051 on a daily basis.

- Enclosure 2 provides the daily volume of treated effluent discharged to the MES during the monitoring period.
- No treated effluent was discharged to the SET during the monitoring period.
- No treated effluent was discharged to NPDES Outfall 051 during the monitoring period.

Condition No. 29: Effluent Sampling
The Permittees shall sample and analyze effluent waste streams discharged to Outfall 051, the SET, and the MES.

- *Treated effluent samples shall be collected once per calendar month for any month in which a discharge occurs to Outfall 051.*
  - No effluent was discharged to Outfall 051 during the monitoring period.
- *Treated effluent samples shall be collected once per calendar month for any month in which a discharge occurs to the MES or SET. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for TKN, NO_3-N, TDS, Cl, F and perchlorate.*
  - No treated effluent was discharged to the SET during the monitoring period.
  - Treated effluent discharged to the MES was sampled on September 24, 2018, for TKN, NO_3+NO_2-N, TDS, Cl, F and perchlorate. Sample results were not available in time for this monitoring report and will be submitted to NMED in the February 1, 2019, monitoring report.
- *The Permittees shall collect and analyze effluent samples once per quarter for any quarterly period in which a discharge occurs to the MES or SET. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants as defined in 20.6.2.7.WW NMAC.*
  - Sampling of treated effluent for the quarterly parameters (3130 contaminants and toxic pollutants) was postponed from September 24, 2018, until October 3, 2018, due to the disruption caused by Hurricane Florence (GEL Laboratories, LLC is located in Charleston, SC). The delay in sampling was communicated to NMED Ground Water Quality Bureau in a September 20, 2018, email). Sample results were not available in time for this monitoring report and will be submitted to NMED in the February 1, 2019, monitoring report.

Condition No. 36: Ground Water Monitoring-Quarterly
The Permittees shall collect ground water samples from the following ground water monitoring wells on a quarterly basis and analyze the samples for TKN, NO3-N, TDS, Cl, F and perchlorate.

- *Replacement Alluvial Wells #1 and #2.*
  - A work plan for the installation of two replacement monitoring wells will be submitted to NMED by November 27, 2018. Following NMED approval of the plan, the replacement alluvial wells will be installed. Sampling at replacement wells #1 and #2 will begin following well installation.

➢ *MCOI-6.*

- Table 1 provides the analytical results from sampling perched/intermediate groundwater monitoring well MCOI-6 during the third quarter of 2018.

Table 1. Analytical Results from Monitoring Well MCOI-6, 3rd Quarter 2018.

Location ID	Sample Date	Parameter Name	Report Result	Report Units	Lab Qualifier	Detected	Filtered	Lab Method	Field Sample ID
MCOI-6	07-11-2018	Ammonia as Nitrogen	0.0791	mg/L		N	Y	EPA:350.1	CAMO-18-159789
MCOI-6	07-11-2018	Chloride	55.3	mg/L		Y	Y	EPA:300.0	CAMO-18-159789
MCOI-6	07-11-2018	Fluoride	0.606	mg/L		Y	Y	EPA:300.0	CAMO-18-159789
MCOI-6	07-11-2018	Nitrate-Nitrite as Nitrogen	10.1	mg/L		Y	Y	EPA:353.2	CAMO-18-159789
MCOI-6	07-11-2018	Perchlorate	103	ug/L		Y	Y	SW-846:6850	CAMO-18-159789
MCOI-6	07-11-2018	Total Dissolved Solids	361	mg/L		Y	Y	EPA:160.1	CAMO-18-159789
MCOI-6	07-11-2018	Total Kjeldahl Nitrogen	0.511	mg/L		Y	N	EPA:351.2	CAMO-18-159790

Condition No. 36: Ground Water Monitoring-Annual
The Permittees shall collect ground water samples from the following ground water monitoring wells on an annual basis and analyze the samples for all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants listed in 20.6.2.7.WW.

➢ *Replacement Alluvial Well #1 and #2.*

- Sampling at the replacement alluvial wells #1 and #2 will begin following installation.

➢ *MCOI-6, R-46, R-60, R-1, and R-14.*

- Sampling at MCOI-6, R-46, R-60, R-1, and R-14 is scheduled for the fourth quarter of 2018.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this quarterly monitoring report.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager

TVV/KEA/MTS/RSB:jdm

Enclosure(s): 1) RLWTF Maintenance Report, Third Quarter 2018
2) RLWTF Daily Influent and Effluent Flows, Third Quarter 2018

Copy: Shelly Lemon, NMED/SWQB, Santa Fe, NM, (E-File)
John E. Kieling, NMED/HWB, Santa Fe, NM, (E-File)
Jody M. Pugh, NA-LA, (E-File)
Karen E. Armijo, NA-LA, (E-File)
Craig S. Leasure, PADOPS, (E-File)
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Enrique Torres, EPC-DO, (E-File)
William H. Schwettmann, IPM, (E-File)
Raelynn Romero, PM6, (E-File)
Randal S. Johnson, DESHF-TA55, (E-File)
Denise C. Gelston, TA-55-RLW, (E-File)
Alvin M. Aragon, TA-55-RLW, (E-File)
John C. Del Signore, TA-55-RLW, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ENCLOSURE 1

RLWTF Maintenance Report,
Third Quarter 2018

EPC-DO: 18-375

LA-UR-18-29673

Date: OCT 1 8 2018

DP-1132 Report: Third Quarter 2018
RLWTF Maintenance

Structures	Description	Built	PM	CM	SR	Total
Building 1	Original treatment bldg.	1963	14	4	1	19
Building 2	Original influent storage bldg.	1963	1	0	0	1
Building 66	TRU influent storage	1982	1	0	0	1
Building 248	Low-level bottoms storage	1996	2	0	0	2
Building 250	Low-level influent storage	2009	5	0	0	5
Building 257	Mechanical evaporator	2010	0	0	0	0
TA52	Solar evaporation	2011	3	0	0	3
	Totals		26	4	1	31

Task Types: PM-preventive maintenance CM-corrective maintenance SR-service request

Acronyms used in Maintenance reports:

BHW	boiler, hot water
FAR	filter, air replaceable
FEXT	fire extinguisher
HEPA	high-efficiency particulate air
HUE	heater unit, electric
LTE	lights, emergency
LTET	lights, emergency, tritium
LTNT	lights, non-tritium
PV	pump, vacuum
RCA	radiological control area
SPH	sprinkler pipe, dry
SPW	sprinkler pipe, wet

DP-1132 Report: Third Quarter 2018
RLWTF Maintenance

TA-50-0001 Work Completion Report (08/29/2018-09/30/2018

Unit	Work Order	Task	Task Type	Task Title
500001	00570856	01	CM	500001 PERFORM SPOT RELAMP & BALLAST REPLACEMENT IN NON RCAS
500001	00585350	01	PM	50-1 ELECTRICAL EQUIPMENT 5YR PM GROUP 2
500001	00594341	01	PM	500001 HUE 1YR PM
500001	00609085	01	SR	500001 REMOVE WATER DIVERTER IN ROOM 30
500001	00609091	01	CM	500001 RE-GLUE BASEBOARD IN ROOMS 130 & 131B
500001	00609107	01	CM	500001 ROTATE THE SAFETY SHOWER AND PAINT FLOOR AREA (KEEP C
500001	00610414	01	PM	500001 FAR 3MO PM (9 EA)
500001	00612612	01	PM	500001 BHW 1YR PM, INSPECTION & MAINTENANCE
500001	00614941	01	PM	500001 SPW/SPH 1 YR FIRE SUPPRRESSION SYSTEMS PM
500001	00614979	01	PM	50-1 PH ANALYZER 2MO CALIBRATION 2 EA
500001	00614985	01	PM	500001 LTE 1MO PM
500001	00614991	01	PM	500001 FEXT 1MO PM
500001	00615009	01	PM	500001 BHW 1MO PM (2 EA)
500001	00615014	01	PM	500001 PERFORM WEEKLY EYEWASH/ SAFETY SHOWER TESTING
500001	00615040	01	PM	500001 LTET 1MO PM
500001	00616028	01	PM	500001 (2 YR) CHEMICAL SKID ASSY, PRV AND PUMP PM (6 EA)
500001	00616095	01	CM	500001 REPAIR CRANE CM-010
500001	00616652	01	PM	500001-60/60A LT 1YR PM LEVEL INSTRUMENT CALIBRATION (22 EA)
500001	00623440	01	PM	500001 PV-007 3 MO PM, (MECHANICAL)

Task Types: PM-preventive maintenance CM-corrective maintenance SR-service request

14153

DP-1132 Report: Third Quarter 2018
RLWTF Maintenance

TA-50-0002 Work Completion Report (08/29/2018-09/30/2018

Unit	Work Order	Task	Task Type	Task Title
500002	00614943	01	PM	500002 HUE 1YR PM

TA-50-0066 Work Completion Report (08/29/2018-09/30/2018

Unit	Work Order	Task	Task Type	Task Title
500066	00588219	01	PM	500066 3YR TANK HEPA FILTER REPLACEMENT PM

TA-50-0248 Work Completion Report (08/29/2018-09/30/2018

Unit	Work Order	Task	Task Type	Task Title
500248	00614972	01	PM	500248 PUMPS 3MO PM (2 EA.)
500248	00616661	01	PM	500248 HUE 1YR PM

TA-50-0250 Work Completion Report (08/29/2018-09/30/2018

Unit	Work Order	Task	Task Type	Task Title
500250	00614925	01	PM	50-250 1YR SPW SYSTEM PM
500250	00614984	01	PM	500250 FEXT 1MO PM
500250	00615031	01	PM	500250 LTE 1MO PM
500250	00615037	01	PM	500250 LTNT 1MO PM
500250	00615039	01	PM	500250 LTET 1MO PM

TA-50-0257 Work Completion Report (08/29/2018-09/30/2018

Unit	Work Order	Task	Task Type	Task Title
*** NO DATA TO REPORT FOR LISTED PERIOD.				

TA-52-SET Work Completion Report (08/29/2018-09/30/2018

Unit	Work Order	Task	Task Type	Task Title
520182	00615010	01	PM	TA52-182 MONTHLY EMERGENCY LIGHTS PM
520182	00615012	01	PM	TA52-182 MONTHLY NON TRITIUM LIGHTS PM
520182	00615013	01	PM	TA52-182 FEXT 1MO PM

Task Types: PM-preventive maintenance CM-corrective maintenance SR-service request

ENCLOSURE 2

RLWTF Daily Influent and Effluent Flows,
Third Quarter 2018

EPC-DO: 18-375

LA-UR-18-29673

Date: OCT 1 8 2018

DP-1132 Report: Third Quarter 2018
RLWTF Daily Influent and Effluent

Date	Low-level Influent	Effluent MES	Effluent Outfall	Effluent SET	Transuranic Influent
Totals, 2018-Q3	279,945	233,598	0	0	0
Sub-total, Aug	19,009	39,771	0	0	0
Sub-total, Sep	260,936	193,828	0	0	0

All flows are in Liters.

1-Aug					
2-Aug					
3-Aug					
4-Aug					
5-Aug					
6-Aug					
7-Aug					
8-Aug					
9-Aug					
10-Aug					
11-Aug					
12-Aug					
13-Aug					
14-Aug					
15-Aug					
16-Aug					
17-Aug					
18-Aug					
19-Aug					
20-Aug					
21-Aug					
22-Aug					
23-Aug					
24-Aug					
25-Aug					
26-Aug					
27-Aug					
28-Aug					
29-Aug	6,992	15,350	0	0	0
30-Aug	6,202	15,232	0	0	0
31-Aug	5,815	9,188	0	0	0

DP-1132 Report: Third Quarter 2018
RLWTF Daily Influent and Effluent

Date	Low-level Influent	Effluent MES	Effluent Outfall	Effluent SET	Transuranic Influent
1-Sep	5,022	0	0	0	0
2-Sep	5,691	0	0	0	0
3-Sep	6,001	0	0	0	0
4-Sep	5,655	0	0	0	0
5-Sep	6,880	0	0	0	0
6-Sep	6,276	0	0	0	0
7-Sep	9,296	0	0	0	0
8-Sep	6,276	0	0	0	0
9-Sep	6,247	0	0	0	0
10-Sep	9,740	0	0	0	0
11-Sep	10,638	6,098	0	0	0
12-Sep	10,633	14,424	0	0	0
13-Sep	6,433	14,861	0	0	0
14-Sep	13,826	14,800	0	0	0
15-Sep	6,362	14,920	0	0	0
16-Sep	6,636	14,920	0	0	0
17-Sep	7,208	14,811	0	0	0
18-Sep	7,329	14,828	0	0	0
19-Sep	8,997	7,018	0	0	0
20-Sep	15,795	0	0	0	0
21-Sep	6,243	0	0	0	0
22-Sep	6,194	0	0	0	0
23-Sep	5,587	4,766	0	0	0
24-Sep	5,587	13,934	0	0	0
25-Sep	12,406	14,610	0	0	0
26-Sep	7,893	14,675	0	0	0
27-Sep	11,698	9,433	0	0	0
28-Sep	15,849	0	0	0	0
29-Sep	13,967	5,144	0	0	0
30-Sep	14,571	14,585	0	0	0

From:	Romero, Andrew C, NMENV
To:	Armijo, Karen (CONTR) (Karen.Armijo@nnsa.doe.gov)
Cc:	Beers, Bob; Pullen, Steve, NMENV; Hunter, Michelle, NMENV
Subject:	DP-1132 Condition No. 13 Time Extension
Date:	Wednesday, October 24, 2018 8:14:23 AM

Karen,

On October 15, 2018, the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) received the *Discharge Plan DP-1132, Condition No. 13, Maintenance and Repair.* Condition No. 13 of DP-1132 requires DOE/LANS to maintain the function and structural integrity of the RLWTF at all times except during maintenance and repair. Maintenance and repair required at a unit that could lead to an unauthorized discharge to the environment or pose a threat to human health shall be corrected as soon as possible but no later than 30 days from the date of the observed malfunction.

Pursuant to Condition No. 13, DOE/LANS have identified seven secondary containment alarms - located in vaults and sumps - that are presently malfunctioning. Repair of these seven alarms will not be completed within 30 days from the date of observed malfunction. DOE/LANS estimate that the task of identifying the root cause for each of the malfunctioning alarms will take approximately 30 days, and is requesting 30 additional days to determine the cause. Upon identifying the cause, a schedule for completing the repairs will be submitted to NMED.

NMED hereby approves a longer period, for good cause, for Condition No. 13 as described in the *Discharge Plan DP-1132, Condition No. 13, Maintenance and Repair.*

Approval of this *Discharge Plan DP-1132, Condition No. 13, Maintenance and Repair* does not relieve the Permittee of the responsibility to comply with any other applicable federal, state, and/or local laws and regulations. This approval does not relieve the Permittee of liability should operations associated with this time extension result in actual pollution of ground or surface waters.

Thank you for your cooperation.

Andrew C. Romero
Environmental Scientist, Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
(505) 827-0076

Beers, Bob

From:	Beers, Bob
Sent:	Monday, October 29, 2018 11:51 AM
To:	'Romero, Andrew C, NMENV'
Cc:	Pullen, Steve, NMENV (steve.pullen@state.nm.us); Aragon, Alvin M; Del Signore, Chris; Schwettmann, Bill; Johnson, Randy; Saladen, Michael Thomas; Torres, Enrique; Foley, William Joseph; Armijo, Karen (CONTR) (Karen.Armijo@nnsa.doe.gov)
Subject:	Discharge Permit DP-1132: Condition No. 40, Cessation of Operation of Specific Units

Dear Mr. Romero,

Pursuant to Discharge Permit DP-1132 Condition No. 40, *Cessation of Operation of Specific Units*, on October 28, 2018, the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) permanently ceased operating the following units:

1. The 75,000 gallon concrete influent storage tank (75K tank)**
2. The 100,000 gallon steel influent storage tank (100K tank)
3. The two 26,000 gallon concrete clarifiers located within Building 1 of TA-50
4. The two 25,000 gallon concrete effluent storage tanks (WM2-N, WM2-S)
5. The gravity filter located within Building 1 of TA-50

**Removed from service as an influent storage tank but will remain available for use as emergency storage.

Stabilization plans for the units listed above will be submitted to NMED GWQB by February 25, 2019.

Please let me know if you have questions regarding this information.

Regards,

Bob Beers
Los Alamos National Security, LLC
505-667-7969

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 667-5191/Fax (505) 667-5948

Date: OCT 3 1 2018
Symbol: EPC-DO-18-393
LA-UR: 18-29966
Locates Action No.: U1801172

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

GROUND WATER
OCT 3 1 2018
BUREAU

Subject: **DP-1132, Condition No. 53, Request for an Extension of Time to Complete SET Pipeline Water Tightness Testing**

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Pursuant to permit Condition No. 53, *Extensions of Time,* DOE/LANS may seek an extension of time in which to perform an obligation in Discharge Permit DP-1132, for good cause, by sending a written request to NMED that states the length of the requested extension and describes the basis for the extension. DOE/LANS request an extension of time to complete water tightness testing, required by permit Condition No. 8, of the pipeline connecting the TA-50 RLWTF and the TA-52 Solar Evaporation Tank (SET).

Permit Condition No. 8 requires that DOE/LANS demonstrate that the pipeline conveying treated wastewater from the TA-50 RLWTF to the TA-52 SET—a pipeline without secondary containment—is not leaking. Further, Condition No. 8 stipulates that the tightness test shall be completed by February

Permit Condition No. 8 requires that DOE/LANS demonstrate that the pipeline conveying treated wastewater from the TA-50 RLWTF to the TA-52 SET—a pipeline without secondary containment—is not leaking. Further, Condition No. 8 stipulates that the tightness test shall be completed by February 25, 2019, 180 days after permit issuance. DOE/LANS would like to delay conducting water tightness testing for the following reasons:

1. The RLWTF-SET pipeline was successfully tested for water tightness during construction of the SET in 2012.

2. The SET has yet to be placed into service since constructed.

3. The SET will not be placed into service until the following upgrades are completed:

   - ✓ Pursuant to permit Condition No. 30, a Moisture Monitoring System for the SET must be installed and approved for use by NMED.

   - ✓ The existing leak detection alarm system, situated between the SET's primary and secondary liners, will be rebuilt. The existing leak detection tape will be removed and a sump installed to capture liquid present between the primary and secondary liners. The sump will be alarmed and accessible for sampling and pumping.

   - ✓ The existing primary liner will be replaced with a new liner of equal or better quality.

DOE/LANS estimate the time required to complete the upgrades listed above at approximtely15 months. DOE/LANS request an extension of time to complete the required water tightness testing of the RLWTF-SET pipeline until all listed upgrades are completed.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this request.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager

TVV/KEA/MTS/RSB:jdm

Copy: Shelly Lemon, NMED/SWQB, (E-File)
John E. Kieling, NMED/HWB, (E-File)
Karen E. Armijo, NA-LA, (E-File)
Craig S. Leasure, PADOPS, (E-File)
William R. Mairson, ADESH, (E-File)
Enrique Torres, EPC-DO, (E-File)
William H. Schwettmann, IPM, (E-File)
Raelynn Romero, PM6, (E-File)
Randal S. Johnson, DESHF-TA55, (E-File)
Denise C. Gelston, TA-55-RLW, (E-File)
Alvin M. Aragon, TA-55-RLW, (E-File)
John C. Del Signore, TA-55-RLW, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 667-5491/Fax (505) 667-5948

Date: OCT 3 1 2018
Symbol: EPC-DO-18-366
LA-UR: 18-25542
Locates Action No.: U1801172

GROUND WATER
OCT 3 1 2018
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

Subject: DP-1132, Condition No. 30, Soil Moisture Monitoring System Workplan

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Pursuant to permit Condition No. 30, *Soil Moisture Monitoring System for the SET*, DOE/LANS is required to submit a proposed moisture monitoring system workplan—containing a design and installation schedule—for NMED approval by December 27, 2018. DOE/LANS proposed workplan is provided as Enclosure 1.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this proposed workplan for the SET soil moisture monitoring system.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager

ARG/KEA/MTS/RSB:jdm

Enclosure: (1) Workplan for a Soil Moisture Monitoring System at the SET

Copy: Shelly Lemon, NMED/SWQB, (E-File)
John E. Kieling, NMED/HWB, (E-File)
Jody M. Pugh, NA-LA, (E-File)
Karen E. Armijo, NA-LA, (E-File)
Kristen M. Dors, LASO-MA-LS, (E-File)
Craig S. Leasure, PADOPS, (E-File)
William R. Mairson, ADESH, (E-File)
Enrique Torres, EPC-DO, (E-File)
William H. Schwettmann, IPM, (E-File)
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Randal S. Johnson, DESHF-TA55, (E-File)
Denise C. Gelston, TA-55-RLW, (E-File)
Alvin M. Aragon, TA-55-RLW, (E-File)
John C. Del Signore, TA-55-RLW, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ENCLOSURE 1

Workplan for a Soil Moisture Monitoring System
at the SET

EPC-DO: 18-366

LA-UR-18-25542

Date: OCT 3 1 2018

Workplan for SET Moisture Monitoring System

Introduction

Groundwater Discharge Permit DP-1132 (the Discharge Permit) was issued by the New Mexico Environment Department (NMED) to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) on August 29, 2018, for the discharge of treated radioactive liquid waste from the Technical Area (TA)-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Condition No. 30 of Discharge Permit DP-1132 requires DOE/TNS to submit, within 120 days following the effective date of the permit, a work plan for the installation of a moisture-monitoring system at the TA-52 Solar Evaporation Tank (SET) System. A moisture-monitoring system—consisting of angled boreholes installed beneath the SET—will be capable of measuring changes in soil moisture content indicative of a leak in the SET. The primary objective of the moisture-monitoring system is for early leak detection with a low probability of missing a potential leak. This work plan provides a design and schedule for the installation of eight boreholes beneath the SET for the detection of unauthorized releases of treated effluent. Attachment 1 describes hydrologic modeling that was performed to support the monitoring design. Attachment 2 provides the drilling and completion work plan for the boreholes.

Site Conditions

The SET is an open-topped, subgrade tank with two cells constructed at TA-52 of reinforced-concrete walls and floor. Each cell is 76-m (248-ft) long by 21.3-m (70-ft) wide by 1.2 m (4-ft) deep, and has a capacity of approximately 380,000 gallons. The concrete floor has construction joints of tongue-and-groove design and expansion joints that are gaps between adjacent concrete slabs (Figure 1). The expansion joints are sealed and filled, but are not intended to be water tight. The SET has two synthetic liners (primary and secondary) that are intended to be water tight. The nearby existing utilities (above and below ground) and Puye Road pose constraints on the system design (Figure 2).

The SET was constructed over two layers of compacted fill material (approximately 18 in. total) (Figure 3). The tank bottom is sloped toward the center along its main axis and toward a central sump. The properties of the fill and underlying bedrock units are described in Attachment 1. The uppermost bedrock unit at the site is Unit 3 of the Tshirege Member of the Bandelier Tuff, also called Qbt3. Qbt3 is formed from a series of volcanic ashfall and ash-flow deposits and is approximately 34-m (110-ft) thick at the SET. Fractures, or joints, were formed in the tuff from the shrinkage of the ash-flow tuff as it cooled. Qbt3 is underlain by several other layers of Bandelier Tuff (> 120-m [400-ft]) thick), Tschicoma Dacite and/or Cerros del Rio basalts (>60-m [200-ft] thick), and Puye Formation (>120-m [400-ft]) thick). No perched-intermediate groundwater was encountered when the two closest regional aquifer monitoring wells, R-14 and R-46 were drilled, and none is thought to be present beneath the SET. The regional aquifer is located approximately 400 m [1300 ft] deep beneath the SET.

The SET is approximately 450 m [1500 ft] south of Mortandad Canyon. Fracture characteristics of Qbt3 were measured along the southern face of Mortandad Canyon, including along a section just north of the SET (Wohletz, 2004). The fracture data show a fracture density of 20 to 40 fractures per 30-m (100-ft) distance along the canyon face. At this density, approximately 100 to 200 fractures would be present along the 560-ft length of the SET. Figure 4 is a rose diagram showing that fracture strikes for Qbt3 measured in Mortandad Canyon have a preferred orientation in two directions, a northeast (NE) set at N82E and a northwest (NW) set at N22W. The NE striking fracture set is the dominant set and is N-dipping at 70 ° to 80°. The NW striking set is a secondary set and those fractures are near vertical. Near TA-52, the apertures along the canyon wall were approximately 0.2 to 0.4 cm. Fractures internal to the mesa are likely to have smaller apertures because those along the canyon wall may have widened from weathering. Fracture fill (i.e., fine grained soils) was observed in the upper 10 m. Cooling fractures in underlying Bandelier Tuff units

are present but are oriented differently than the fractures in Qbt3. In addition, such cooling fractures are generally present in the upper Tshirege units of the Bandelier Tuff but do not propagate into the underlying Otowi Member of the Bandelier Tuff.

Although Qbt3 is highly fractured, two studies indicate that spreading of infiltrating pore water through the unsaturated tuffs beneath the Pajarito Plateau does not occur preferentially through fractures, but rather is dominated by flow though the tuff matrix. An injection test was conducted at TA-50 in 1965 in which 265 m^3 (70,000 gal) of water were injected over 89 days into a borehole drilled into unsaturated, fractured Qbt3 (Purtymun et al., 1989). Moisture monitoring was conducted in nearby boreholes at 7, 29, 55, and 89 days after injection started (Figure 5). Purtymun et al. (1989) noted that large-scale moisture measurements showed bulb-shaped growth of the wetting front with some spreading at the Qbt3/Qbt2 interface. A mass balance based on the moisture data accounted for all the injected water.

Robinson et al. (2005) ran numerical simulations of the TA-50 injection test to determine the relevant importance of matrix and fracture flow in the spreading of the wetting front based on the data collected by Purtymun et al. (1989). Four different approaches were used to model the hydrologic characteristics of the two tuff units present at the experimental site, including a single-continuum model (SCM) representing matrix flow only and three different types of matrix-fracture models that capture the hydrologic interaction between the rock matrix and the fractures. The overall conclusion was that the high matrix permeability and capillary suction of the Bandelier tuff units present at TA-50 (Qbt3 and Qbt2) allow water entering fractures to quickly soak into the surrounding porous matrix such that the overall spreading of the wetting front can be modeled as matrix flow. Fractures were predicted to play only a minor role in the spreading of the wetting front because simulations with fracture-dominated flow did not match the wetting front observed during the field test. Figure 5 shows the modeling results for the SCM (matrix only) compared with the field test results. These results indicate that a matrix-dominated, single-continuum flow model captures the growth of the wetting front even at the high water fluxes applied during the 1965 injection test (Robinson et al., 2005). The injection rates applied during the test far exceed potential leakage rates from the SET, and the applicability of the SCM is even greater at lower water fluxes.

Numerical Model to Support Moisture Monitoring System Design

A numerical model was used to help design the number and orientation of the boreholes for the moisture monitoring system to be installed beneath the SET. The model estimates the potential spreading of moisture fronts beneath the SET for a variety of leak scenarios.

Conceptually, the leak scenario for the SET assumes that evaporation may not always dry out all the effluent delivered to the tank (e.g., the daily effluent volume during cooler months or rainy summer days may exceed the daily volumetric evaporation rate). Figure 6 illustrates the conceptual model of the leak scenario. At times, there could be standing water in the tank that could potentially leak through the liners and the concrete floor into the underlying fill and bedrock, as depicted by the small puddles on the tank floor in Figure 6. In this scenario, leaks through the concrete are most likely to occur through the expansion joints, which are the most open potential pathways. Other potential leakage points are through the construction and wall joints, at the sumps, and finally through cracks in the concrete that could form between the engineered joints. If water leaks through the liner and concrete, it could then percolate into the underlying fill and tuff forming subsurface wet zones, as illustrated in Figure 6. Spreading would likely occur in the fill layers before percolating into the tuff because the fill has a higher hydraulic conductivity than the underlying tuff. We note that under typical usage (2000 gal/day), the effluent would add approximately 4 mm of water per day across a single cell of the SET. At this typical rate, most to all of the water would evaporate on a daily basis, depending on the time of year and the daily weather.

Water that spreads beneath the SET along the interface between the fill and the underlying tuff would encounter many fractures. As summarized earlier, an estimated 100 to 200 fractures could be encountered along the full EW length of the SET. Many of these fractures are likely filled with fine-grained soil that would inhibit infiltration directly beneath the SET. The previous infiltration test and modeling of that test indicate that water would likely spread into the tuff matrix between the fractures and subsequently be present throughout the rock matrix (Purtymun et al., 1989; Robinson et al., 2005). If any fracture flow occurs, the wetting front could presumably elongate vertically along the near-vertical fracture sets, but would eventually spread throughout the matrix into the Qbt3 tuff.

A numerical model was developed to support the design of the moisture monitoring system. The model simulates potential leak scenarios to investigate the geometry and spreading of wetting fronts that may develop under different conditions. Proposed scenarios included a year-long continuous leak and a shorter-duration (2-month) leak, different depths (5, 15, and 30 cm) of standing water present in the SET, and different crack sizes (3, 6, and 10 mm) in the concrete through which the water leaks into the underlying fill. Attachment 1 documents the simulations including model set-up, assumed hydrologic properties of the fill and underlying tuff layers, the leak scenarios, and the simulation results.

Figures 7 and 8 illustrate the simulated growth of the wetting front (in terms of volumetric soil moisture content) based on a constant water depth of 5 cm applied to a crack size of 3 mm. Figure 7 shows the wetting front after 6 months with the inset illustrating that 14 m (46 ft) of simulated horizontal spreading occurs in the two thin fill layers located directly beneath the concrete base of the SET. Such horizontal spreading would help with respect to detecting leaks that might occur between moisture monitoring boreholes. Figure 8 illustrates the growth of the wetting front at 1, 3, 6, and 12 months. Following initial horizontal spreading in the fill layer, vertical spreading to a depth of 32 m is predicted over a year. Final flow results after one year for all of the cases are presented in Attachment 1. Those remaining cases show that there is little difference in the depth of the wetting front calculated for continuous standing water if the model assumes the leak occurs through wider cracks or is driven by deeper standing water in the tanks (e.g., the maximum depth of the wetting front increases to 36 m over a year in comparison to the minimum case reaching 32 m). These results indicate that a similar monitoring design should apply for a wide variety of cases. The wetting front is quite steep, and a difference of greater than 0.3 in volumetric soil water content over a distance less than a meter is predicted with the numerical simulations.

Figure 9 illustrates the growth of the wetting front following 2 months of 5-cm deep water entering a 3-mm crack and then followed by 10 months of no additional water. In this case, the wetting front spreads to a similar width as in the continuous head case and propagates to a 16-m depth over a year. The duration of water application causes a significant difference in the depth of the wetting front. This case is meant to simulate a period of low evaporation that might occur seasonally. This cycle (2 months of standing water followed by 10 months of dry conditions) was repeated over a 3-year period, and the depth of the wetting front is predicted to reach 19.5 m at the end of the third year. The wetting front for the shorter-term leak is also quite steep, and a difference of 0.2 in volumetric soil water content over a distance of 2 to 3 meters is predicted.

Figure 10 shows several modeled wetting fronts aligned with the major construction and expansion joints, the center sump, and the outer walls of the SET. The figures show results for the constant-leak and the 2-month-leak wetting fronts at 6 months. The joints in the concrete have 16.7-m (55-ft) spacing. After six months, both of these leak scenarios have spread laterally nearly the distance of the joint spacing. After one year, the constant leak wetting fronts have a projected width of 22 m (72 ft) (Figure 8), and if there were leaks at multiple joints, some overlap of the wetting fronts would occur. After 1 year, the wetting fronts for the discontinuous leak have a projected width of 16 m (52.5 ft) (Figure 9), also nearly equivalent to the spacing of the major joints.

Moisture Monitoring System Design

The proposed subsurface moisture monitoring system is designed primarily to detect leaks that percolate into Qbt3, which lies directly beneath the SET. The design is based on the configuration of the tank, the simulation results, site access, and drilling constraints. The network of moisture monitoring boreholes accounts for spacing of the joints in the concrete floor and the orientation of the fractures in Qbt3.

Eight angled boreholes are proposed for monitoring subsurface moisture beneath the SET (Figure 11). The modeling results shown in Figure 10 indicate that the monitoring network configuration would detect lateral spreading of wetting fronts from leaks at the joints and/or leaks that may occur between the joints in less than a year, based on the simulated continuous and two-month duration leaks. The boreholes will be auger-drilled from the south side of the SET. Overhead power lines, underground utility lines, and steep topography prohibit drilling from the northern side (Figure 2). The center 6 boreholes are located beneath major joints with the center 2 sufficiently close to the sump to detect a sump leak. The easternmost and westernmost boreholes are placed to detect leaks at the outer joints or along the outer walls. Overhead power lines prohibit placing the westernmost borehole near the western end of the SET; therefore, that borehole is oriented from the southeast to the northwest in to gain access.

The proposed borehole design is for eight 45° boreholes, seven of these will be approximately 34.5 m (113 ft) long, drilled to total design depth of approximately 24.4 m (80 ft) below ground surface (bgs). The westernmost borehole is longer and deeper to reach across the width of the SET while avoiding overhead utilities; the design of that borehole will be approximately 36.6-m (120-ft) deep and approximately 51.8-m (170-ft) long. The boreholes will be drilled approximately 3 m (10 ft) from the edge of the SET to avoid hitting the 1.2-m (4-ft) deep tank foundation and the underlying fill. The boreholes will be auger-drilled using approximately a 4.25-in inside-diameter hollow-stem auger that will generate 8- to 9-in. diameter boreholes. Some drifting of the holes from the 45° design angle will occur, but this will have little impact on the performance of the monitoring system. Each borehole will be lined with an approximately 2-in aluminum conduit to be used for neutron logging. No fill will be placed between the conduit and the borehole wall. The conduit will be open at the bottom so that condensation will not collect in the tube.

Figure 12 shows side views of a borehole design angled at 45° from vertical that correspond to seven of the eight boreholes shown in Figure 11. The boreholes span the 21.3-m (70-ft) width of the SET. The predicted depth of the wetting fronts at 1, 3, 6, and 12 months for both the constant leak (Figure 8) and for the discontinuous leak (Figure 9) are superimposed on the borehole profile. The proposed design indicates that the 45° borehole would detect a leak within approximately 6 months for the constant leak even if the leak were to occur at the north side of the SET where the borehole is the deepest. For a discontinuous (2-month) leak, the 45° borehole could detect the leak in the middle of the SET within 6 months and to the northern edge of the SET within approximately 3 years, if a similar 2-month long leak occurs annually. A similar analysis that considered boreholes drilled at 30° from vertical would be substantially less effective at detecting a discontinuous leak at the northern side of the SET than the 45° borehole. Therefore, 45° boreholes are the recommended design.

With respect to monitoring for fracture flow, the fracture study showed that the primary NE-striking fracture set runs almost due east (8° N of E, Figure 4). The proposed 7 south-north (SN) boreholes will be nearly perpendicular to this fracture set and should intersect tens of fractures per borehole. The angled borehole on the western end will intersect fractures from both fracture sets.

Data Collection

The following characterization data will be collected during and soon after drilling of the moisture monitoring boreholes.

- Core will be collected from one of the SN oriented boreholes and analyzed for volumetric soil water content, water potential, and porosity at 5-ft intervals. The volumetric soil water content data will be used to calibrate the neutron probe to field conditions.

- Within seven days of the completion of all the moisture monitoring boreholes, seven of the boreholes will be neutron logged at 5-ft intervals to obtain initial conditions following drilling. The borehole from which core was collected for neutron probe calibration will be logged at 1-ft intervals, with each 5-ft interval corresponding as closely as possible to the sampling depths for accurate calibration. Monitoring will be conducted in accordance with an approved standard operating procedure for measuring subsurface moisture using a neutron probe to ensure repeatability. Monitoring depths will be recorded. Future monitoring will be conducted to ensure that logging data are collected at the same depths each time.

Recommendation of Action Levels

Baseline soil moisture conditions for all the boreholes will be established from initial neutron moisture logging conducted within seven days of completion of the moisture monitoring boreholes. Calibration of the neutron logs to volumetric soil moisture content will be done using core collected at 5-ft intervals from one of the SN oriented boreholes, as described above. All the boreholes will be neutron logged, at 5-ft intervals, two additional times at approximately 30-day intervals to establish baseline conditions. This will provide three sets of logs for each borehole to demonstrate the repeatability and variation in the volumetric moisture content before the SET is used. The initial neutron log run at a 1-ft interval (noted above) for the borehole from which core samples were collected will provide information about spatial variability along the length of a borehole. The three data sets will then be used to demonstrate that the measurements can detect, at a minimum, absolute variations in volumetric soil moisture content within a precision of 2%, as required by Condition No. 30 of the Discharge Permit. The data sets will also be used to establish the action level, which will be proposed to NMED within 90 days following the final construction of the moisture monitoring boreholes, to be used to indicate that elevated moisture has been detected beneath the SET.

Reporting

Per Condition No. 30 (Soil Moisture Monitoring System) of the Discharge Permit, within 90 days following acceptance of the final construction of the moisture monitoring boreholes and prior to the discharge to the SET, the Laboratory will submit the following items to NMED for approval:

- Confirmation of completion of the moisture monitoring borehole installation
- Record drawings of final design of the completed installation
- Reports on the baseline moisture condition and neutron probe calibration. This will include data based on initial neutron logging results for all the boreholes and two additional neutron logging campaigns conducted approximately 30 and 60 days after the initial campaign.
- A proposed action level to be used to indicate that elevated moisture has been detected beneath the SET.

Once the SET is operational, the Laboratory will conduct quarterly soil moisture monitoring and report the results in the quarterly monitoring reports required by Condition No. 24 (Monitoring Reports) of the Discharge Permit. If the action level is exceeded, Condition No. 31 (Soil Moisture Monitoring System Exceedance) will trigger corrective actions as outlined in the Discharge Permit.

Schedule

The following schedule is based on the requirements in Condition No. 30 in the Discharge Permit.

Activity Duration	Cumulative Days Following NMED Approval of Work Plan	Activity
0	0	NMED approval of SET Moisture Monitoring System Workplan
180	180	Begin installation of moisture monitoring system boreholes
60	240**	Completion of moisture monitoring boreholes
7	247	LOG 1: Initial neutron logging of all moisture monitoring boreholes within 7 days of borehole field completion.
30	277	LOG 2: 2nd neutron logging of all moisture monitoring boreholes 30 days following initial logging.
30	307	LOG 3: 3rd neutron logging of all moisture monitoring boreholes 30 days following initial logging.
**90 days from borehole completion (240+90=330)	330	Submittal to NMED of a moisture monitoring system completion report containing (1) confirmation of completion, (2) record drawings, (3) baseline moisture condition & neutron probe calibration, and (4) proposed action level.

Upon approval or approval with conditions by NMED of the completed installation and soil moisture action level, discharge to the SET can commence. LANL will perform quarterly soil moisture monitoring (Condition No. 30) and provide this information in quarterly reports (Condition No. 24).

References

NMED, 2018. "Ground Water Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory" issued to the US DOE and LANS on August 29, 2018.

Purtymun, W.D., E.A. Enyart, and S.G. McLin, 1989. "Hydrologic Characteristics of the Bandelier Tuff as Determined through an Injection Well System, Los Alamos National Laboratory Manuscript LA-11511-MS.

Robinson, McLin and Viswanathan, 2005. "Hydrologic Behavior of Unsaturated, Fractured Tuff: Interpretation and Modeling of a Wellbore Injection Test," Vadose Zone Journal, 4: 694-707.

Wohletz, 2004, "Tuff Fracture Characterization along Mortandad Canyon between OU-1114 and OU-1129," Los Alamos National Laboratory Report LA-UR-04-8337.

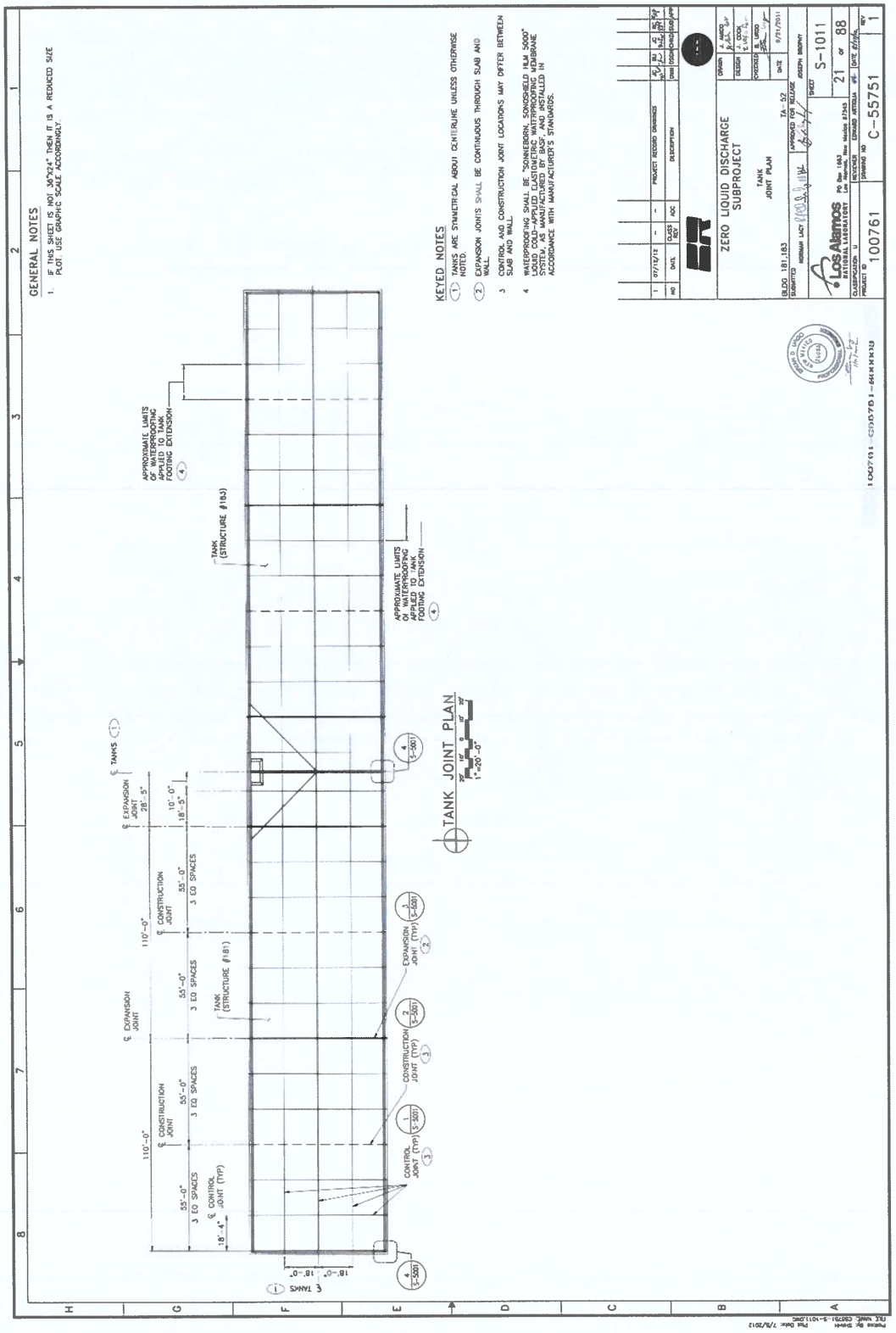


Figure 1. SET Concrete Floor Joint Plan (plan view).

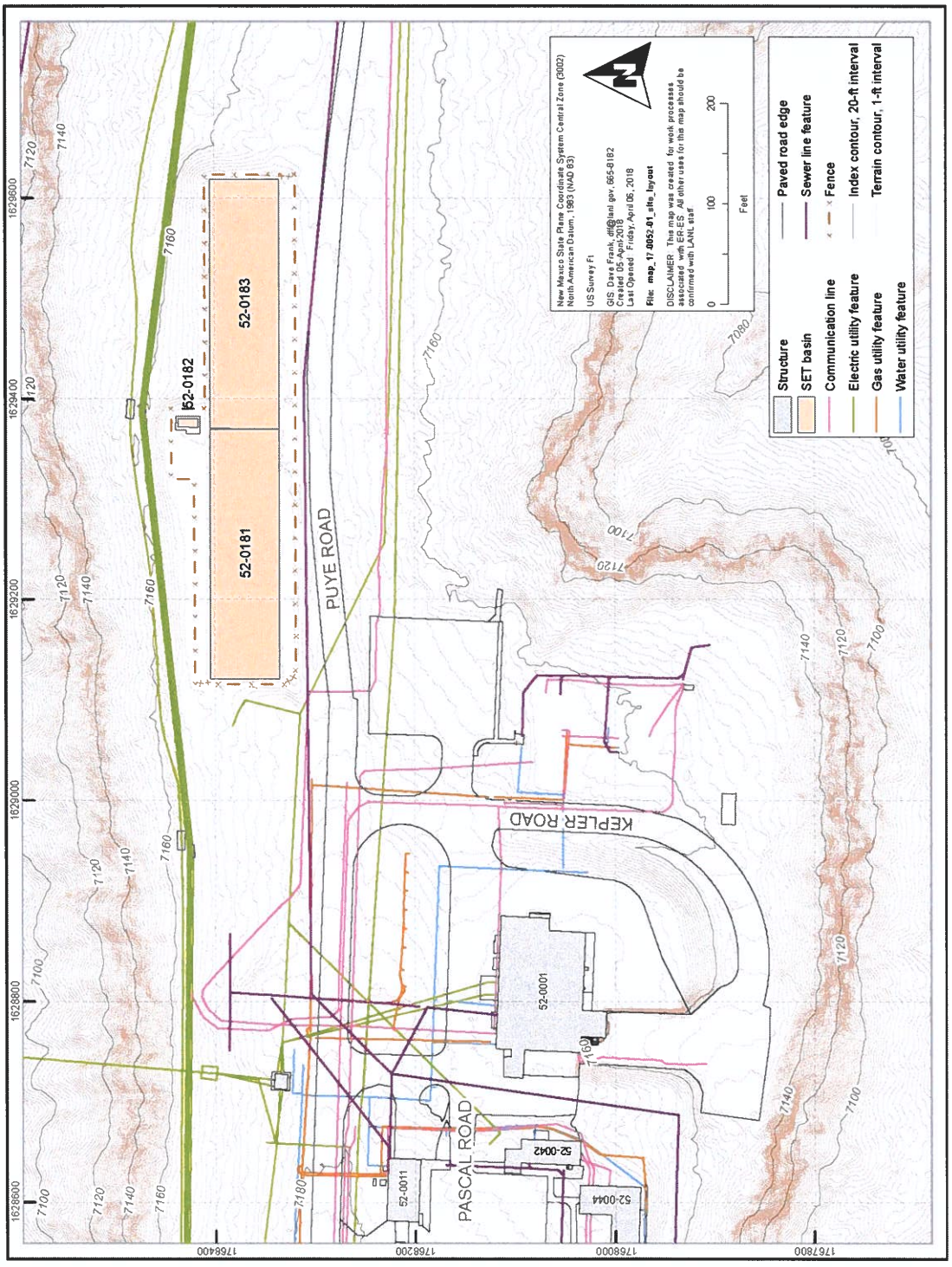


Figure 2. Map of TA-52 SET and nearby utilities, road, and fencing

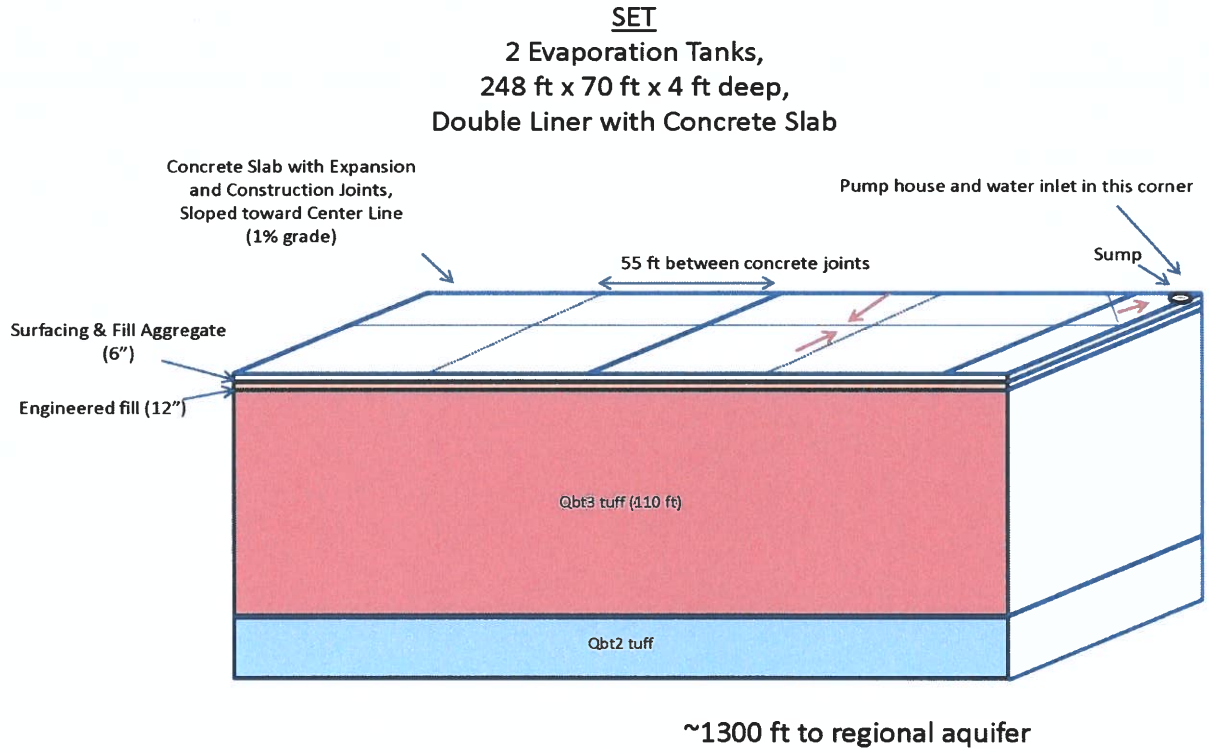


Figure 3. SET single cell with underlying fill materials and geologic material (not to scale)

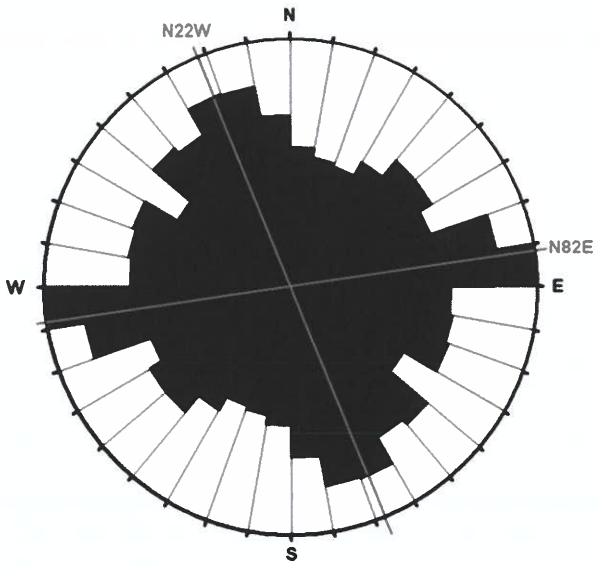


Figure 4. Fracture strike of Qbt3 measured along canyon wall in Mortandad Canyon, including an area north of the SET (from Wohletz, 2004)

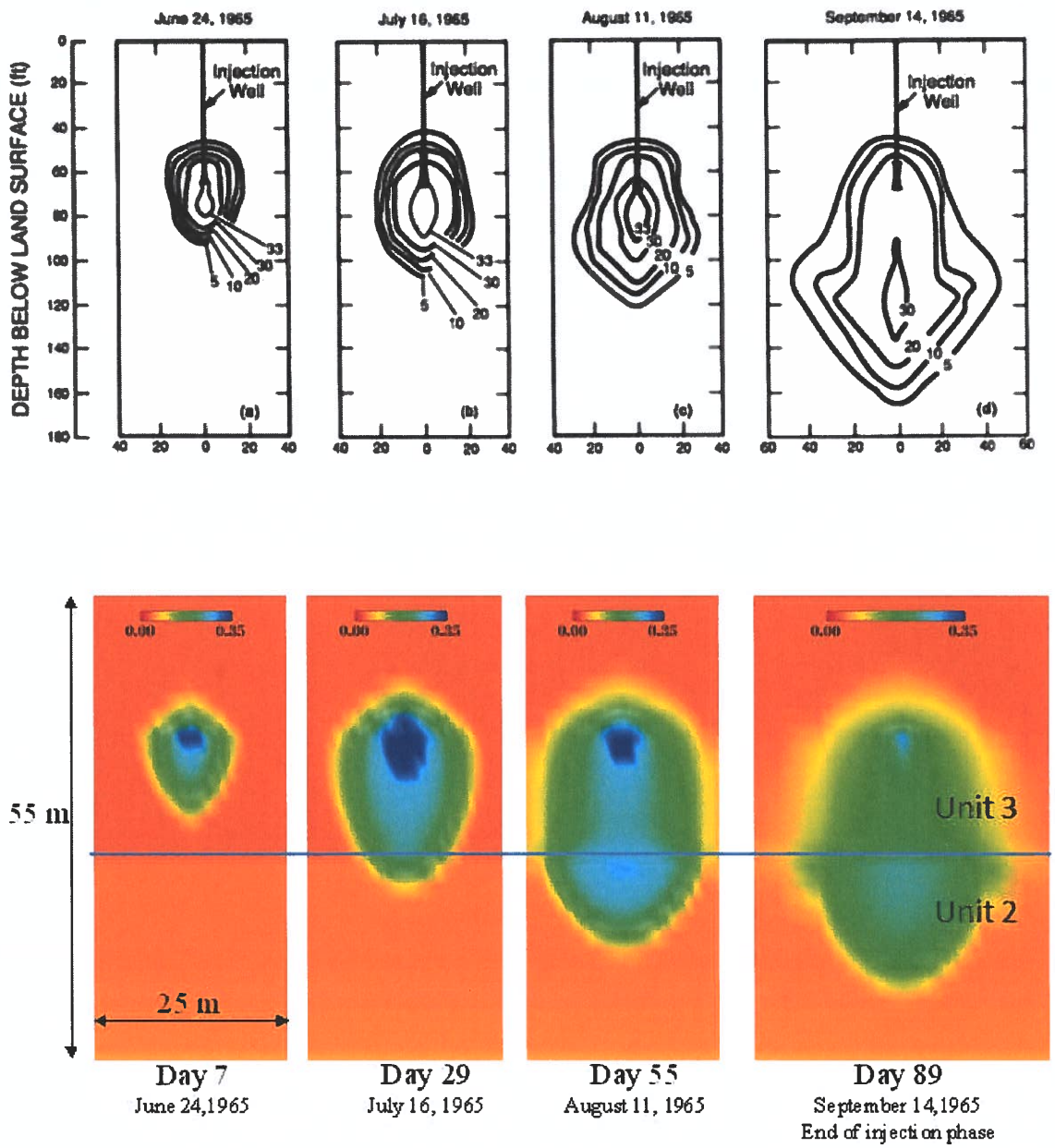
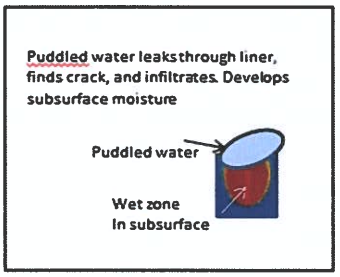


Figure 5. Spreading of wetting front during a 1965 test, (a) field data (Purtymun et al., 1989) and (b) simulation results assuming matrix-dominated flow (Robinson et al., 2005)

Modeled Leak Scenarios

- Period when water disposal > evaporation created puddled water
- Double liner leaks
- Leak occurs at concrete joints, along floor/wall contact, and at sump
- Leak occurs with consistent head for 1 yr or for a limited duration



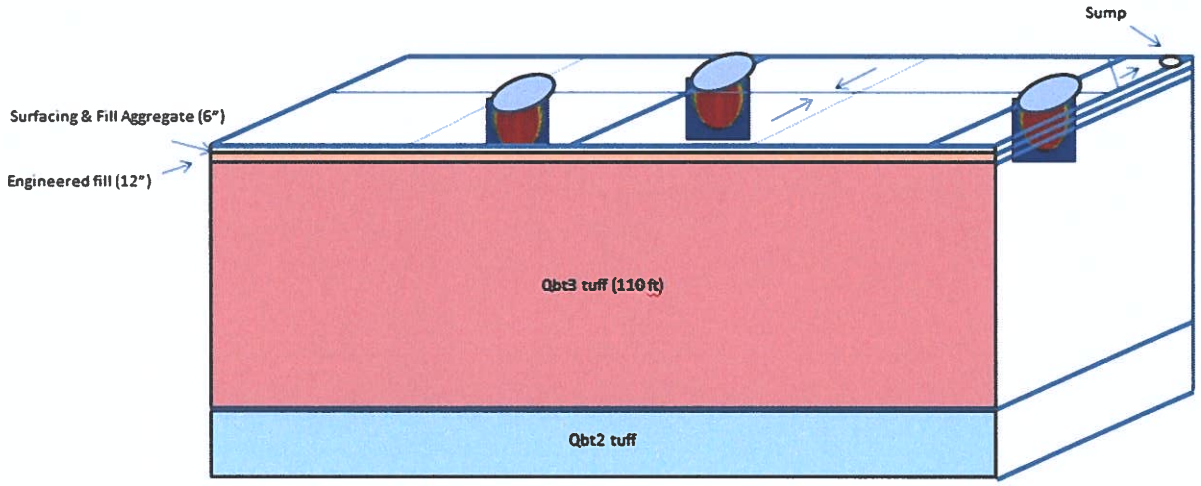


Figure 6. Conceptual model of leak scenario

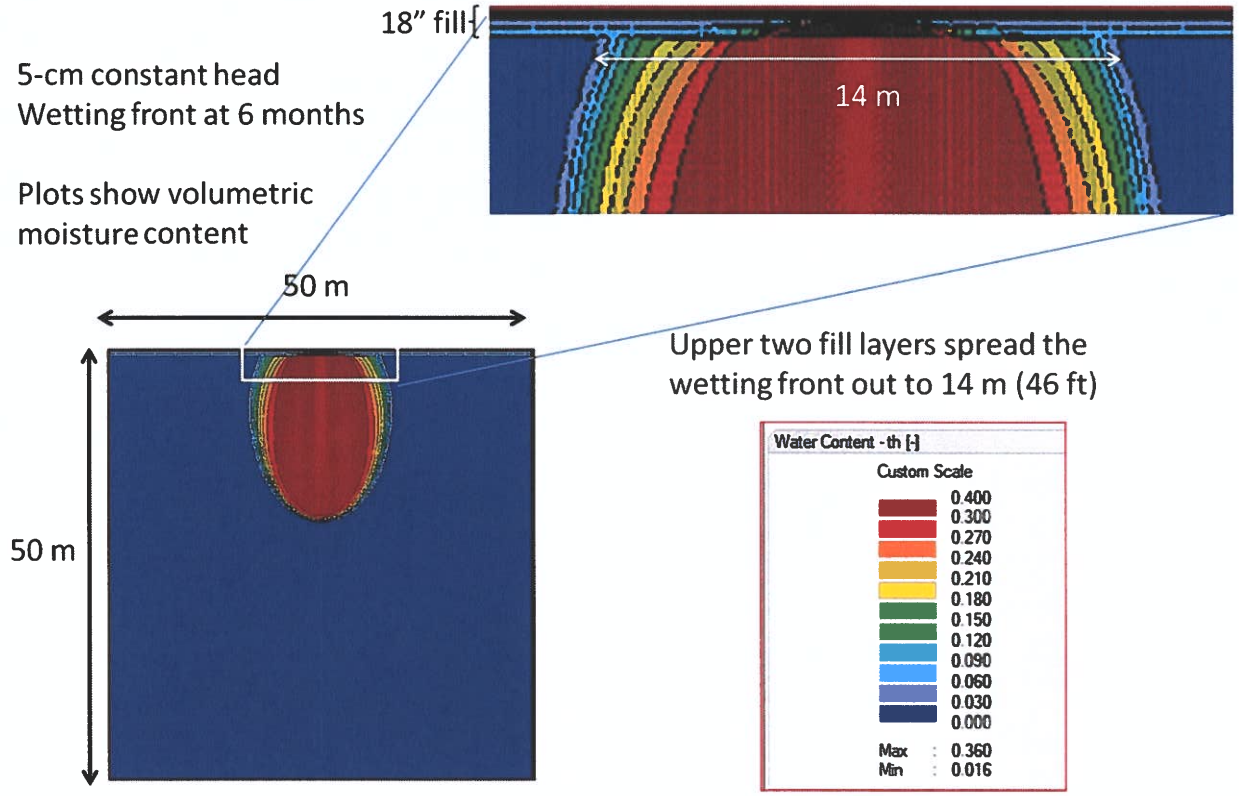


Figure 7. Side view of wetting front after 6-months of 5-cm constant-head leak applied to a 3-mm crack. Inset shows lateral spreading that occurs in upper two fill layers.

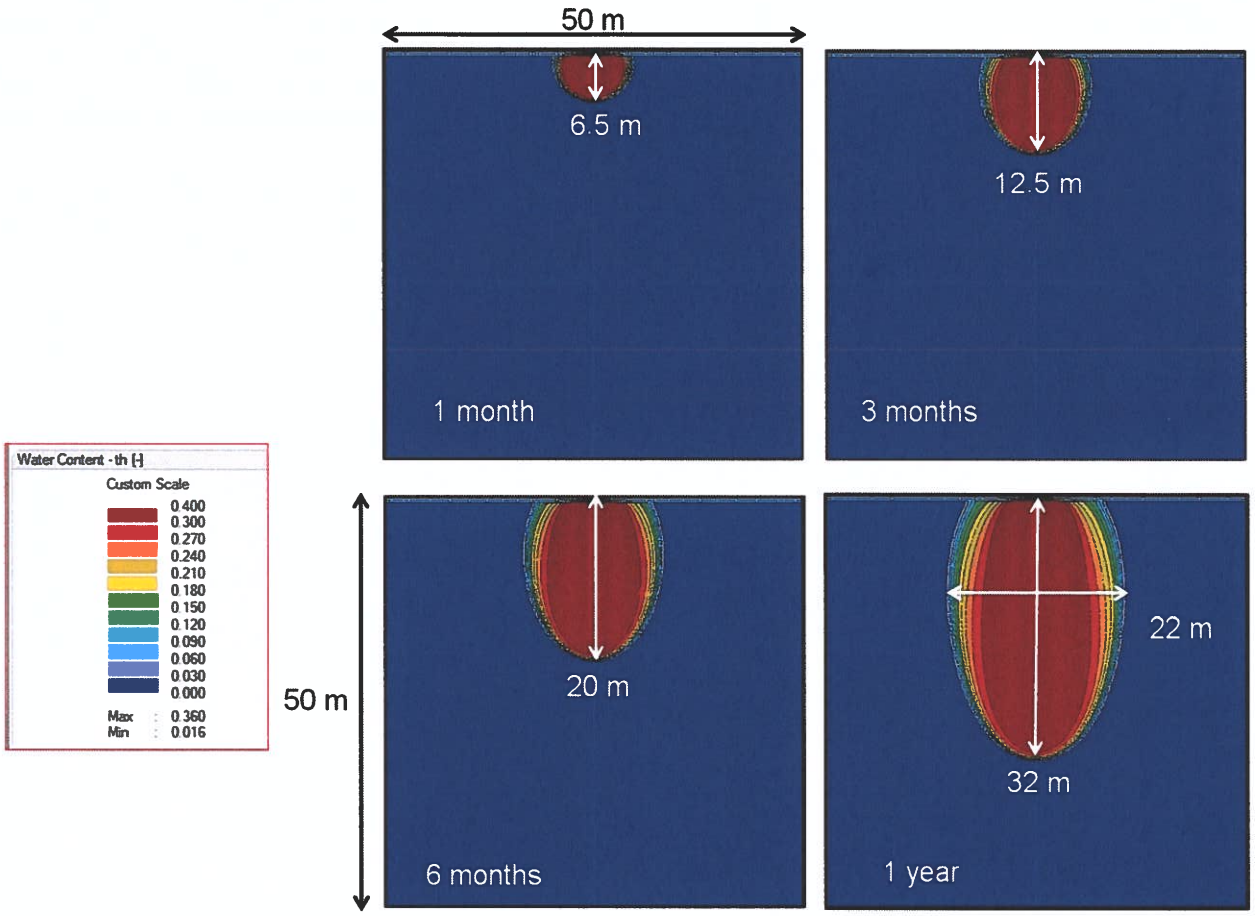


Figure 8. Side view of wetting front after 1 month, 3 months, 6 months, and 1 year following a 5-cm, constant-head leak applied to a 3-mm crack.

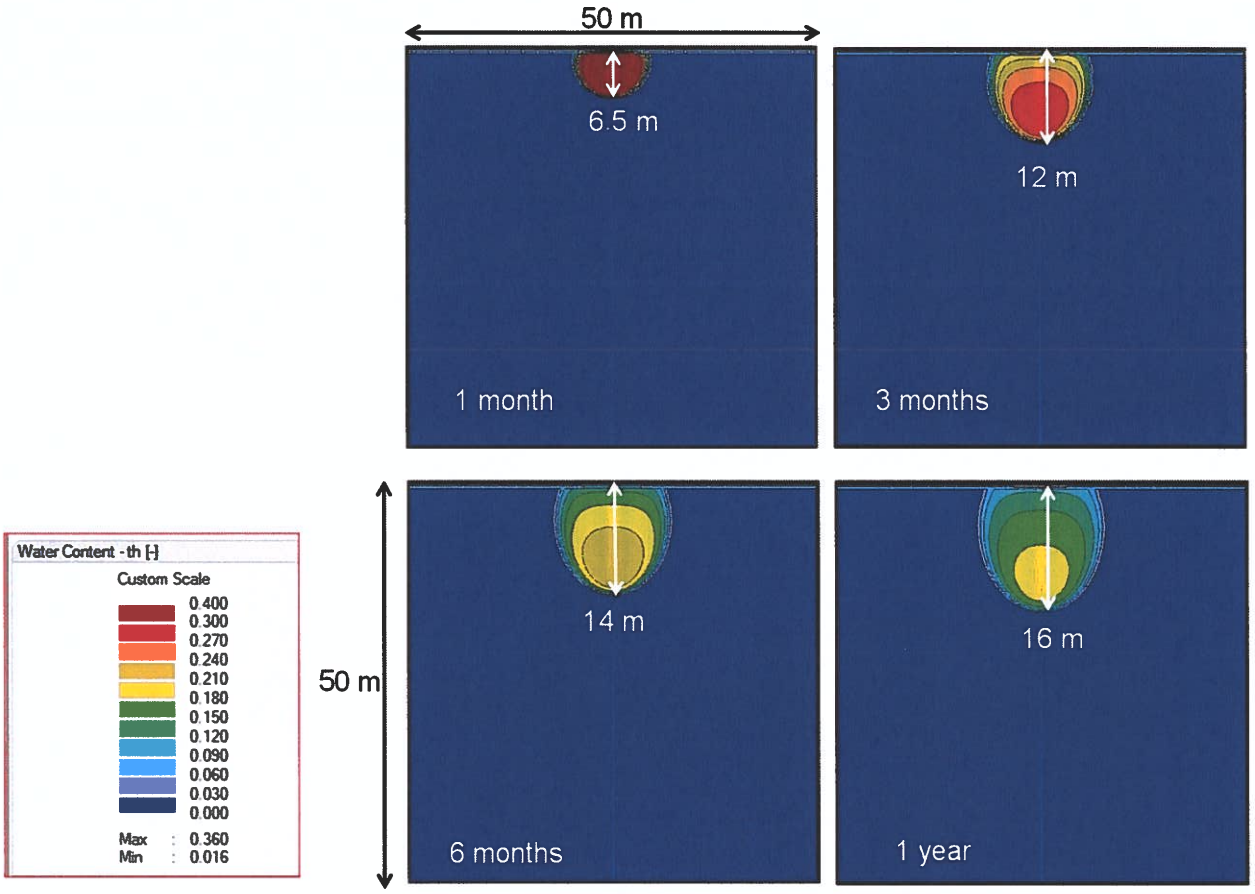


Figure 9. Side view of wetting front after 1 month, 3 months, 6 months, and 1 year following a 5-cm head leak applied for 2 months to a 3-mm crack, followed by 10 months of dry conditions.

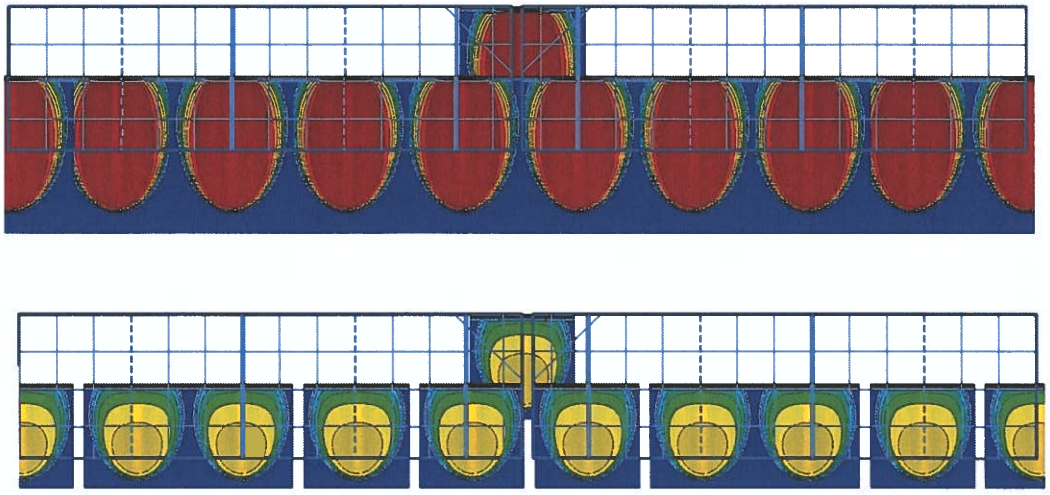


Figure 10. Wetting front lateral spread after 6 months assuming leaks at sumps and joints in concrete (a) with constant head of 5 cm and (b) with 2-month head of 5 cm. Tank joints shown in aerial view; wetting fronts shown in side view.

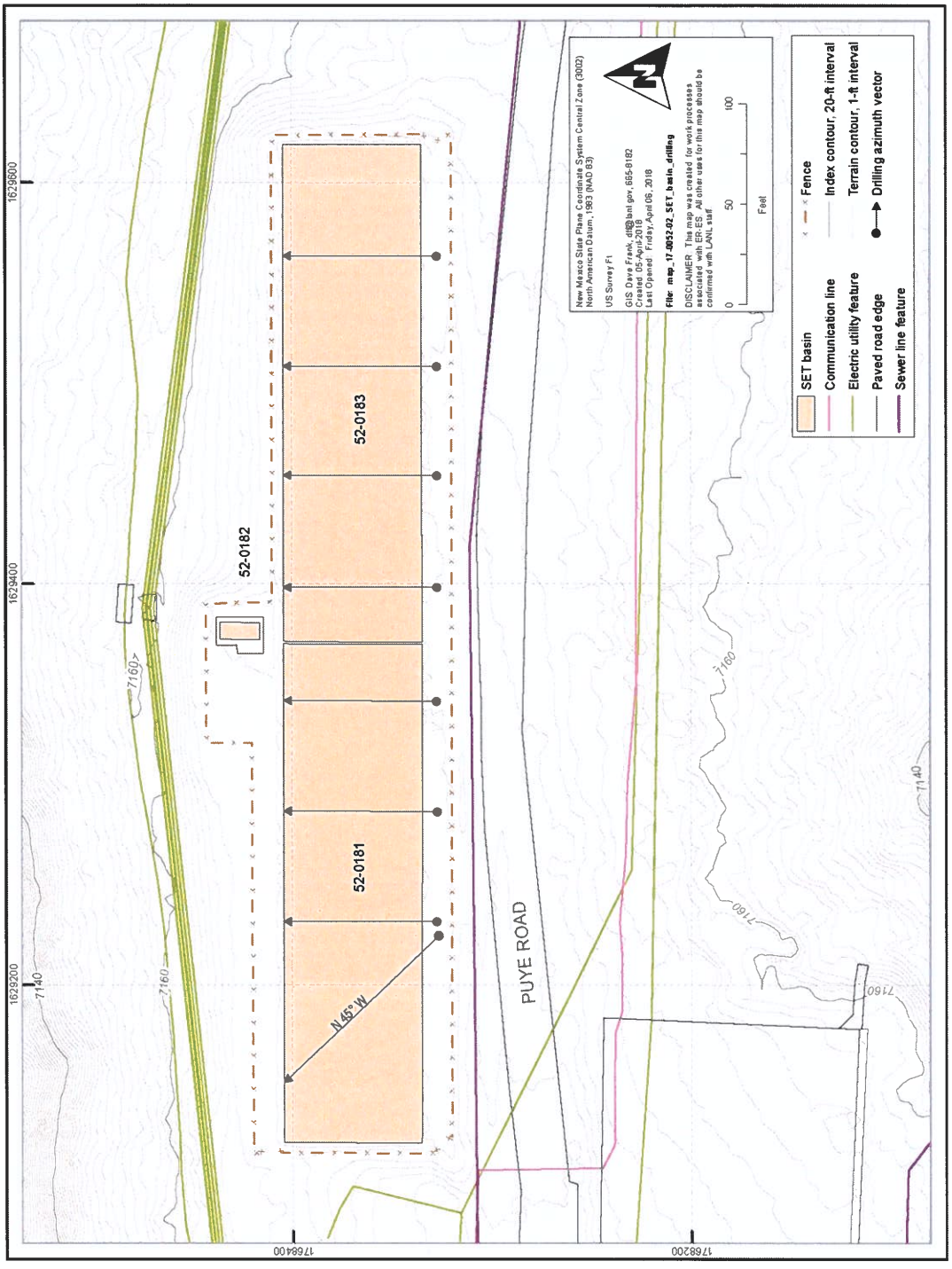


Figure 11. Plan view of proposed monitoring borehole (black arrowed lines) placement. Westernmost borehole drilled at angle to avoid overhead power lines.

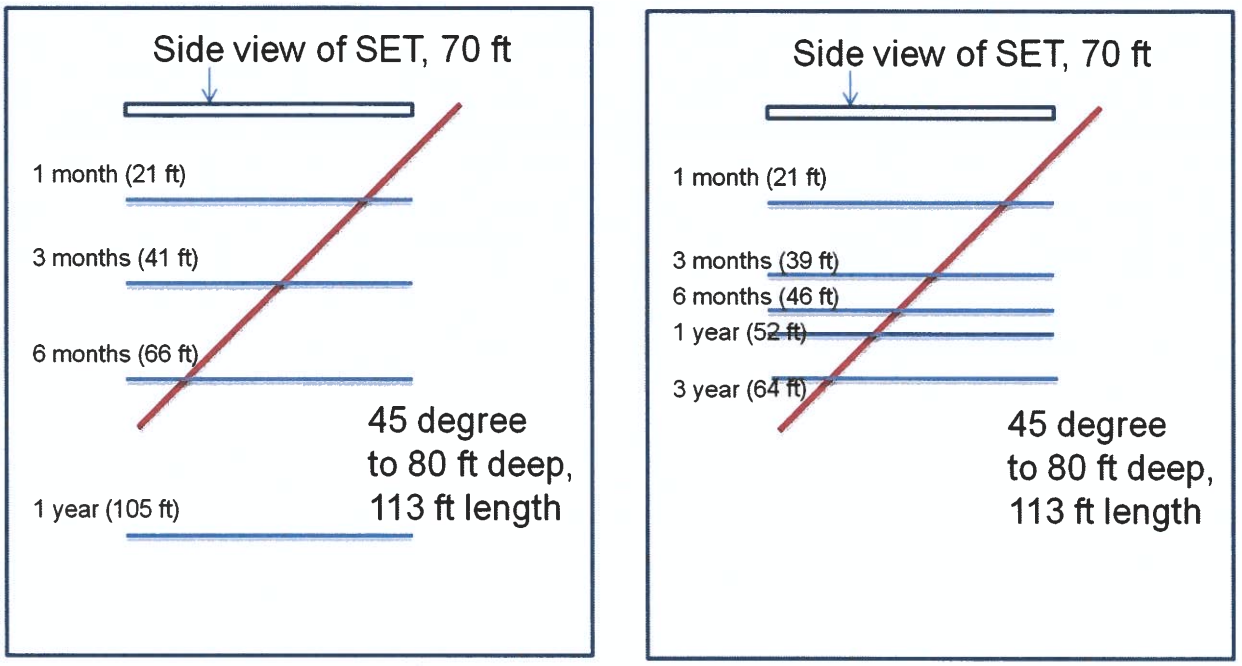


Figure 12. Side views of potential design for 45° angled boreholes showing depth of wetting front vs. time for (a) constant head condition and (b) discontinuous head (2-months/year)

Attachment 1 – Modeling to Support the SET Moisture Monitoring System Design

Introduction

Attachment 1 describes details of the hydrologic modeling that was conducted to support the moisture monitoring system design. Hydrus-2D (H2D) (Šimùnek et al., 1999) was selected for the hydrologic modeling because of its widespread use and acceptance, and ease of use. In addition, H2D has a built-in graphical user interface that facilitates presentation of model results.

SET Configuration

The general stratigraphic layering beneath the SET is shown in Figure 1-1. The top layer is the concrete slab of the SET with expansion joints. The next layer is a 15-cm (6-in) thick layer of surfacing and fill aggregate. Beneath that is a 30-cm (12-in) thick layer of engineered fill. Beneath that is Unit 3 of the Tshirege Member of the Bandelier Tuff (Qbt3), which has a thickness of 33.5 m (110 ft). Unit 2 (Qbt2) is beneath Qbt3; Qbt2 extends beyond the bottom of the model domain but is also below the design depth of the moisture monitoring boreholes.

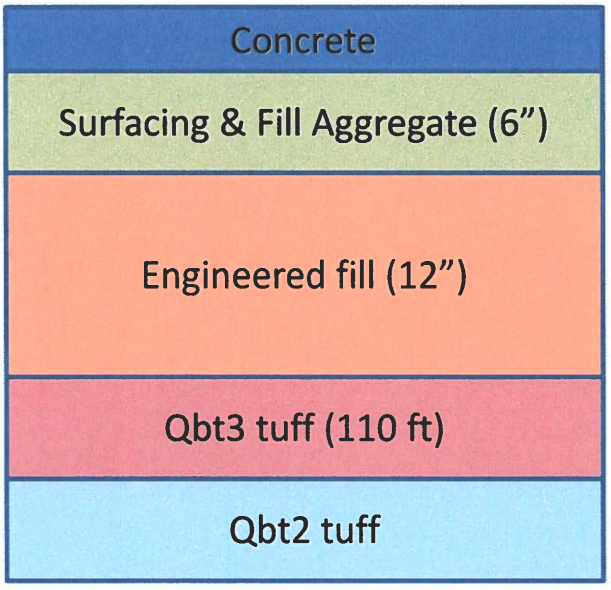


Figure 1-1. Profile view of the modeled layers beneath the SET (not to scale).

Figure 1-2 shows a 3D schematic diagram of one cell of the two-cell SET. The concrete floor of the SET is sloped such that water will flow toward the center line of the long axis of each cell. The center line of each SET cell is flat, and water will not drain along the center line unless enough water pools, in which case it will drain into the sump, which is a low point in each cell, as shown in Figure 1-2.

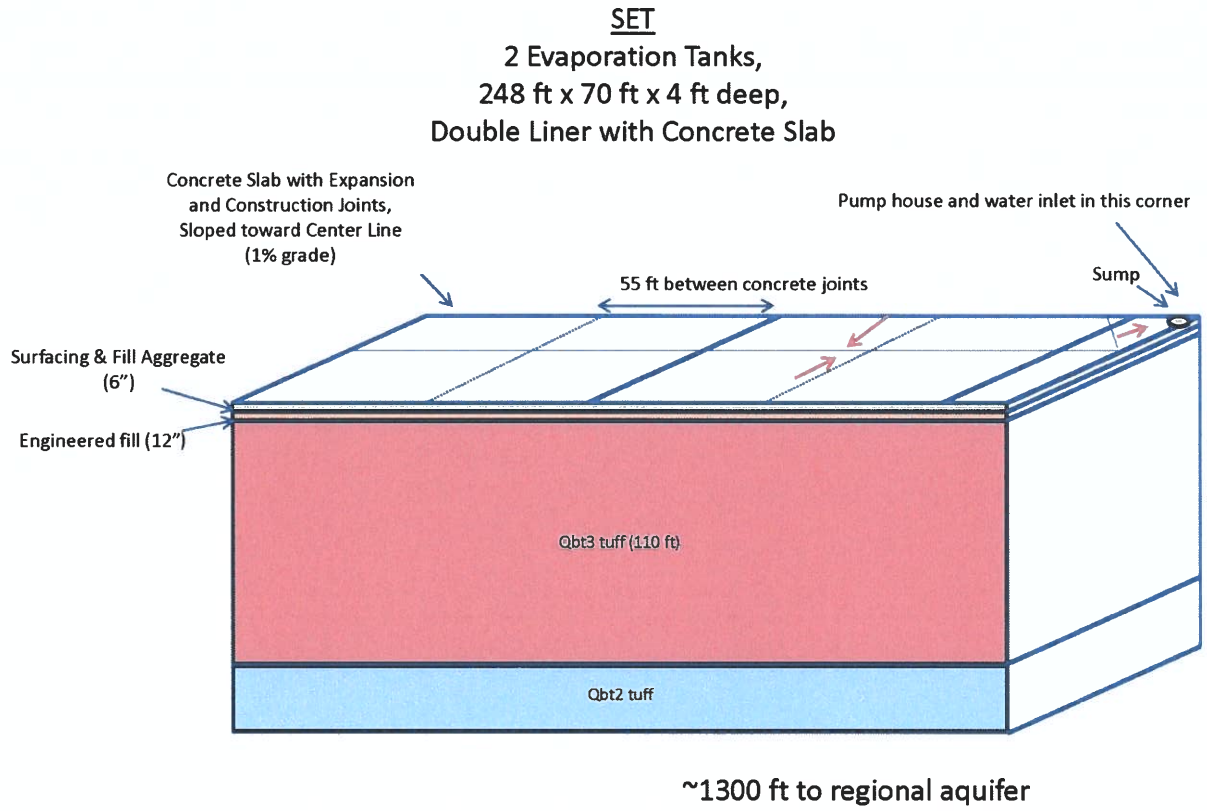


Figure 1-2. Schematic 3D diagram of one cell of the SET showing dimensions and general drainage directions (pink arrows).

Conceptual Model of Leak Scenario

There is a double-liner system overlying the concrete slab floor of the SET, with a leak detection system to detect moisture buildup between the two layers of the liner system. If holes were to develop in both the primary and secondary liners, water could potentially seep through the holes, down to the concrete slab and move horizontally to either an expansion joint or a crack, and then move vertically through the concrete slab and into the 400-m (1300-ft) thick unsaturated zone beneath the SET.

Model Setup

This section describes the H2D model setup used for the simulations including model geometry, hydraulic properties, and scenarios with varying crack sizes and water heads.

Model Geometry

Two-dimensional (2D) simulations were run to represent an east-west slice at any given location within the SET, with an expansion joint or crack located in the center of the model domain. The vertical joint or crack runs perpendicular to the 2D plane (i.e. into the page/screen). The model domain is 50 m (164 ft) wide by 50 m deep.

Vertical spacing of the nodes was set to between 5 and 15 cm (2 and 6 in), and horizontal spacing was highly variable in order to capture the resolution needed for a 3-mm (0.12 in) wide crack, while using wider spacings away from the crack. Horizontal nodal spacing is shown in Figure 1-3 and ranges from 70 cm (28 in) on the model edges, to 1 mm (0.04 in) at the model domain center, which represents the location of a simulated crack.

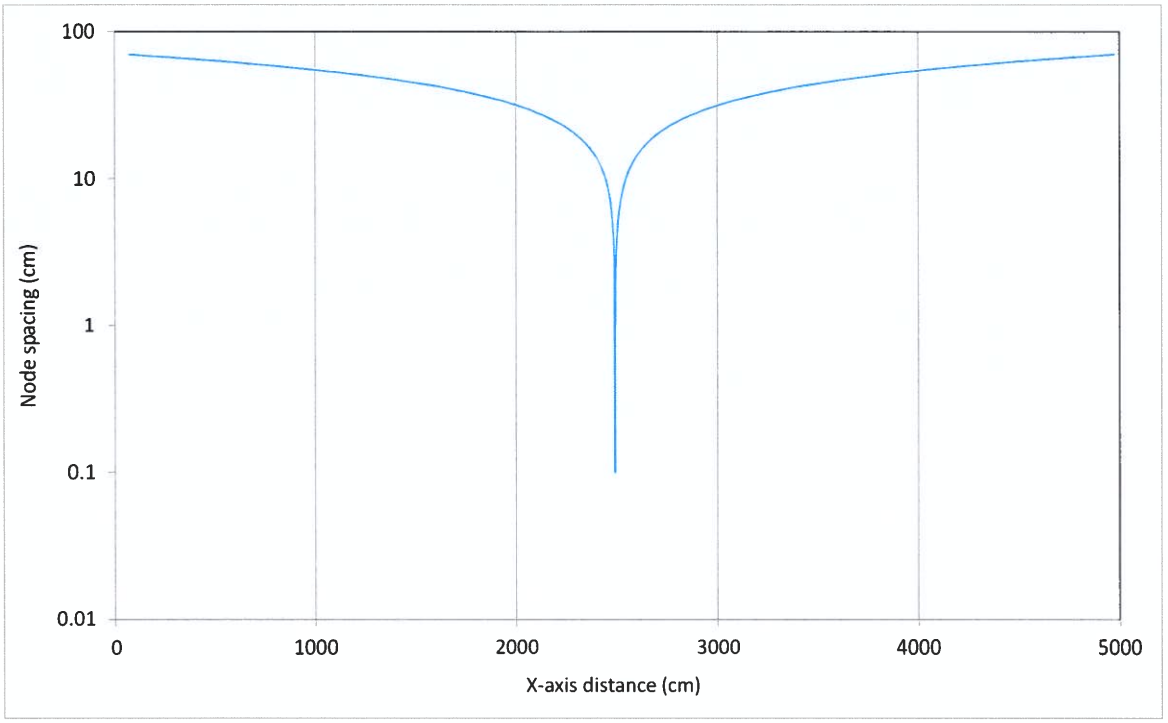


Figure 1-3. Horizontal nodal spacing.

Hydraulic Properties

Hydraulic properties for Qbt2 and Qbt3 are thoroughly studied and well-documented. Properties for these two units were taken from Springer (2005, Tables 6 and 7 for TA-21).

For the fill layers, sieve size data obtained from the SET design document were used to determine particle size distribution, and therefore, textural classification of the fill layer. The H2D pull-down menu was used to assign properties for each classification. For the uppermost fill layer (surfacing and fill aggregate), sieve size data indicate this layer is a sand using the U.S. Dept. of Agriculture soil textural triangle (http://upload.wikimedia.org/wikipedia/commons/6/65/SoilTextureTriangle.jpg). For the next layer (engineered fill), sieve size data indicate this layer is a sandy loam.

All hydraulic properties used in the H2D simulations are summarized in Table 1-1. The van Genuchten (1980) model for unsaturated soils was used with H2D.

Initial Conditions

The initial moisture conditions of all grids within the model domain were set to -70 m (~-7 bar) tension, which is consistent with other modeling studies of the area (i.e., Levitt, 2011).

Table 1-1. Summary of Hydraulic Properties used in the H2D Simulations.

Property abbrev.	**Sand***	**Sandy Loam***	**Qbt2****	**Qbt3****
Ksat (log cm/s)			-4.33	-4.18
Ksat (cm/s)			4.7E-05	6.6E-05
Ksat (cm/d)	712.8	106.1	4.04	5.71
alpha (log 1/cm)			-2.51	-2.24
alpha (1/cm)	0.145	0.075	0.00309	0.00575
n	2.68	1.89	2.16	2.16
ThetaSat (cm^3/cm^3)	0.43	0.41	0.33	0.36
ThetaRes (cm^3/cm^3)	0.045	0.065	0.008	0.011

Source:
*Properties for sand from H2D pull-down menu
**Hydraulic properties from Springer et al., 2005 (VZJ)
Qbt3: Table 6, properties for TA-21
Qbt2: Table 7, properties for TA-21

Property abbrev.	**Property**
Ksat	Saturated hydraulic conductivity
Alpha	van Genuchten alpha
N	van Genuchten n
ThetaSat	Saturated water content
ThetaRes	Residual water content

A profile view of the model node spacing and locations of materials is shown in Figure 1-4.

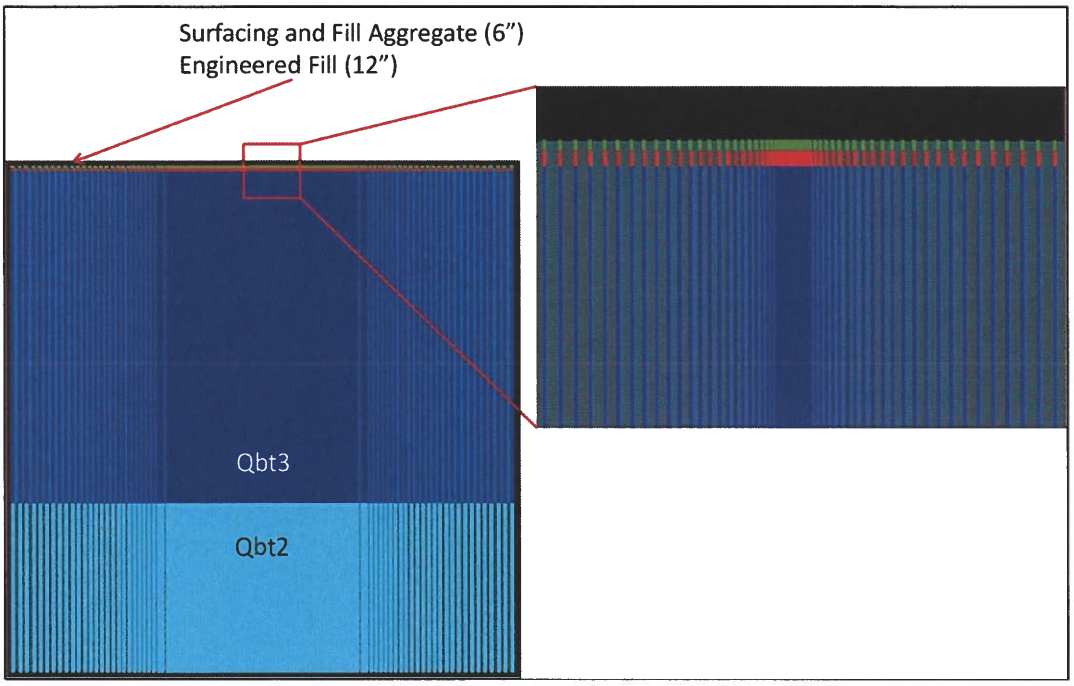


Figure 1-4. Profile view of model node spacing and materials.

Boundary Conditions

The bottom and sides of the model domain are no flow boundaries. The top is also a no flow boundary, with the exception of the expansion joint (or crack), at which a constant-head boundary condition was applied to represent a continuous leak occurring at the crack.

Scenarios

Model simulations included various scenarios that investigated the effects of crack size and height of water head (ponding depth), on the flow of water beneath the SET. In addition, the effects of a year-long continuous leak versus a shorter-duration, two-month leak were simulated.

Three sets of conditions were investigated in the simulations (Table 1-2):

1) Crack sizes of 3, 6, and 10 mm (0.12, 0.24, and 0.39 in) width, all with a ponding depth of 15 cm (6 in.);

2) Ponding depths of 5, 15, and 30 cm (2, 6, and 12 in), all with a 3 mm (0.12 in) wide crack: and

3) Year-long vs 2-month leak (followed by 10 months of redistribution) for a 3-mm (0.12-in) crack size and 5 cm (2 in) pond depth.

Model results

All model scenarios are summarized in Table 1-2, along with results for the amount of water that leaked into the subsurface along a 21-m (70-ft) long crack (in L/yr and gal/yr) and for the depth of the wetting front (in m) below ground surface after one year.

Table 1-2. Summary of H2D Simulations

	Simulation ID					
	Set21	**Set22**	**Set23**	**Set24**	**Set25**	**Set26**
Simulation time (months)	12	12	12	12	12	12
Leak time (months)	12	2	12	12	12	12
Crack width (mm)	3	3	3	3	6	10
Pond depth (cm)	5	5	15	30	15	15
Wetting front depth (m)	32	16	35.5	39	35.5	36
Water leaked through 21-m long crack (L/yr)	3.23E+06	5.58E+05	3.90E+06	4.75E+06	3.92E+06	3.93E+06
Water leaked through 70-ft long crack (gal/yr)	8.53E+05	1.47E+05	1.03E+06	1.25E+06	1.03E+06	1.04E+06

Figure 1-5 shows the water content profiles for each of the six simulations after one year. Despite the differences in crack sizes and hydraulic heads, the results are quite similar for all five scenarios that leak continuously for one year. For these five scenarios, a wetting front reaches a depth of between 32 and 39 m (105 to 128 ft) below ground surface after one year. For the scenario that leaked for two months followed by 10 months of redistribution, the wetting front reached a depth of 16 m (52 ft) below ground surface.

Finally, simulation Set22 was extended to look at the wetting front propagation assuming a 2-month leak occurred followed by 10 months of redistribution each year for a 3-year period, rather than over a single year. Figure 1-6 shows the extents of the wetting fronts after one, two, and three years. The wetting front reaches a depth of 19.5 m (64 ft) below ground surface after three years.

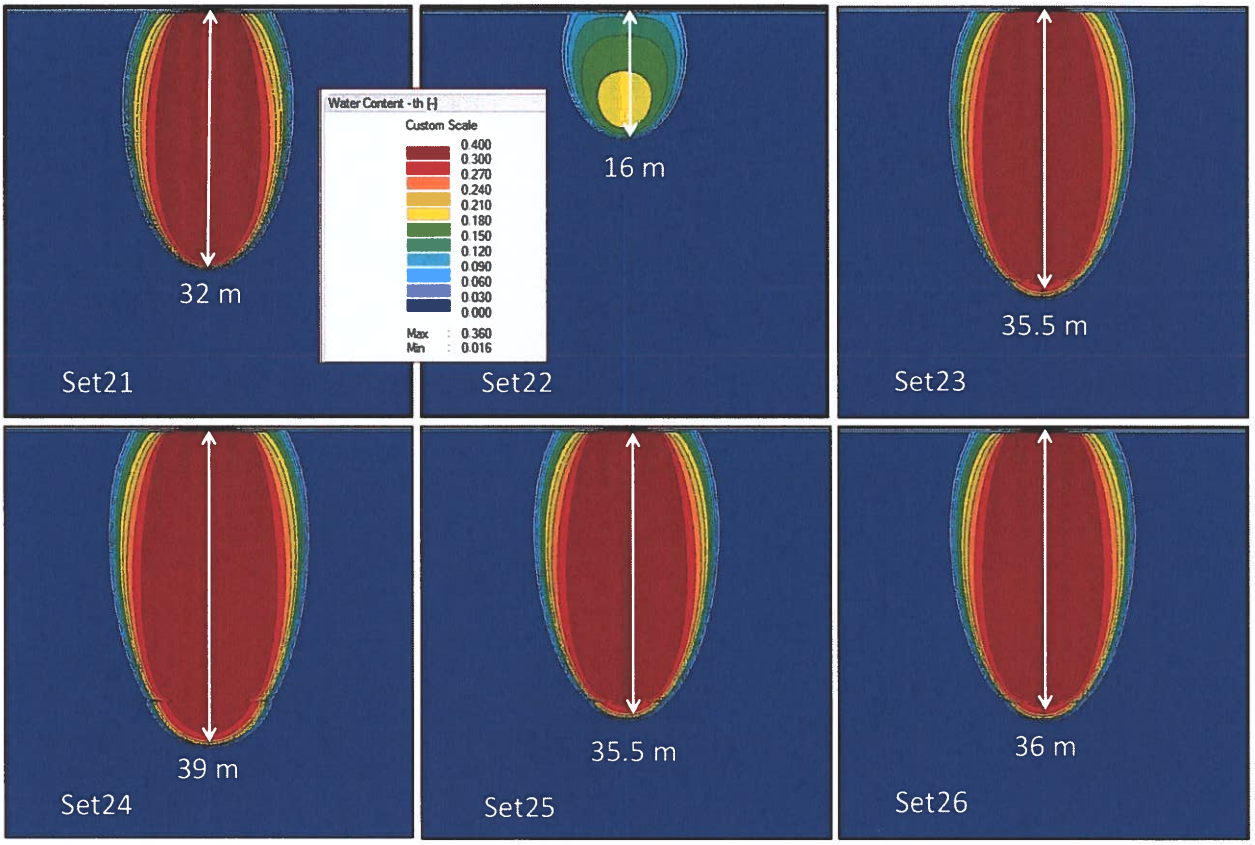


Figure 1-5. Water content profiles after one year for the six simulations.

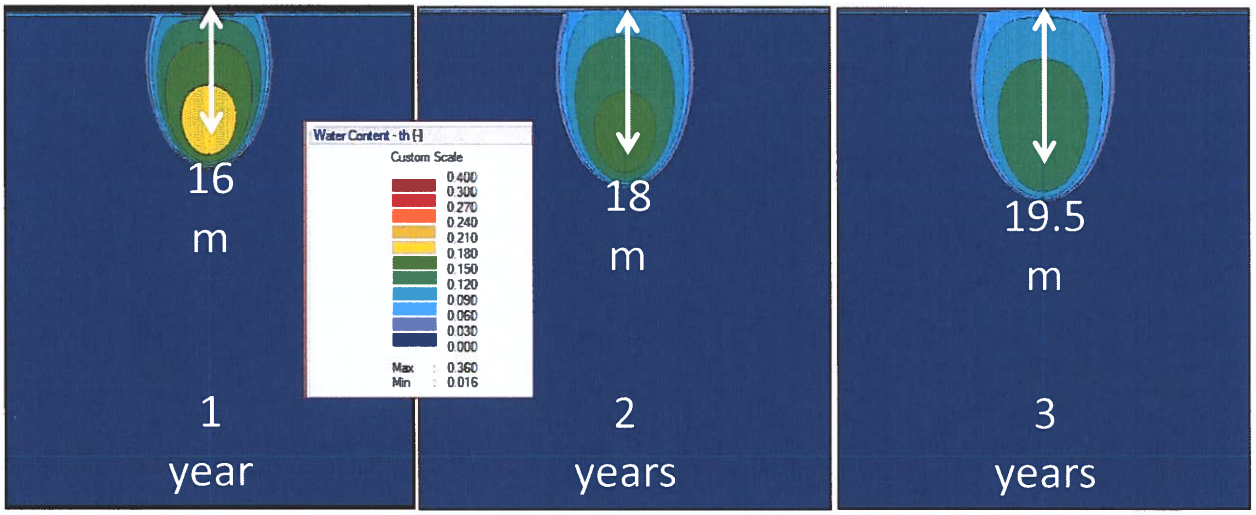


Figure 1-6. Water content profiles after one, two and three years for the discontinuous head simulation.

References

Levitt, D.G., 2011. Modeling the Movement of Transient Moisture through Disposal Units at Los Alamos National Laboratory Technical Area 54, Area G. Los Alamos National Laboratory Report LA-UR-11-05424.

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van Genuchten, M. Th., 1980. A Closed-form Equation for Predicting the Hydraulic Conductivity of Unsaturated Soils. Soil Science Society of America Journal 44: 892-898.

Attachment 2 - Drilling Work Plan for SET Moisture Monitoring System

Primary Purpose	In accordance with Condition No. 30 of the New Mexico Environment Department's (NMED's) Discharge Permit DP-1132, dated August 29, 2018 (NMED, 2018), Los Alamos National Laboratory (LANL or the Laboratory) proposes the following drilling work plan for the installation of a moisture monitoring system at the TA-52 Solar Evaporation Tank (SET). As stated in the Discharge Permit, a moisture monitoring system—consisting of directional boreholes under the SET—will provide the capability to measure small changes in soil moisture content indicative of a leak in the SET. The primary objective of the moisture monitoring system is for early leak detection—with a low probability of missing a potential leak—through periodic neutron logging of boreholes beneath the SET. This drilling work plan details the drilling and borehole completion information. Eight auger-drilled (angled) boreholes are proposed for the monitoring moisture system beneath the SET (Figure 2-1). The boreholes will be drilled from the south side of the SET. The center six boreholes are located beneath major joints in the concrete floor with the center two boreholes being sufficiently close to the sumps to detect sump leaks. The easternmost and westernmost boreholes are placed to detect leaks at the outer joints or along the outer walls. Overhead power lines prohibit placing the westernmost borehole near the western end of the SET; therefore, that borehole is oriented from the southeast to the northwest to gain access. The proposed borehole design is for eight boreholes directionally drilled at approximately 45°, seven of these will be drilled perpendicular to the axis of the SET and be approximately 34.5 m (113 ft) long, drilled to total design depths of approximately 24.4 m (80 ft) below ground surface. The westernmost borehole is longer and deeper to reach across the width of the SET; the design of that borehole will be approximately 36.6-m (120-ft) deep and 51.8-m (170-ft) long. The starting locations of the boreholes will be drilled approximately 3 m (10 ft) from the edge of the SET to avoid hitting the 1.2-m (4-ft) deep tank foundation and underlying fill.
Drilling Approach	The proposed drilling approach for the moisture monitoring boreholes will be hollow stem auger drilling (HSA) method. The boreholes will be auger-drilled using a 4.25 in. inside-diameter HSA that will drill 8 to 9 in. diameter boreholes. Core samples will be collected at 5-ft intervals from one of the SN oriented [34.5 m (113 ft) length] boreholes (TBD) and analyzed at a laboratory for volumetric soil moisture content and water potential. Cores samples will be collected using a continuous core barrel sampler advanced ahead of the auger. The samples should be 10 to 15 cm (4-6 in.) in length, and protected for moisture loss. The moisture content data will be used to calibrate the neutron probe.
Neutron Logging	Neutron logs will be run when the boreholes have all been drilled to total depth and completed with aluminum conduit. The initial neutron logging for each borehole will be conducted within 7 days of the completion of all 8 boreholes. Seven of the boreholes should be logged at 5-ft intervals. The borehole from which core was collected for neutron probe calibration will be logged at 1-ft intervals, with each 5-ft interval corresponding as closely as possible to the sampling depths for accurate calibration. All measurement depths from all the boreholes will be carefully documented so that repeat neutron logging events are conducted at approximately the same depths.
Completion Design	Each borehole will be installed with a 2-in. aluminum rigid conduit (ARC) to be used for neutron logging. No fill will be placed between the conduit and the borehole wall. Centralizers will center the conduit within the borehole. Hydrated bentonite supported by a shale trap formation packer will seal the borehole at the surface. The conduit will be open at the bottom. The boreholes will have 'stick-up' surface completion and concrete pads. A typical moisture monitoring borehole design is shown in Figures 2-2 and 2-3.
Borehole IDs	Borehole IDs: SET-MMS-1, -2, -3, -4, -5, -6, -7, -8. See Figure 2-1.

Geodedic Survey	A geodetic survey will be conducted after all 8 boreholes are installed and surface completions finished. Survey results (northing, easting, and elevation) will be given in New Mexico state plane coordinate system, North American Datum (NAD) 1983. Elevation will be expressed in feet above mean sea level (amsl) using the National Geodetic Vertical Datum of 1929. Survey points include the top of brass marker in the concrete pad, top of conduit, and top of protective casing. Brass monuments will be stamped with well ID and elevation.

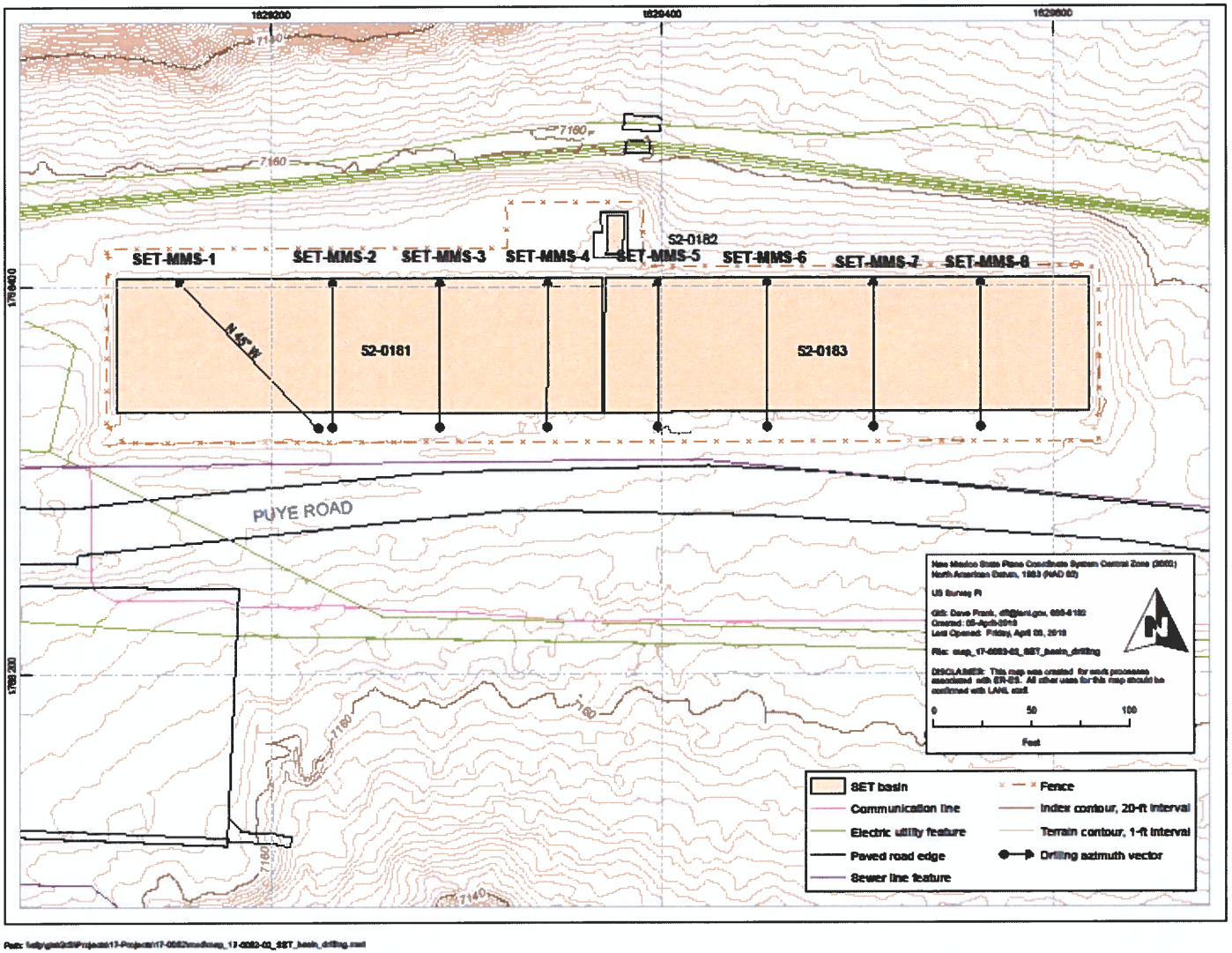

Figure 2-1. Proposed borehole locations and borehole IDs for SET Moisture Monitoring System

14193

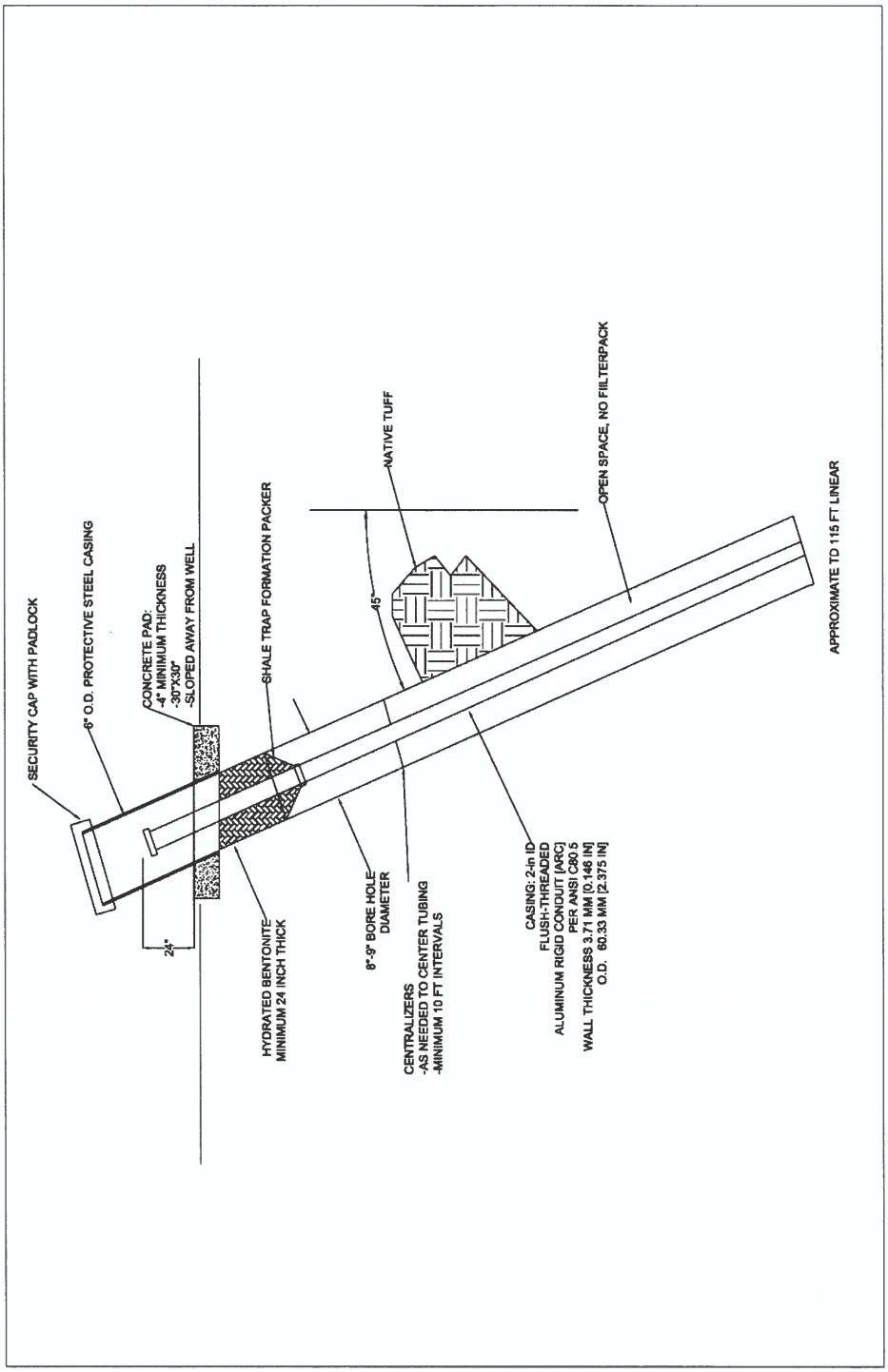

Figure 2-2. Conceptual borehole design for SET Moisture Monitoring System

(no scale)

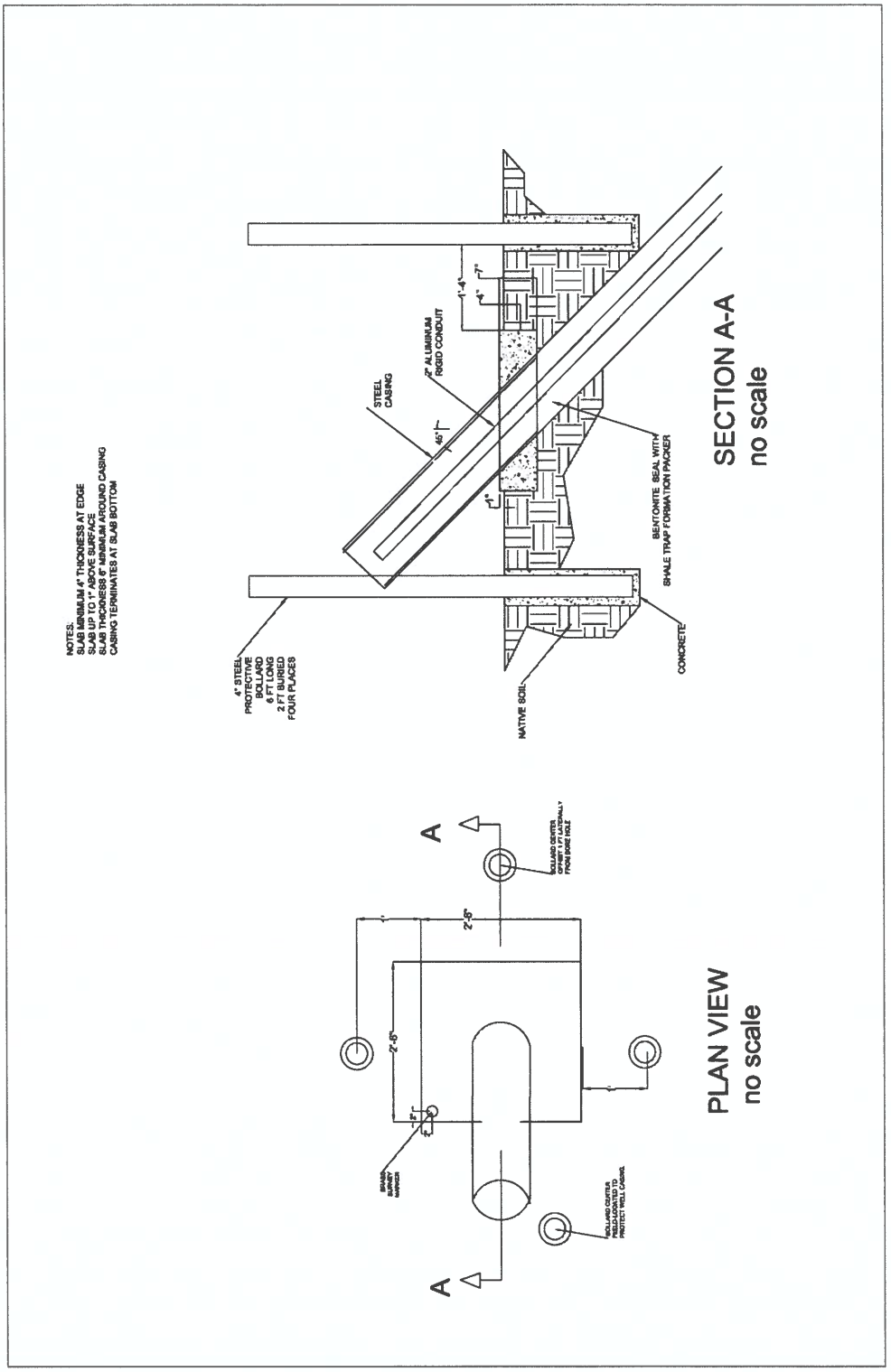

Figure 2-3. Conceptual surface completion design for SET Moisture Monitoring System

(no scale)

From:	Romero, Andrew C, NMENV
To:	Armijo, Karen (CONTR) (Karen.Armijo@nnsa.doe.gov); Beers, Bob
Cc:	Pullen, Steve, NMENV; Hunter, Michelle, NMENV
Subject:	DP-1132, Condition No. 8, Request for an Extension of Time Approval
Date:	Tuesday, November 13, 2018 9:39:29 AM

Karen,

On October 31, 2018, the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) received *DP-1132, Condition No. 53, Request for an Extension of Time to Complete SET Pipeline Water Tightness Testing.* Pursuant to permit Condition No. 53 of DP-1132, DOE/LANS may seek an extension of time which to perform an obligation in Discharge Permit DP-1132, for good cause, by sending a written request to NMED that states the length of the requested extension and describes the basis for the extension. DOE/LANS requests an extension of time to complete water tightness testing, required by permit Condition No. 8 of the pipeline connecting the TA-50 RLWTF and the TA-52 Solar Evaporation Tank (SET).

According to the *Request for an Extension of Time*, DOE/LANS would like to delay conducting water tightness testing for the following reasons:

- The RLWTF-SET pipeline was successfully tested for water tightness during construction of the SET in 2012.
- The SET has yet to be placed into service since constructed.
- The SET will not be placed into service until the following upgrades are completed:
    - Pursuant to permit Condition No. 30, a Moisture Monitoring System for the SET must be installed and approved for use by NMED.
    - The existing leak detection alarm system, situated between the SET's primary and secondary liners, will be rebuilt. The existing leak detection tape will be removed and a sump installed to capture liquid present between the primary and secondary liners. The sump will be alarmed and accessible for sampling and pumping.
    - The existing primary liner will be replaced with a new liner of equal or better quality.

DOE/LANS estimate the time required to complete the upgrades listed above at approximately 15 months. DOE/LANS request an extension of time to complete the required water tightness testing of the RLWTF-SET pipeline until all listed upgrades are completed.

NMED hereby approves a longer period, for good cause, for Condition No. 8 as described the *Request for an Extension of Time*

Approval of this *Request for an Extension* does not relieve the Permittee of the responsibility to comply with any other applicable federal, state, and/or local laws and regulations. This

approval does not relieve the Permittee of liability should operations associated with this time extension result in actual pollution of ground or surface waters.

Thank you,

Andrew C. Romero
Environmental Scientist, Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
(505) 827-0076

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 665-7314/Fax (505) 667-5948

Symbol: EPC-DO-18-403
LA-UR: 18-30432
Locates Action No.: U1801172
Date: NOV 19 2018

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: DP-1132, Condition No. 7, Verification of Secondary Containment

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC (subsequently transferred to Triad National Security, LLC) for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Pursuant to permit Condition No. 7, *Verification of Secondary Containment*, the U.S. Department of Energy and Triad National Security, LLC (DOE/Triad) is required to submit to NMED by November 27, 2018, verification that all units intended to convey, store, treat or dispose of untreated liquid or semi-liquid waste streams meet the requirements of secondary containment as defined in Discharge Permit DP-1132.

Enclosure 1 documents that all treatment, storage, and conveyance units at the RLWTF have secondary containment. The majority of those secondary containments—63 out of 81—are associated with the Radioactive Liquid Waste Collection System (RLWCS). The remaining 18 secondary containments are located within buildings and rooms at Technical Area (TA)-50. Presently, six of these 18 secondary containments do not have functioning leak detection systems, as required by permit Condition No. 7.

Planning and design are underway for installation of the missing leak detection systems. The design effort will take approximately 90 days. Once the design has been completed, a schedule for installing the additional detection systems will be prepared.

The RLWTF has round-the-clock knowledge of the status of vessels within TA-50 through other facility monitoring systems. For example, tank levels are continuously monitored and an unexpected level drop will generate an alarm that requires a response by the on-call duty operator. In addition, Rooms 60, 60A, and 61 are equipped with continuous radiation monitoring instruments that would sound an alarm if a vessel develops a leak.

In the interim, until the missing leak detection systems are installed, the listed rooms will be inspected at least once each work day. In addition, a revised secondary containment verification report will be submitted with each Discharge Permit DP-1132 quarterly monitoring report until all leak detection systems are installed and operational.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this submittal.

Sincerely,

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy

TVV/KEA/MTS/RSB:jdm

Enclosure(s): (1) DP-1132, Verification of Secondary Containment

Copy: Shelly Lemon, NMED/SWQB, Shelly.Lemon@state.nm.us, (E-File)
John E. Kieling, NMED/HWB, john.kieling@state.nm.us, (E-File)
Gerald Knutson, NMED/GWQB, Gerald.Knutson@state.nm.us, (E-File)
Andrew Romero, NMED/GWQB, AndrewC.Romero@state.nm.us, (E-File)
Karen E. Armijo, NA-LA, Karen.Armijo@nnsa.doe.gov, (E-File)
Michael W. Hazen, ALDESHQSS, mhazen@lanl.gov, (E-File)
Enrique Torres, EPC-DO, etorres@lanl.gov, (E-File)
William H. Schwettmann, IPM, bills@lanl.gov, (E-File)
Raelynn Romero, PM6, raelynn@lanl.gov, (E-File)
Randal S. Johnson, DESHF-TA55, randyj@lanl.gov, (E-File)
Denise C. Gelston, TA-55-RLW, dgelston@lanl.gov, (E-File)
Alvin M. Aragon, TA-55-RLW, alaragon@lanl.gov, (E-File)
John C. Del Signore, TA-55-RLW, jcds@lanl.gov, (E-File)

Michael T. Saladen, EPC-CP, saladen@lanl.gov, (E-File)
Robert S. Beers, EPC-CP, bbeers@lanl.gov, (E-File)
Steven G. Pearson, EPC-CP, spearson@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ENCLOSURE 1

DP-1132, Verification of Secondary Containment

EPC-DO: 18-403

LA-UR-18-30432

Date: NOV 19 2018

Discharge Permit DP-1132
Condition No. 7: Verification of Secondary Containment
Radioactive Liquid Waste Treatment Facility (RLWTF)

November 2018

Purpose

This report verifies secondary containment for all units and systems that convey, store, treat, or dispose of an untreated liquid or semi-liquid waste stream at the Radioactive Liquid Waste Treatment Facility (RLWTF) meet the requirements of secondary containment as defined in Discharge Permit DP-1132.

Requirements

Discharge Permit DP-1132 requires Los Alamos National Laboratory (LANL) to verify secondary containment by November 27, 2018. Permit requirements are listed below:

- Condition 7 of DP-1132 requires that LANL submit to the New Mexico Environment Department (NMED) verification demonstrating that all units intended to convey, store, treat, or dispose of an untreated liquid or semi-liquid waste stream meet the requirements of secondary containment as defined in DP-1132.
- Definition Y of DP-1132 defines secondary containment as a constructed unit or system designed to prevent any migration of waste streams or accumulated liquid out of the unit or system to the soil, ground water, or surface water at any time.
- Definition Y of DP-1132 adds that secondary containment can include, but is not limited to: double-walled pipes, concrete and floors equipped with sumps and alarm systems to detect potential leaks.
- Definition Y of DP-1132 states that secondary containment must be:
  - Designed, constructed and maintained to surround the unit on sides and bottom;
  - Free of cracks, gaps, or fissures;
  - Constructed of, or lined with, materials that are compatible with the waste streams to be in contact with the unit or system;
  - Placed on a foundation or base capable of withstanding pressure gradients, settling or uplift which may cause failure of the unit or system; and
  - Equipped with a leak detection system that is designed and operated so that it will detect the failure of the primary containment structure.

Scope of the Secondary Containment Survey

The secondary containment verification included all facilities and systems regulated by Discharge Permit DP-1132:

- Underground collection systems (piping and access vaults) at six LANL Technical Areas: TA-03, TA-35, TA-48, TA-50, TA-55, TA-59;
- Treatment units and systems in five buildings at TA-50 (Buildings 1, 2, 66, 248, and 250);
- The three treatment processes as described in Discharge Permit DP-1132: the main treatment process, the transuranic radioactive liquid waste (RLW) treatment process, and the secondary treatment process;
- The seventeen treatment units within the three treatment processes.

Treatment Processes

The RLWTF receives and treats RLW from generators at LANL. The RLWTF has a main treatment process for low-level RLW, a process for treating transuranic RLW, and a secondary treatment process for waste streams from both the low-level and transuranic processes.

The main treatment process consists of influent collection and storage, the treatment of low-level RLW, and the discharge of treated water to the environment. Process steps include treatment with chemicals in a reaction tank, filtration, ion exchange, reverse osmosis, and the sampling and analysis of treated water prior to discharge. Two secondary streams are generated by primary treatment, solids precipitated in the reaction tanks, and reverse osmosis concentrate. Both are sent to the secondary treatment process.

Transuranic RLW treatment consists of influent collection and storage, treatment of the transuranic RLW, and sludge treatment. Treated transuranic RLW cannot be discharged to the environment because it exceeds DOE, EPA, and NMED effluent limits (e.g., Radioactivity levels in treated transuranic RLW can exceed levels found in low-level RLW influent). Instead, treated transuranic RLW must be re-treated in the main or secondary treatment processes. Solids from the treatment process are concentrated, solidified with cement, and shipped to the Waste Isolation Pilot Plant (WIPP) for disposal as a transuranic waste.

The secondary process treats wastes from the primary and transuranic treatment lines. It consists of a vacuum filter to treat solids from main process, secondary reverse osmosis to treat RO concentrate from the main process and/or treated transuranic RLW, and a bottoms disposal step. Wastes from the secondary treatment process are disposed as low-level radioactive solid waste.

Treatment Units

Units within each of these process lines are summarized in Table 1, and discussed in the following pages.

TABLE 1: RLWTF TREATMENT PROCESSES AND UNITS

Treatment Unit		Location
Main Treatment:		
M1	Collection system	TA-03, 35, 48, 50, 55, 59
M2	Influent storage	50-250
M3	Emergency influent storage	50-250
M4	Reaction tanks	50-01
M5	Microfilter	50-01
M6	Pressure filters	50-01
M7	Perchlorate ion exchange	50-01
M8	Primary reverse osmosis	50-01
M10	Effluent storage	50-01
Transuranic:		
T1	TRU Collection system	TA50, 55
T2	TRU Influent storage	50-66
T3	TRU Treatment	50-01
T4	TRU Sludge	50-01
T5	TRU Effluent	50-01
Secondary Treatment:		
S1	Secondary reverse osmosis	50-01
S2	Rotary vacuum filter	50-01
S3	Bottoms storage	50-248

Location: Technical Area – Building (e.g., 50-248)

Table 1 does not list treatment unit M9, copper-zinc ion exchange, because this treatment step is no longer used. Nor does Table 1 include units that convey or store treated water to be discharged to the environment, in accordance with DP-1132 Condition 7. Specifically, it does not list the NPDES Outfall 051, the mechanical evaporator system (MES), or the solar evaporation tank (SET).

Vessels and Secondary Containment

Table 2 expands upon the treatment unit summary provided in Table 1. Table 2 lists vessels associated with each treatment unit, vessel location, and information about each vessel and its secondary containment.

Vessels include water treatment equipment (e.g., the microfilter) and tanks associated with the unit (e.g., the sludge tank and cleaning tanks). Each vessel is described by capacity, material of construction, and whether the vessel is above ground, on the ground (or floor), or in-ground. Definition CC of Discharge Permit DP-1132 defines these three terms, as they apply to tanks.

Table 2 also describes the secondary containment provided for each vessel, by identifying the type of secondary containment, its material of construction, and the leak detection alarm that notifies RLWTF personnel of the presence of water in the secondary containment.

Survey Summary

The survey confirmed that secondary containment is in place for all units and systems that convey, store, treat, or dispose of an untreated liquid or semi-liquid waste stream. However, the following rooms in Building 50-01 do not have the required leak detection systems:

- Room 24, location of the secondary reverse osmosis treatment unit
- Room 36, location of the double-pass M8 reverse osmosis unit
- Room 61, used for storage of low-level solids (TK08)
- Rooms 60 and 60A, location of equipment for the treatment of transuranic RLW
- Room 62, used for storage of RLW that has been chemically treated and filtered (TK09)

Planning and design is underway for the installation of the required leak detection system in these rooms. The design effort will take approximately 90 days. Once the design has been completed, a schedule for installing the additional detection systems will be prepared.

The RLWTF has round-the-clock knowledge of the status of vessels within these rooms through the other facility monitoring systems. For example, tank levels are continuously monitored, and unexpected level drops generate an alarm that requires a response by an on-call duty operator. In addition, Rooms 60, 60A, and 61 are equipped with continuous radiation monitoring instruments that would sound an alarm if a vessel develops a leak.

In the interim, until the leak detection alarms are installed, the listed rooms will be inspected at least once each work day. In addition, a revised secondary verification report will be submitted with each DP-1132 quarterly monitoring report, until leak detection systems are installed.

Table 2: RLWTF Vessels and Secondary Containment

Treatment Unit		Vessel	Location	Vessel			Secondary Containment		
				Capacity (gals.)	Category	Material	Structure	Material	Leak Detection
Main Treatment:									
M1	Collection system	Piping (~ 4 miles)	Six TAs	---	In-ground	Polyethylene	Pipe	Polyethylene	63 alarms
		Vaults (63)	Six TAs	---	In-ground	Concrete	Floor	Concrete	63 alarms
M2	Influent storage	WMRM tanks (2)	50-250-003	50,000	Aboveground	Fiberglass	Floor	Concrete	PLC250_SMP3
		Xfer piping	50-250-004	---	In-ground	Polyethylene	Pipe	Polyethylene	250_Inf, 250_Eff
		Xfer pump room	50-250-001	---	Aboveground	Steel	Floor	Concrete	PLC250_SMP1
M3	Emergency influent storage	WMRM tanks (4)	50-250-003	50,000	Aboveground	Fiberglass	Floor	Concrete	PLC250_SMP3
M4	Reaction Tanks	TK71, TK72	50-01-70	10,000	Aboveground	Steel	Floor	Concrete	RUF_71A_A1
M5	Microfilter	Filter	50-01-70	40	Aboveground	Steel	Floor	Concrete	RUF_71A_A1
		Sludge tank	50-01-70	500	On-ground	Polyethylene	Floor	Concrete	RUF_71A_A1
		Cleaning tanks (2)	50-01-70	200	On-ground	Polyethylene	Floor	Concrete	RUF_71A_A1
M6	Pressure filters	Filters (3)	50-01-63	100	Aboveground	Lined Steel	Floor	Concrete	SMP_16_A2
M7	Perchlorate ion exchange	IX vessels (8)	50-01-16	50	Aboveground	Fiberglass	Floor	Concrete	SMP_16_A2
		TK09	50-01-62	10,000	Aboveground	Steel	Floor	Concrete	F
M8	Primary reverse osmosis	R72 RO unit	50-01-72	40	Aboveground	Steel	Floor	Concrete	RUF_71A_A1
		R72 CIP tank	50-01-72	500	Aboveground	Polyethylene	Floor	Concrete	RUF_71A_A1
		M8 RO unit	50-01-36	60	Aboveground	Fiberglass	Floor	Concrete	F
		M8 CIP tank	50-01-36	300	Aboveground	Polyethylene	Floor	Concrete	F
M1	Effluent storage	N.Frac, S.Frac	50-01-34B	20,000	Aboveground	Steel	Floor	Concrete	SMP_34B_A1
Transuranic:									
T1	TRU Collection system	Piping (~1 mile)	TA50, TA55	---	In-ground	PVDF, PP	Pipe	PVDF, PP	CTL_WM57_A1
		Vaults (1)	50-201	---	In-ground	Concrete	Floor	Concrete	CTL_WM57_A1
T2	TRU Influent storage	Acid tank	50-66	3,900	Aboveground	Steel	Floor	Concrete	CTL_WM66_A4
		Caustic tank	50-66	3,000	Aboveground	Steel	Floor	Concrete	CTL_WM66_A4
T3	TRU Treatment	TK1	50-01-60	900	Aboveground	Steel	Floor	Concrete	F
		TK2	50-01-60	800	Aboveground	Fiberglass	Floor	Concrete	F
T4	TRU Sludge	TK-7A	50-01-60A	900	Aboveground	Steel	Floor	Concrete	F
T5	TRU Effluent	TK3	50-01-60	1,000	Aboveground	Fiberglass	Floor	Concrete	F

Notes: See Page 6

14206

Table 2: RLWTF Vessels and Secondary Containment (concluded)

Treatment Unit		Vessel	Location	Vessel			Secondary Containment		
				Capacity (gals.)	Category	Material	Structure	Material	Leak Detection
Secondary Treatment:									
S1	Secondary reverse osmosis	RO vessel	50-01-24	10	Aboveground	Fiberglass	Floor	Concrete	F
		TK25	50-01-24	300	Aboveground	Polyethylene	Floor	Concrete	F
		TK73	50-01-70	3,700	Aboveground	Steel	Floor	Concrete	RUF_71A_A1
S2	Rotary vacuum filter	Vacuum filter	50-01-116	900	Aboveground	S.Steel	Floor	Concrete	SMP_16_A2
		TK08	50-01-61	8,000	Aboveground	Steel	Floor	Concrete	F
S3	Bottoms storage	TK-NE, SE, SW, NW	50-248	20,000	Aboveground	Steel	Floor	Concrete	SMP_TKF_A2
		3K tank	50-248	3,000	Aboveground	Steel	Floor	Concrete	SMP_TKF_A2
		17K tank	50-02	17,000	Aboveground	Steel	Floor	Concrete	SMP_WM2_A2

Notes:

1. Vessel Descriptions, per definition CC of DP-1132: Aboveground, On-ground, In-ground.
2. When multiple tanks or vessels are identified, capacity is for each vessel.
3. Collection systems: Each access vault is equipped with a sump and leak detection probe-alarm
4. Collection system:
   - Piping: leaks in primary pipe would drain into the next downstream access vault.
   - Access vaults: each is equipped with a sump and leak detection probe-alarm.
5. Location: Technical Area-Bldg-Room
6. F means a leak detection system for the listed containment needs to be installed.

14207

Environmental Protection & Compliance Division
Los Alamos National Laboratory
PO Box 1663, K490
Los Alamos, New Mexico 87545
(505) 667-0666

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 665-7314/Fax (505) 667-5948

Symbol: EPC-DO-18-414
LA-UR: 18-29710
Locates Action No.: U1801172
Date: NOV 19 2018

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: DP-1132, Condition No. 33, Alluvial Monitoring Wells Workplan

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC (subsequently transferred to Triad National Security, LLC) for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Pursuant to permit Condition No. 33, *Replacement of Two Existing Alluvial Ground Water Monitoring Wells*, the U.S. Department of Energy and Triad National Security, LLC (DOE/Triad) is required to submit a workplan for NMED approval by November 27, 2018. DOE/LANS proposed workplan is provided as Attachment 1.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this proposed workplan for the replacement of two alluvial ground water monitoring wells.

Very truly yours,

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC

Very truly yours,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy

ET/KEA/MTS/RSB:jdm

Attachment(s): Attachment 1 Drilling Workplan for Discharge Permit DP-1132 Alluvial Monitoring Wells

Copy: Shelly Lemon, NMED/SWQB, Shelly.Lemon@state.nm.us, (E-File)
John E. Kieling, NMED/HWB, john.kieling@state.nm.us, (E-File)
Gerald Knutson, NMED/GWQB, Gerald.Knutson@state.nm.us, (E-File)
Andrew Romero, NMED/GWQB, AndrewC.Romero@state.nm.us, (E-File)
Karen E. Armijo, NA-LA, Karen.Armijo@nnsa.doe.gov, (E-File)
Michael W. Hazen, ALDESHQSS, mhazen@lanl.gov, (E-File)
Enrique Torres, EPC-DO, etorres@lanl.gov, (E-File)
William H. Schwettmann, IPM, bills@lanl.gov, (E-File)
Raelynn Romero, PM6, raelynn@lanl.gov, (E-File)
Randal S. Johnson, DESHF-TA55, randyj@lanl.gov, (E-File)
Denise C. Gelston, TA-55-RLW, dgelston@lanl.gov, (E-File)
Alvin M. Aragon, TA-55-RLW, alaragon@lanl.gov, (E-File)
John C. Del Signore, TA-55-RLW, jcds@lanl.gov, (E-File)
Michael T. Saladen, EPC-CP, saladen@lanl.gov, (E-File)
Robert S. Beers, EPC-CP, bbeers@lanl.gov, (E-File)
Steven G. Pearson, EPC-CP, spearson@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ATTACHMENT 1

Drilling Workplan for Discharge Permit DP-1132
Alluvial Monitoring Wells

EPC-DO: 18-414

LA-UR-18-29710

Date: NOV 19 2018

Drilling Work Plan for Discharge Permit DP-1132 Alluvial Monitoring Wells

1.0 GENERAL BACKGROUND

Los Alamos National Laboratory (LANL) discharges treated effluent from the Technical Area (TA) -50 Radioactive Liquid Waste Treatment Facility (RLWTF) to NPDES Outfall 051 in Effluent Canyon. See Figure 1.0. On August 29, 2018 the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC. Subsequently, the permit was transferred to Triad National Security, LLC for said discharges. As presented below, Condition No. 33 of Discharge Permit DP-1132, requires the installation of two new alluvial groundwater monitoring wells in the canyon downgradient of the outfall.

DP-1132 CONDITION NO. 33. REPLACEMENT OF TWO EXISTING ALLUVIAL GROUND WATER MONITORING WELLS - *Within 90 days of the effective date of this Discharge Permit (by November 27, 2018), the permittees shall submit to NMED a work plan for the installation of two replacement monitoring wells in the alluvial aquifer at a location hydrologically downgradient of Outfall 051. The well installation work plan will include proposed well locations, drilling methods, well specifications, and proposed schedule for construction. Upon NMED approval, the Permittees shall construct the replacement wells in accordance with the Groundwater Quality Bureau, Monitoring Well Construction and Abandonment Guidelines, Revision 1.1, March 2011 and the approved work plan and schedule.*

DOE/Triad propose in this work plan to install two new alluvial groundwater monitoring wells, RLW-A-1 and RLW-A-2, hydrologically downgradient of Outfall 051 and in accordance with NMED Ground Water Quality Bureau Monitoring Well Construction and Abandonment Guidelines. The location of alluvial groundwater monitoring wells RLW-A-1 and RLW-A-2 are shown in **Figure 1.0.**

2.0 SITE PREPARATION

The drill sites will be prepared with as minimal an impact and disturbance to the area as practical. Road or drill pad construction will not be required for either location. Any ground disturbance will be kept to a minimum, but if a drill site area is disturbed, then Best Manage Practices (BMPs) will be installed to minimize erosion and any surface water run-on or run-off from the site. Borehole locations near stream channels will have a sediment barrier installed between drilling operations and the stream channel.

3.0 DRILLING AND WELL INSTALLATION METHODS

Both boreholes will be completed using a hollow stem auger (HSA) drilling techniques. See **Table 1.0** and **Figure 2.0**. Water or other fluids will not be used for any drilling method anticipated for this project. Split-spoon samples will be collected every 5-feet for borehole logging purposes. Borehole logs will be prepared in the field, as borings are drilled, by a qualified, experienced geologist or geotechnical engineer.

Drilling Work Plan for Discharge Permit DP-1132 Alluvial Monitoring Wells

A boring log will be prepared for each borehole. The drill log will contain at a minimum the following information: name of the project and site; hole number and dates drilled; location of the boring; type of drill rig; size and type of bit used; thickness of each stratum; identification of the material of which each stratum is composed; depth interval from which each formation sample was taken; depth at which groundwater was first encountered; depth to static water level and changes in static water level with hole depth; total depth of hole; loss of tools or equipment and any other problems encountered; reference elevation for all depth measurements; and name of driller and name and signature of the geologist preparing the log.

A 4-in inside diameter (ID) PVC well with a .010-in continuous wrap vee-wire screen will be installed in the borehole. Two stainless steel centralizers shall be installed, one immediately above the screen and the second above the bentonite seal to centralize the well in the borehole. A 20/40 silica sand filter pack will be placed extending 1-foot below the completed well to 2-feet above the top of the screened interval. A bentonite seal will then be placed immediately above the filter pack. The bentonite seal shall be 3 feet in thickness, consisting of chips or pellets (3/8-inch size) and hydrated with clean water. The annular space above the bentonite seal shall be sealed with cement grout or a bentonite-based sealing material acceptable to the NMOSE pursuant to 19.27.4 NMAC. The annular seal will extend from the top of the bentonite seal to within 2 feet of the ground surface. A locking protective surface casing will be cemented in place, filling the remaining annular space above the cement grout/bentonite-based annular seal.

Suitable construction (as-built) diagrams detailing construction practices of both wells will be maintained. The diagram should be prepared by the geologist/geotechnical engineer present during all construction operations. Information provided in the construction diagram should include, but not be limited to the following: reference elevation for all depth measurements; project and site name; well number; date(s) of installation; the location and thickness of each stratum; nominal hole diameter(s); the depth of the static water level during drilling, at completion, before and after development; total depth of the completed well; depth of any grouting or sealing materials; depth and type of well casing; description of well screen (to include length, location, diameter, slot size, material, and manufacturer); description of development procedures, including method, time spent developing, water quantity removed; sand content, pH, conductivity and temperature as appropriate; other construction details including grain size and source of well filter pack material, location of seals and casing joints, and generalized surface completion; name of driller and name and signature of the geologist preparing the diagram.

Table 1.0. Alluvial Monitoring Wells, Drilling Requirements

Well Name	Location	Approximate Alluvial Thickness/ Borehole Depth	Drilling Method	Well Material (diameter)	Estimated Screen Length	Well Screen Design
RLW-A-1	Mortandad Canyon Above Confluence with Ten Site Canyon	~20/25 ft	HSA[1] 6 ¼ ID[2] 10 ¼ OD[3]	PVC (4-in. ID) 2 stainless steel centralizers	~10 ft	.010-in. slot size, continuous wrap vee-wire screen with 20/40 filter pack sand
RLW-A-2	Mortandad Canyon Above Confluence with Ten Site Canyon	~40 ft	HSA 6 ¼ ID 10 ¼ OD	PVC (4-in.ID) 2 stainless steel centralizers	~20 ft	.010-in. slot size, continuous wrap vee-wire screen with 20/40 filter pack sand

Notes:
[1]HSA means hollow stem auger
[2]ID means inside diameter
[3]OD means outside diameter

All drilling and sampling equipment will be decontaminated before use at each borehole, and prior to demobilizing from LANL. The augers, samplers, and all sampling scoops and bowls will be cleaned between wells. Whenever possible, dry decontamination methods will be used to minimize waste products.

4.0 COMPLETION, DEVELOPMENT, AND SURVEY OF GROUNDWATER MONITORING WELLS

Well Completion/Protection: Wellhead completion will include a protective outer casing and concrete pad. Pad dimensions will be a 3 ft square of 6-in.-thick concrete set into the ground surface. A brass monument will be placed in the northwest corner of the concrete pad as a survey marker point. Temporary wellhead protection measures will be maintained during all drilling and development activities so unauthorized individuals shall not have access to the open borehole/well.

Well Development: Forty-eight (48) hours after and within the first week of well completion, the well will be developed to remove cuttings, mobile particulates, and entrapped gases from within and adjacent to the well. Installed wells will be pumped or bailed, or combination of both, until the following criteria are met:

1. Well water is clear and measured turbidity is 5 nephelometric turbidity units (NTUs) or less and measured pH, specific conductivity, and temperature have stabilized.

2. A minimum of "five times the standing water volume" is removed[1]

The LANL Project Manager will be contacted if any of the following circumstances occur:

1. Well recharge is so slow that the required volume of water cannot be removed during 10 consecutive hours of development
2. Groundwater samples show persistent water discoloration after well development
3. Sediment remains after well development.

On-site potable and contaminant-free water required for proper well installation, grouting and equipment washing will be provided by drilling contractor.

Survey: A geodetic survey will be conducted by LANL after both wells are installed and surface completions finished. Survey results will be entered into the LANL database system. Survey results (northing, easting, and elevation) will be given in New Mexico state plane coordinate system, North American Datum (NAD) 1983. Elevation will be expressed in feet above mean sea level (amsl) using the National Geodetic Vertical Datum of 1929. Survey points include the top of brass marker in the concrete pad, top of PVC well casing and top of protective casing. Brass monuments will be stamped with well ID and elevation.

5.0 FORMATION WATER LEVEL MONITORING

An In-Situ LevelTroll® 500 series vented pressure transducer will be installed in each monitoring well for long-term water-level monitoring. Upon installation, the subcontractor shall program the transducers for 1-hour data collection intervals.

6.0 WASTE MANAGEMENT AND DISPOSAL

Investigation-derived waste (IDW) refers to all solid waste generated during the drilling operations. The anticipated IDW may include, but is not limited to, (1) drill cuttings; (2) personal protective equipment (PPE); (3) other wastes that may potentially come in contact with contaminants such as plastic, glass, disposable sampling supplies and solid decontamination wastes; (4) spent field screening supplies, (5) well purge water, (6) petroleum contaminated soil; and (7) petroleum contaminated absorbent materials.

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[1] The "five times (5X) the standing water volume" is calculated to include the well screen and casing plus saturated annulus and assumes 30 percent annular porosity and that no water was used in the drilling or installation stages of the well.

It is anticipated that the IDW generated during implementation of the drilling operations will be characterized as non-hazardous waste but as a conservative practice all waste will be stored inside either a Satellite Accumulation Area (SAA) or a Central Accumulation Area (CAA) until a final hazardous waste determination is made. Waste characterization and determination will be completed using one or more of the following methods: (1) Acceptable Knowledge (e.g. review of existing data and/or documentation), (2) site characterization, or (3) direct sampling of waste.

Regardless, all wastes generated during each investigation will be characterized, stored in a proper waste accumulation area, managed, and disposed per the processes defined in the approved site-specific Waste Characterization Strategy Forms (WCSFs) as well as in accordance with all applicable SOPs.

Waste containers will be selected based on appropriate DOT requirements, waste types, and the estimated volumes generated. Immediately following containerization, each waste container will be individually labeled with a unique identification number and with information regarding waste classification, item(s), and date generated. Waste will be stored in clearly marked and appropriately constructed and managed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on the type of IDW and its classification.

It is anticipated that all waste will be disposed of at one of the following locations, as appropriate: (1) an authorized non-hazardous solid waste disposal facility, (2) an authorized treatment, storage, and disposal facility, (3) a NM Special Waste landfill (or an out-of-state equivalent), or (4) land application via the NMED-approved decision trees for the land application of groundwater and drill cuttings. No waste will be generated during any of these investigations that do not have an identified disposal path.

7.0 SITE DEMOBILIZATION AND RESTORATION

Upon completion of investigation activities, all investigation-related equipment and materials will be promptly removed from the site. Staging areas no longer in use will be dismantled. Due to pending waste characterization results, site demobilization will be completed in two phases: (1) following completion of drilling, sampling, and well installation activities and (2) following the demobilization of waste containers, after receipt of waste characterization results.

8.0 SCHEDULE

Upon NMED approval or approval with conditions of this work plan, DOE/Triad will begin construction of the two alluvial monitoring wells in Mortandad Canyon within 180 days. Completion of the two alluvial monitoring wells will occur 60 days following the start of construction.

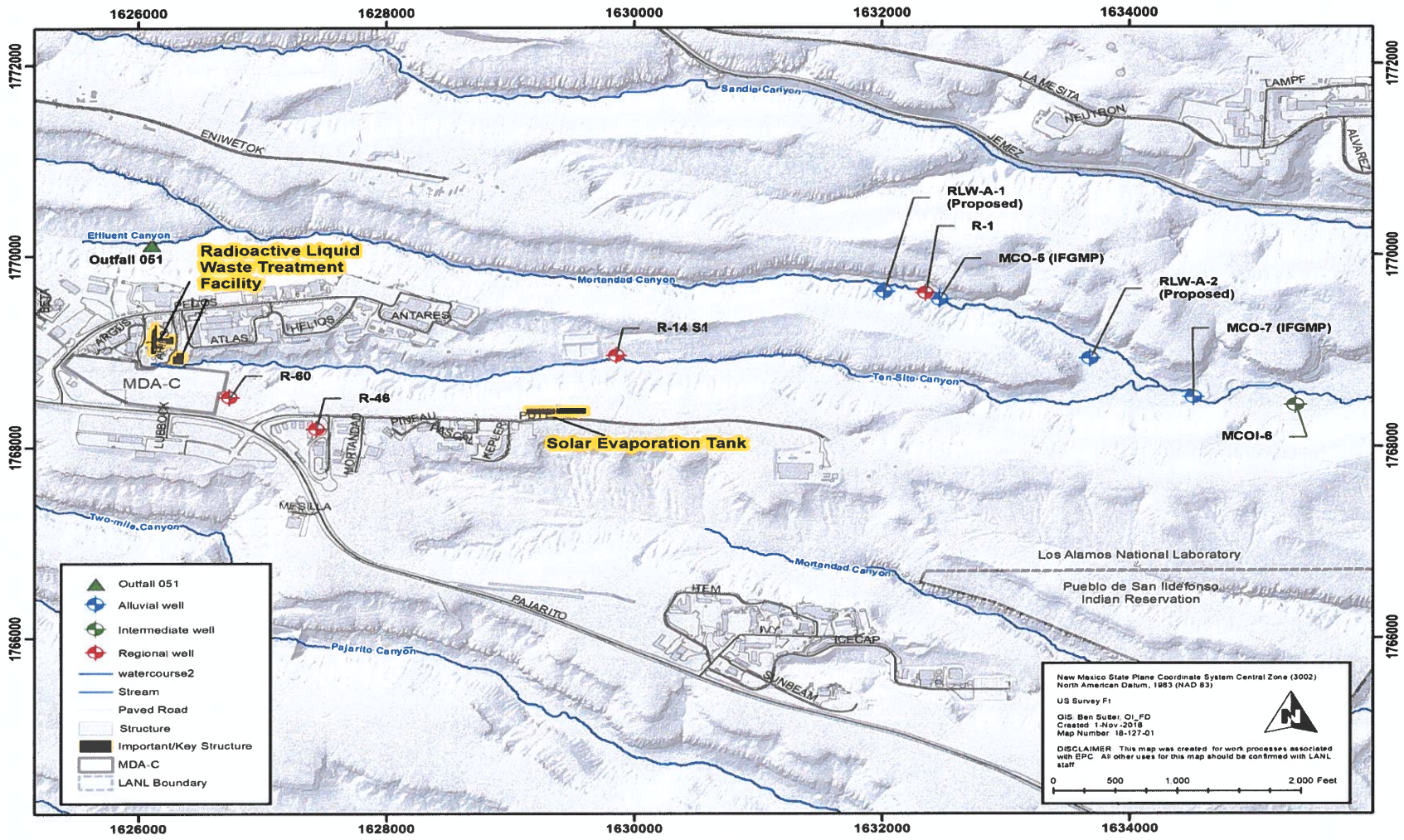


Figure 1.0. Location of Proposed Alluvial Monitoring Wells Downgradient of Outfall 051.

Note: IFGMP means the well is sampled routinely pursuant to LANL's Interim Facility-Wide Groundwater Monitoring Plan.

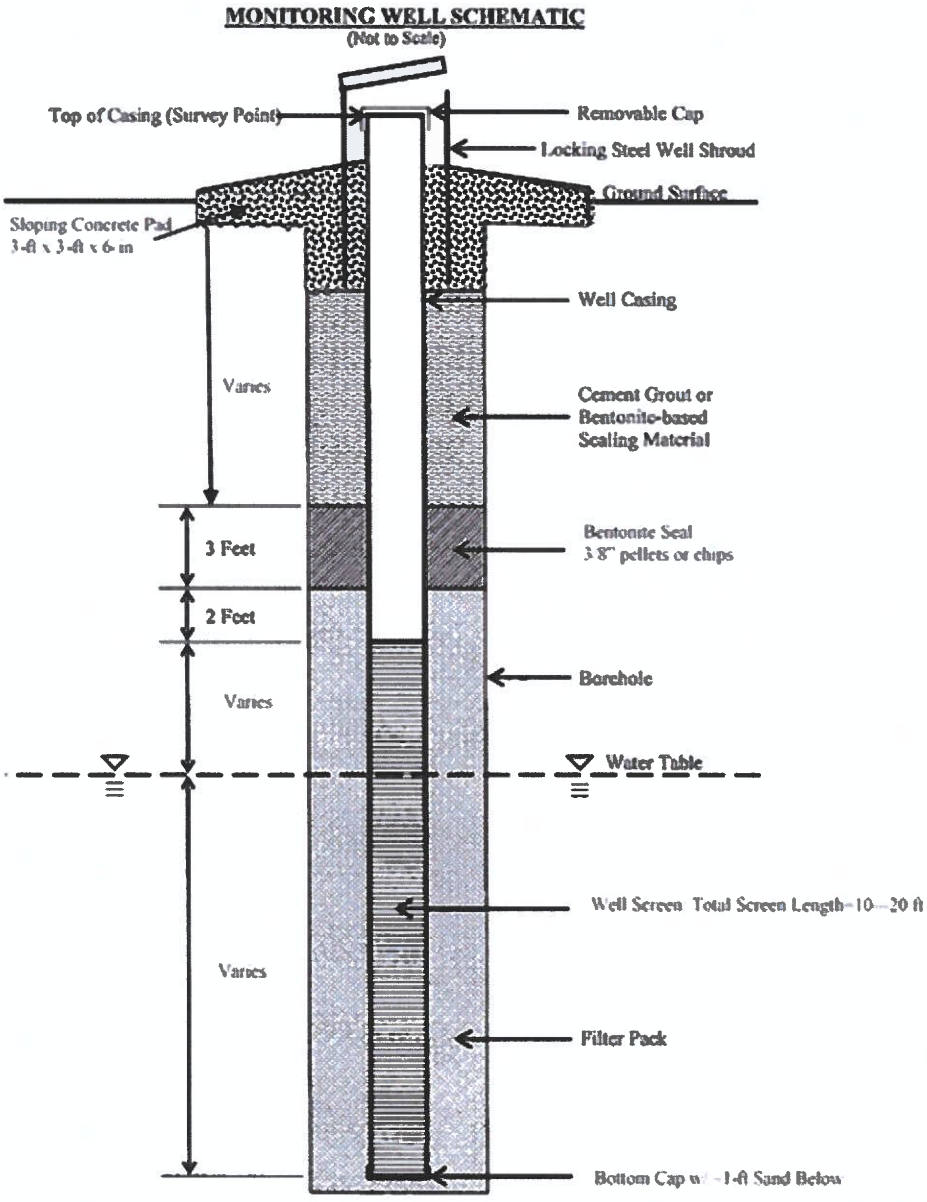


Figure 2.0. Conceptual Design, Alluvial Monitoring Well

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 665-7314/Fax (505) 667-5948

Symbol: EPC-DO-18-432
LA-UR: 18-30938
Locates Action No.: U1801172
Date: DEC 0 4 2018

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

GROUND WATER
DEC 0 4 2018
BUREAU

Subject: DP-1132, Status Update on Malfunctioning RLWTF Vault and Sump Alarms

Dear Ms. Hunter:

On October 15, 2018, the U.S. Department of Energy (DOE) and Los Alamos National Security, LLC submitted to the New Mexico Environment Department (NMED) notification pursuant to Condition No. 13 of Discharge Permit DP-1132 that seven secondary containment alarms at the Radioactive Liquid Waste Treatment Facility (RLWTF) were malfunctioning (EPC-DO-18-365). Subsequently, DP-1132 was transferred to Triad National Security, LLC (Triad). A copy of the above-referenced letter is provided as Attachment 1. The intent of this letter is to provide NMED with an update on the status of the seven malfunctioning secondary containment alarms.

In the attached letter, DOE/Triad identified seven malfunctioning secondary containment alarms. Three of the malfunctioning alarms have been repaired; two were mistakenly identified as malfunctioning; and two will be repaired over the next four months. Table 1.0 below summarizes the updated alarm status.

Table 1.0. Status Update of Malfunctioning RLWTF Vault and Sump Alarms

Alarm Tag	Location	Alarm Type	Repair Status
PLC11_SM749	TA03-029	vault	in progress
PLC11_SM776	TA03-029	vault	in progress
PLC14_SM758	TA03-130	vault	repaired
PLC2_INF_16_A11	TA50-001	pump control	mistakenly identified
PLC2_INF_16_A41	TA50-001	pump control	mistakenly identified
PLC2_INF_16_A5	TA50-001	floor sump	repaired
PLC2_SMP_34B_A1	TA50-001	floor sump	repaired

Alarms Repaired

- PLC14_SM758: An electrical relay was discovered to be defective, was replaced, and was tested to confirm operability. Communication has been re-established.
- PLC2_INF_16_A5: The communication module for this alarm, a part of the Programmable Logic Controller, was determined to be defective, was replaced, and was tested to confirm operability. Communication has been re-established.
- PLC2_SMP_34B_A1: Wiring between the alarm and the Programmable Logic Controller was corroded. Wiring was replaced, and the alarm was tested to confirm operability. Communication has been re-established.

Alarms Mistakenly Identified as Malfunctioning

- PLC2_INF_16_A11 and PLC2_INF_16_A41 were both determined to be pump ON-OFF controls, not secondary alarms. They had been mistakenly identified during a recent modification to the RLWTF building alarm system.

Repair in Progress

- PLC11_SM749 and PLC11_SM776 have probable breaks in underground communication wiring. These will be upgraded with wireless communication devices. For alarm PLC11_SM749, installation and testing is scheduled to be completed by December 15, 2018. For alarm PLC11_SM776, installation and testing is scheduled to be completed February 15, 2019.

Interim Actions

Until communication is re-established with alarms PLC11_SM749 and PLC11_SM776, the RLWTF will continue to perform weekly visual inspections of these vaults. If liquid is discovered during a weekly inspection, the liquid will be sampled to determine if the water is due to vault infiltration, or due to a leak in the primary pipe.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this status update.

Very truly yours,

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC

Very truly yours,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy

ET/KEA/MTS/RSB:jdm

Attachment(s): Attachment 1 October 15, 2018, Letter to NMED RE: DP-1132, Condition No. 13

Copy: Shelly Lemon, NMED/SWQB, Shelly.Lemon@state.nm.us, (E-File)
John E. Kieling, NMED/HWB, john.kieling@state.nm.us, (E-File)
Gerald Knutson, NMED/GWQB, Gerald.Knutson@state.nm.us, (E-File)
Andrew Romero, NMED/GWQB, AndrewC.Romero@state.nm.us, (E-File)
Karen E. Armijo, NA-LA, Karen.Armijo@nnsa.doe.gov, (E-File)
Michael W. Hazen, ALDESHQSS, mhazen@lanl.gov, (E-File)
William R. Marison, ADESH, wmairson@lanl.gov, (E-File)
Enrique Torres, EPC-DO, etorres@lanl.gov, (E-File)
William H. Schwettmann, IPM, bills@lanl.gov, (E-File)
Raelynn Romero, PM6, raelynn@lanl.gov, (E-File)
Randal S. Johnson, DESHF-TA55, randyj@lanl.gov, (E-File)
Denise C. Gelston, TA-55-RLW, dgelston@lanl.gov, (E-File)
Alvin M. Aragon, TA-55-RLW, alaragon@lanl.gov, (E-File)
John C. Del Signore, TA-55-RLW, jcds@lanl.gov, (E-File)
Michael T. Saladen, EPC-CP, saladen@lanl.gov, (E-File)
Robert S. Beers, EPC-CP, bbeers@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ATTACHMENT 1

October 15, 2018, Letter to NMED
RE: DP-1132, Condition No. 13

EPC-DO: 18-432

LA-UR-18-30938

Date: DEC 0 4 2018

Los Alamos NATIONAL LABORATORY EST 1943

COPY

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

National Nuclear Security Administration
Los Alamos Field Office, A316
3747 West Jemez Road
Los Alamos, New Mexico, 87545
(505) 667-5105/Fax (505) 667-5948

Date: OCT 11 2018
Symbol: EPC-DO-18-365
LA-UR: 18-29518
Locates Action No.: U1801172

GROUND WATER
OCT 15 2018
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Hunter:

Subject: Discharge Plan DP-1132, Condition No. 13, Maintenance and Repair

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS) for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Condition No. 13, Maintenance and Repair, requires DOE/LANS to maintain the function and structural integrity of the RLWTF at all times except during maintenance and repair. Maintenance and repair required at a unit that could lead to an unauthorized discharge to the environment or pose a threat to human health shall be corrected as soon as possible but no later than 30 days from the date of the observed malfunction. Condition No. 13 allows NMED to approve a longer period, for good cause.

Pursuant to Condition No. 13, DOE/LANS have identified seven secondary containment alarms—located in vaults and sumps—that are presently malfunctioning. Repair of these seven alarms will not be completed within 30 days from the date of observed malfunction. Table 1 below provides additional, detailed information on each alarm.

Table 1. List of RLWTF Vault and Sump Alarms Requiring Repair

Tag Name	Location	Alarm Type	Malfunction Type
PLC11_SM749	TA-03-029	RLWCS[1] vault	Communication Failure
PLC11_SM776	TA-03-029	RLWCS vault	Communication Failure
PLC14_SM758	TA-03-130	RLWCS vault	Communication Failure
PLC2_INF_16_A11	TA-50-001	Containment sump	Communication Failure
PLC2_INF_16_A41	TA-50-001	Containment sump	Communication Failure
PLC2_INF_16_A51	TA-50-001	Containment sump	Communication Failure
PLC2_SMP_34B_A1	TA-50-001	Containment sump	Communication Failure

[1]Radioactive Liquid Waste Collection System

DOE/LANS estimate that the task of identifying the root cause for each of the malfunctioning alarms will take approximately 30 days. Once the root cause is determined then DOE/LANS will provide NMED with a schedule for completing the required repairs.

In the interim, until the alarms are fully functional, DOE/LANS commit to implement the following contingencies to ensure that no unauthorized discharge occurs to the environment.

Vault Alarms

- Weekly visual inspection of the vaults with the malfunctioning alarms.
- If liquid is identified during a weekly inspection then the liquid will be sampled to confirm that the source of the liquid is infiltrated ground or storm water and not radioactive liquid waste.

Sump Alarms

- Daily visual inspection of the sumps with the malfunctioning alarms.
- Functioning tank-level alarms that respond to rapid changes in tank volumes.

In closing, DOE/LANS has identified seven secondary containment alarms that require repair; the time period to complete said repairs will extend beyond the 30-day allowable window specified in DP-1132 Condition No. 13. DOE/LANS request 30 days to determine the root cause of the malfunctioning alarms. Once the root cause is identified then a schedule for completing the repairs will be submitted to NMED. DOE/LANS request NMED approval of the proposed plan.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this report.

Sincerely,

Taunia S. Van Valkenburg
Group Leader

Sincerely,

Karen E. Armijo
Permitting and Compliance Program Manager

ARG:KEA:MTS:RSB/jdm

Copy: Shelly Lemon, NMED/SWQB, (E-File)
John E. Kieling, NMED/HWB, (E-File)
Jody M. Pugh, NA-LA, (E-File)
Karen E. Armijo, NA-LA, (E-File)
Kristen M. Dors, LASO-MA-LS, (E-File)
Craig S. Leasure, PADOPS, (E-File)
William R. Mairson, ADESH, (E-File)
Enrique Torres, EPC-DO, (E-File)
Randal S. Johnson, DESHF-TA55, (E-File)
Denise C. Gelston, TA-55-RLW, (E-File)
Alvin M. Aragon, TA-55-RLW, (E-File)
John C. Del Signore, TA-55-RLW, (E-File)
Michael T. Saladen, EPC-CP, (E-File)
Robert S. Beers, EPC-CP, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

Los Alamos NATIONAL LABORATORY EST 1943

COPY

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 665-7314/Fax (505) 667-5948

Symbol: EPC-DO: 18-428
LA-UR: 18-30874
Locates Action No.: U1801172
Date: DEC 0 4 2018

GROUND WATER
DEC 0 4 2018
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: DP-1132, Condition No. 41, Stabilization Work Plans, 100K Tank and Clarifier #1

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy (DOE) and Los Alamos National Security, LLC for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Subsequently, DP-1132 was transferred to Triad National Security, LLC (DOE/Triad). Pursuant to permit Condition No. 41, *Stabilization of Individual Units and Systems,* DOE/Triad is required to submit a work plan for the stabilization of a unit and system that has ceased operations. Stabilization work plans are attached for the following two units that have been removed from service pursuant to Discharge Permit Condition No. 40: (1) 100,000-gallon steel influent tank (100K tank), and (2) Clarifier #1. Upon NMED approval of the attached stabilization work plans, DOE/Triad will implement the plans in accordance with the approved scope and schedule.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding the enclosure work plans for stabilization of the 100K tank and Clarifier #1.

Very truly yours,

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC

Very truly yours,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy

ET/KEA/MTS/RSB:jdm

Attachment(s): Attachment 1 DP-1132, Stabilization Plan for the 100K Tank
Attachment 2 DP-1132, Stabilization Plan for the Low-Level Clarifier #1

Copy: Shelly Lemon, NMED/SWQB, Shelly.Lemon@state.nm.us, (E-File)
John E. Kieling, NMED/HWB, john.kieling@state.nm.us, (E-File)
Gerald Knutson, NMED/GWQB, Gerald.Knutson@state.nm.us, (E-File)
Andrew Romero, NMED/GWQB, AndrewC.Romero@state.nm.us, (E-File)
Karen E. Armijo, NA-LA, Karen.Armijo@nnsa.doe.gov, (E-File)
Michael W. Hazen, ALDESHQSS, mhazen@lanl.gov, (E-File)
William R. Marison, ADESH, wmairson@lanl.gov, (E-File)
Enrique Torres, EPC-DO, etorres@lanl.gov, (E-File)
William H. Schwettmann, IPM, bills@lanl.gov, (E-File)
Raelynn Romero, PM6, raelynn@lanl.gov, (E-File)
Randal S. Johnson, DESHF-TA55, randyj@lanl.gov, (E-File)
Denise C. Gelston, TA-55-RLW, dgelston@lanl.gov, (E-File)
Alvin M. Aragon, TA-55-RLW, alaragon@lanl.gov, (E-File)
John C. Del Signore, TA-55-RLW, jcds@lanl.gov, (E-File)
Michael T. Saladen, EPC-CP, saladen@lanl.gov, (E-File)
Robert S. Beers, EPC-CP, bbeers@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ATTACHMENT 1

DP-1132, Stabilization Plan for the 100K Tank

EPC-DO: 18-428

LA-UR-18-30874

Date: DEC 0 4 2018

Radioactive Liquid Waste Treatment Facility
Stabilization Plan for the 100K Tank

Condition No. 41
Discharge Permit DP-1132

ATTACHMENT 1
EPC-DO-18-428
LA-UR-18-30874

Los Alamos
NATIONAL LABORATORY
EST 1943

Table of Contents

1.0 STABILIZATION OBJECTIVE

This Stabilization Plan describes activities that will be undertaken to stabilize the 100,000 gallon (100K) Tank, a storage unit for low-level radioactive liquid wastes (RLW). This Plan has been prepared in accordance with the provisions specified in Condition 41 of Discharge Permit DP-1132, issued by the New Mexico Environment Department (NMED). Information is presented in the same sequence as the requirements listed in Condition 41.

The primary objective of stabilizing the 100K Tank is to decommission the tank. In addition, its two process lines will be emptied and capped thereby abating any potential for a release until closure can be completed at a future date.

2.0 DESCRIPTION OF THE 100K TANK

The 100K Tank is a cylindrical carbon steel tank with a square bottom sump; see Attachment C. The cylindrical portion of the tank has an inside diameter of 15 feet (ft), a total height of ~20 ft, with a distance of 19 ft to the 6-in.-diameter overflow pipe. An integral part of the tank is a 5-ft x 5-ft sump where the concrete slab indents 3 ft below the cylinder; see Attachment D. The total storage volume of the sump plus the cylinder is 101,000 gallons (gal.).

Secondary containment is provided by a concrete octagon that is 20.7 ft on a side by 8 ft high. The containment walls are 8 in. thick. The sump rests on a concrete slab; see Attachment D. The concrete slab beneath the tank and its sump is 12 in. thick. This secondary containment can hold 124,000 gal. of water.

The 100K Tank went into operation in 1982, nearly 20 years after the RLWTF began to treat water. The 100K Tank is within SWMU 50-001(a). There are no reports of past leaks, and there is no evidence of current leaks.

2.1 Function

The 100K Tank was used for storage of low-level RLW influent from the tank's installation in 1982 through 2000. Since the early 2000s, the tank has also been used for storage of RLW bottoms (also a low-level RLW stream). No treatment occurred within the tank.

The 100K Tank has only two process pipes and one overflow pipe: (1) a 4-in.-diameter carbon steel influent line, (2) a 6-in.-diameter outlet drainpipe, and (3) a 6-in.-diameter overflow line connecting to the outlet drainpipe; see Attachment B.

2.2 Historic Waste Streams

Low-level RLW influent and low-level RLW bottoms were the historic streams stored in the 100K Tank. Influent came from multiple generators at LANL and RLW bottoms are shipped to subcontractors for off-site treatment and disposal.

2.3 Low-level RLW Influent

- *Radioactivity levels* averaged approximately 50-100 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the influent. Beta-emitting radionuclides averaged less than 1 nCi/L. Tritium concentrations have historically averaged 25 nCi/L, but have averaged less than 10 nCi/L in recent years.

- *Non-radioactive constituents* included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate) at parts per million (ppm) concentrations. Regulated metals were also present, but always at parts per billion (ppb) concentrations, far below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of influent was almost always less than 1000 ppm.

2.4 Low-level RLW Bottoms

- *Radioactivity levels* averaged approximately 500-800 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the influent. Beta-emitting radionuclides averaged less than 40 nCi/L. Tritium concentrations have historically averaged 25 nCi/L, but have averaged less than 10 nCi/L in recent years.

- *Non-radioactive constituents* included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate), with sodium being the most prevalent metal. Regulated metals were also present, but always at parts per billion (ppb) concentrations, below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of bottoms were as high as 80,000 ppm.

3.0 STABILIZATION ACTIVITIES FOR THE 100K TANK

3.1 Remove Process Liquids from the 100K Tank

Liquids will be transferred from the 100K Tank to the Main Treatment Plant (microfilter, perchlorate ion exchange, and reverse osmosis) or shipped offsite for third-party treatment and disposal. Low-level radioactive liquid wastes will be treated in accordance with existing operating procedures prior to discharge.

Criterion: The 100K Tank will no longer contain process liquids.

Verification: Removal will be visually verified using photographs.

Documentation: The condition of the interior of the 100K Tank following removal of liquids will be documented through process records and will be used as input for the Stabilization Report.

3.2 Remove Process Solids from 100K Tank

Process solids will be removed (e.g. by hand or by employing a vacuum system), then either placed in approved waste containers or sent through the Secondary Treatment Plant to be processed through the vacuum filter.

Criterion: The 100K Tank will be a shell.

Verification: Removal will be visually verified (before and after photographs).

Documentation: The condition of the interior of the 100K Tank following removal of the solids will be documented through photographs and through radiological surveys of the interior walls of the 100K Tank. Operating records and photographs will be used as input for the Stabilization Report.

3.3 Flush the 100K Tank and Process Piping

Industrial water will be used to flush the 100K Tank. The tank flush may include the removal of solids adhering to tank walls using methods such as a high-pressure spray wand. Flush water will be transferred to the Main Treatment Plant (microfilter and reverse osmosis). The act of transferring flush water in and out of the 100K Tank will flush process piping. Flushing may need to be repeated until the stabilization criterion is met.

Criterion: Flushing will be adequate when flush water concentration decreases to <20 nCi/L.

Verification: Analytical results for flush water samples will be used to verify that the flush criterion has been met.

Documentation: Operating records and analytical data will be used as input for the Stabilization Report.

3.4 Remove Process Piping

Piping that carried process materials into or from the 100K Tank will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that materials can no longer enter the 100K Tank, and that the 100K Tank will be in a stable condition until closure in accordance with the RLWTF Closure Plan (*LANL 2016*). Section 4.1 of this Stabilization Plan has a detailed list of the lines and how each will be isolated.

Criterion: All inlet and outlet lines will be isolated either by removing the line, by capping, or by applying a blind flange.

Verification: Isolation will be visually verified (before and after photographs).

Documentation: Before and after photographs will be taken of process pipe connections. Photographs and activity records will be used as input for the Stabilization Report.

3.5 Remove the Secondary Containment Wall

The secondary containment wall will be removed and disposed as municipal or industrial solid waste.

Criterion: The secondary containment wall will no longer exist.

Verification: Removal will be visually verified (before and after photographs).

Documentation: Before and after photographs will be taken of the secondary containment wall. Photographs and activity records will be used as input for the Stabilization Report.

3.6 Remove the 100K Tank

Prior to the 100K Tank removal, an enclosure with approved high-efficiency particulate air (HEPA) filtration will be constructed around the tank. The 100K Tank will then be removed (e.g. cutting) and disposed as solid low-level radioactive waste.

Criterion: The 100K Tank will no longer exist.

Verification: Removal will be visually verified (before and after photographs).

Documentation: Before and after photographs will be taken of the secondary containment wall. Photographs and activity records will be used as input for the Stabilization Report.

3.7 Remove the Secondary Containment Floor

The secondary containment floor will be removed and disposed as municipal or industrial solid waste.

Criterion: The secondary containment floor will no longer exist.

Verification: Removal will be visually verified (before and after photographs).

Documentation: Before and after photographs will be taken of the secondary containment wall. Photographs and activity records will be used as input for the Stabilization Report.

3.8 Isolate Support Systems

Compressed Air: Compressed air was once used to operate 100K Tank automated valves and has since been disconnected. Air lines disappear into the concrete slab; they will be removed during the removal of the secondary containment floor and disposed as municipal or industrial solid waste.

Electrical: Electric power was used to operate valves. A single line disappears into the concrete slab; it will be removed during removal of the secondary containment floor and disposed as municipal solid waste.

Industrial Water: Not applicable

Ventilation: Not applicable

4.0 OTHER STABILIZATION INFORMATION

4.1 The 100K Tank Conveyance Lines

The 100K Tank has one 4-in. inlet pipe into the bottom of the tank and two 6-in. pipes; one outlet pipe from the bottom of the tank and one overflow pipe from the top of the tank. The overflow pipe ties into the outlet drain pipe. The inlet pipe comes from the 17K tank in Building 50-0248, enters Building 50-0002, disappears into the ground, and comes back up and through the secondary containment wall to the 100K Tank. The outlet drain from the 100K Tank goes through the secondary containment wall, into the ground (where it enters building 50-0248) and connects to the 17K tank.

Stabilization will be achieved when the ~10-in. steel inlet pipe is severed and capped downstream of the last tee where valve WM2-TK75-V43 branches off. The 100K Tank 6-in. outlet pipe and overflow pipe will be stabilized when the pipe is severed and capped ~12- in. from the flange connected to the 17K tank.

4.2 Portions of the Closure Plan to Be Implemented

Stabilization of the 100K Tank pursuant to this Stabilization Plan will execute the following portions of Closure Plan-related activities at the RLWTF:

DP-1132, Condition 42.d, Methods to be used for decontamination of the site and equipment:

- Liquids will be removed within the 100K Tank and processed (treated) in the existing RLWTF.
- Solids will be removed from the 100K Tank, packaged (e.g., 55-gal. drums), then ship to a commercial facility for disposal as solid low-level radioactive waste.
- The interior surfaces of the 100K Tank will be cleaned (e.g., low-pressure and/or high-pressure wash).

DP-1132, Condition 42.h, Methods to be used to characterize waste generated during closure:

- Samples of solids removed from the 100K Tank will be sampled and analyzed for radioactivity (alpha radionuclides, beta radionuclides, and tritium) and RCRA toxicity-characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).

4.3 Portions of the Closure Plan to Be Implemented (continued)

DP-1132, Condition 42.j, Methods to be used to remove, transport, treat, recycle, and dispose of waste generated during closure:

- Liquids and solids from within the 100K Tank will be removed and treated in accordance with existing operating procedures for the 100K Tank and for the Main Treatment Plant .

4.4 Interim Measures and Controls for the 100K Tank

The activities described in Section 3 of this Stabilization Plan will prevent all future releases of (a) water contaminants to the environment, (b) water contaminants from moving into the groundwater, and (c) water contaminants from posing a threat to human health.

Succinctly, process solids and liquids will be removed from the 100K Tank so that it is empty. Inlet and outlet pipes will be removed or capped, or will have blind flanges applied so that new water and process wastes cannot be introduced to the unit. The 100K Tank itself along with the secondary containment floor and wall will be removed and disposed as solid low-level radioactive waste.

4.5 Soil and Groundwater Investigation

There are no reports of past leaks for The 100K Tank, and there is no evidence of current leaks. The 100K Tank is a part of SWMU 50-0001(a), defined as all of building 50-0001.

In addition, the 100K Tank itself is located southeast of building 50-0001. Exterior walls of the tank are visible to operators and other personnel. Had the 100K Tank developed a leak, then water would have been discovered in the secondary containment, and the origin of the leak would have been obvious.

However, the process line that brought RLW bottoms into the 100K Tank, and the drain line from the 100K tank, extend beneath the ground surface. Some portions of these lines are visible from the outside of the 100K Tank, inside of building 50-0248 and building 50-0002.

The investigation, characterization, cleanup, and corrective action requirements for potential releases of contaminants into soil, groundwater, and other environmental media from solid waste management units (SWMUs) and areas of concern (AOCs) associated with the RLWTF are contained within the Compliance Order of June 2016 entered into between the NMED and the DOE pursuant to the New Mexico Hazardous Waste Act - NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act - NMSA 1978,§74-9-36(D). Accordingly, sampling will be conducted per an investigation work plan approved by the Hazardous Waste Bureau under the Consent Order during final closure.

4.6 Stabilization Report

Within 30 days of completion of stabilization activities, a Stabilization Report will be submitted to the NMED for approval. The report will describe stabilization activities. It will contain photographs, radioactive survey data, and other documentation specified in Section 3 of this Plan as evidence that stabilization has been completed.

4.7 Stabilization Schedule

Stabilization is expected to require approximately 30 months. Funding for the stabilization of the 100K Tank was requested for fiscal year 2019 (FY2019 began on October 1, 2018). Stabilization was initiated in October 2018 (planning and start of the procurement process). Removal of process liquids will occur by June 2019. Subcontractor mobilization will occur October 2019. The remaining stabilization steps (cleaning walls and pipes, removing process piping, demolition) will be completed by December 2020. The Stabilization Report will be submitted to NMED in early to mid 2021.

5.0 REFERENCES

New Mexico Environment Department, June 2016. Compliance Order on Consent U.S. Department of Energy, Los Alamos National Laboratory.

New Mexico Environment Department, 08-29-2018. Ground Water Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory.

LANL, April 2010. *Investigation Report for Upper Mortandad Canyon Aggregate Area*, Revision 1, EP-2010-0149, page 98.

6.0 APPENDICES AND ATTACHMENTS

Appendix	Title
1	*None*

Attachment	Title
A	*Stabilization Activities, Criterion, and Documentation for The 100K Tank*
B	*Drawing RLWTF-SD-INF – Influent Storage WM-90 - RLWTF support drawing As-Found, Influent Storage WM-90, Sheet D-6001. Revision 0, June 2015*
C	*Drawing AB57, As-Built Facility Rad Liquid Waste Treatment Plant, 100,000 Gallon Storage Tank Plan & Details, Sheet S41. Revision 1, Sept. 2001.*
D	*Drawing AB57, As-Built Facility Rad Liquid Waste Treatment Plant, 100,000 Gallon Storage Tank Plan & Details, Sheet S42. Revision 1, Sept. 2001.*

6.1 Attachment A

Stabilization Criteria and Documentation for the 100K Tank

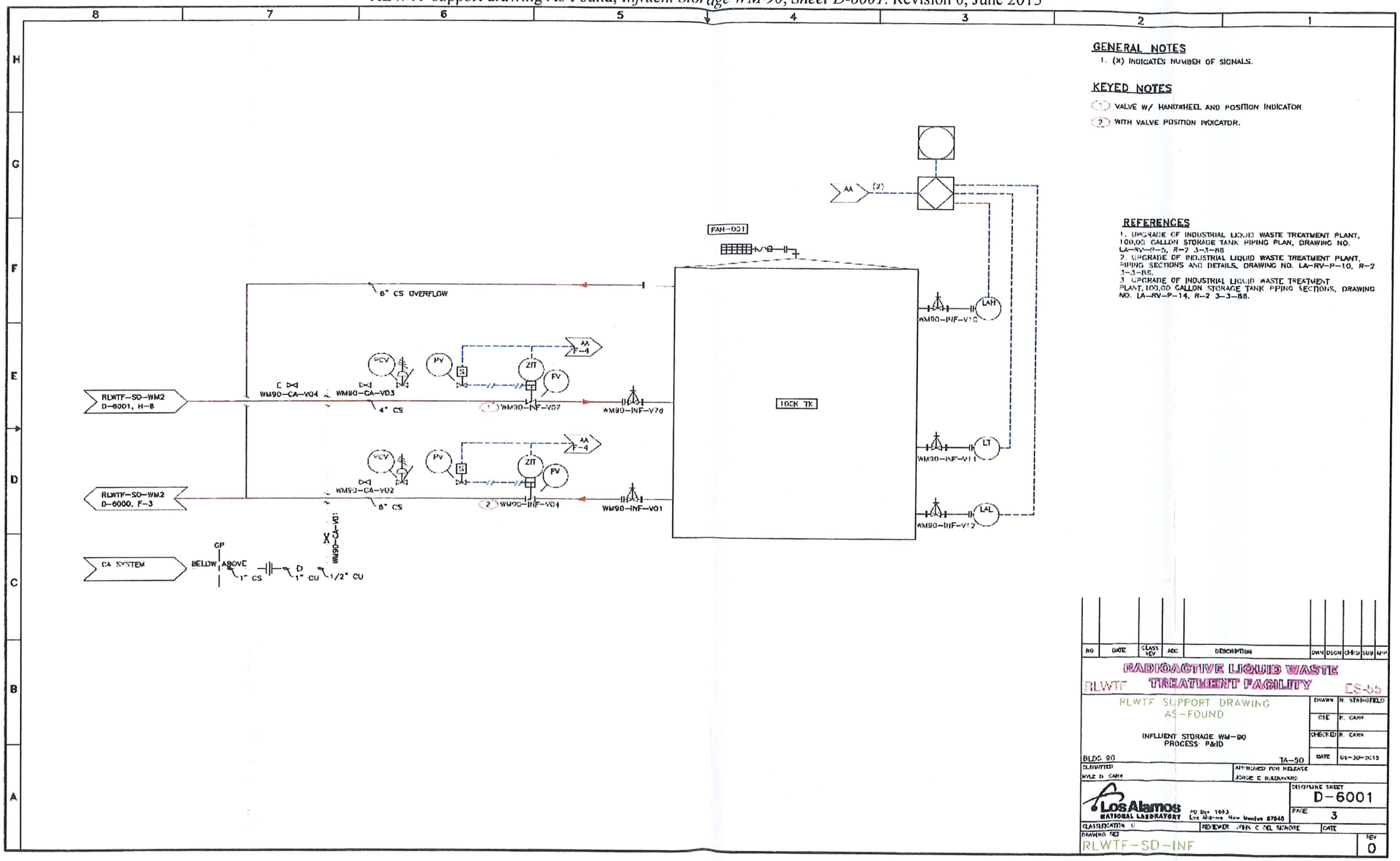
Activity	Criteria	Documentation
1. Remove Process Liquids	The 100K Tank no longer contains process liquids	Process records, including graph of tank levels over time
2. Remove Process Solids	The 100K Tank will be empty	Before and after photographs
3. Flush The 100K Tank and Process Piping	Flush water < 20 nCi/L	Flush water analytical results
4. Remove Process Piping	• Piping no longer exists • Piping cut and capped in WM2	Before and after photographs
5. Remove the Secondary Containment Wall	Secondary containment wall will no longer exist	Before and after photographs
6. Remove the 100K Tank	100K Tank no longer exists	Before and after photographs
7. Remove the Secondary Containment Floor	Concrete base no longer exists	Before and after photographs

In addition to above-listed documentation, activity logs and records will be used as documentation for all activities.

6.2 Attachment B

Drawing RLWTF-SD-INF – Influent Storage WM-90

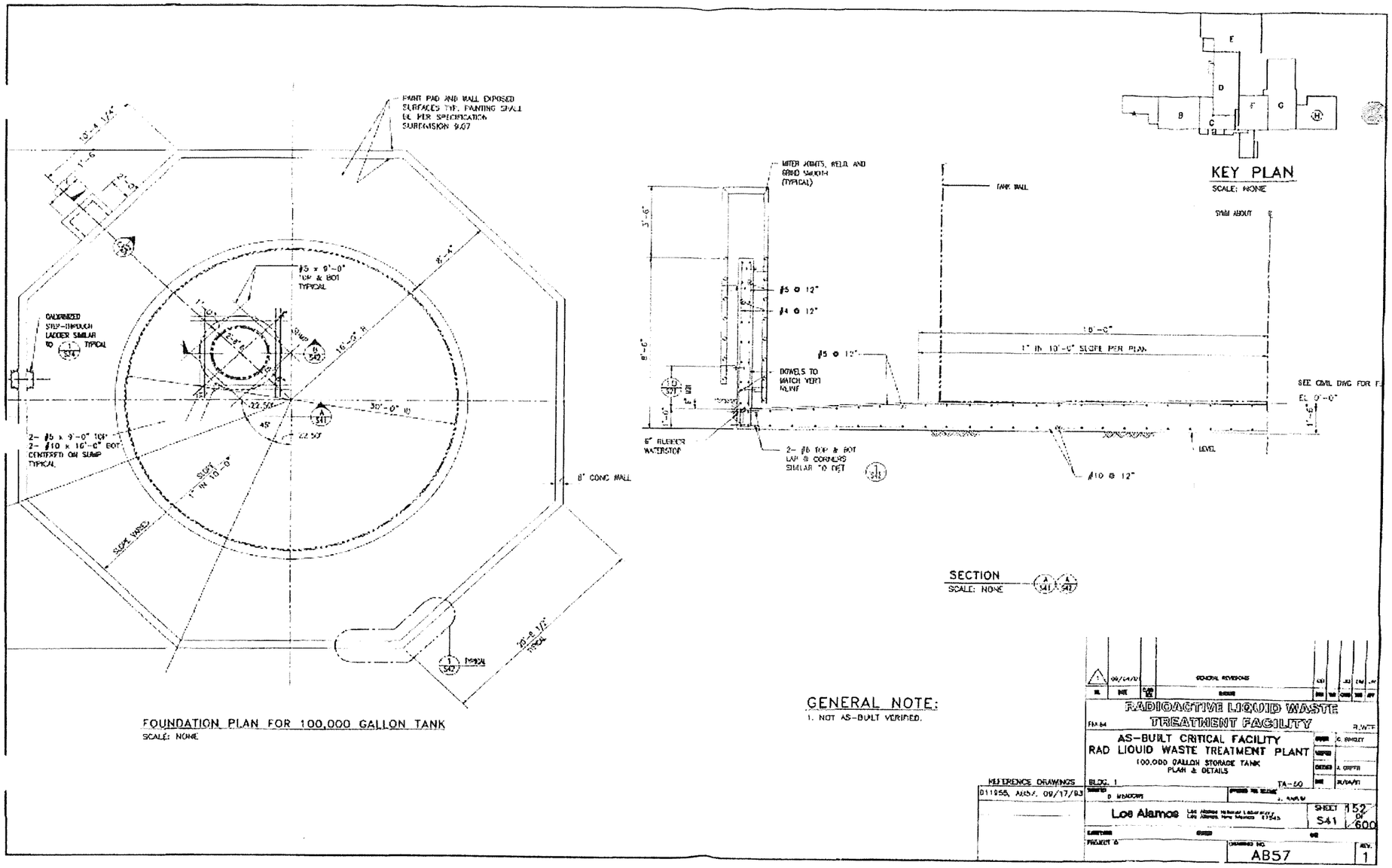
RLWTF support drawing As-Found, *Influent Storage WM-90, Sheet D-6001*. Revision 0, June 2015



6.3 Attachment C

Drawing AB57, As Built Critical Facility Rad Liquid Waste Treatment Plant – Sheet S41

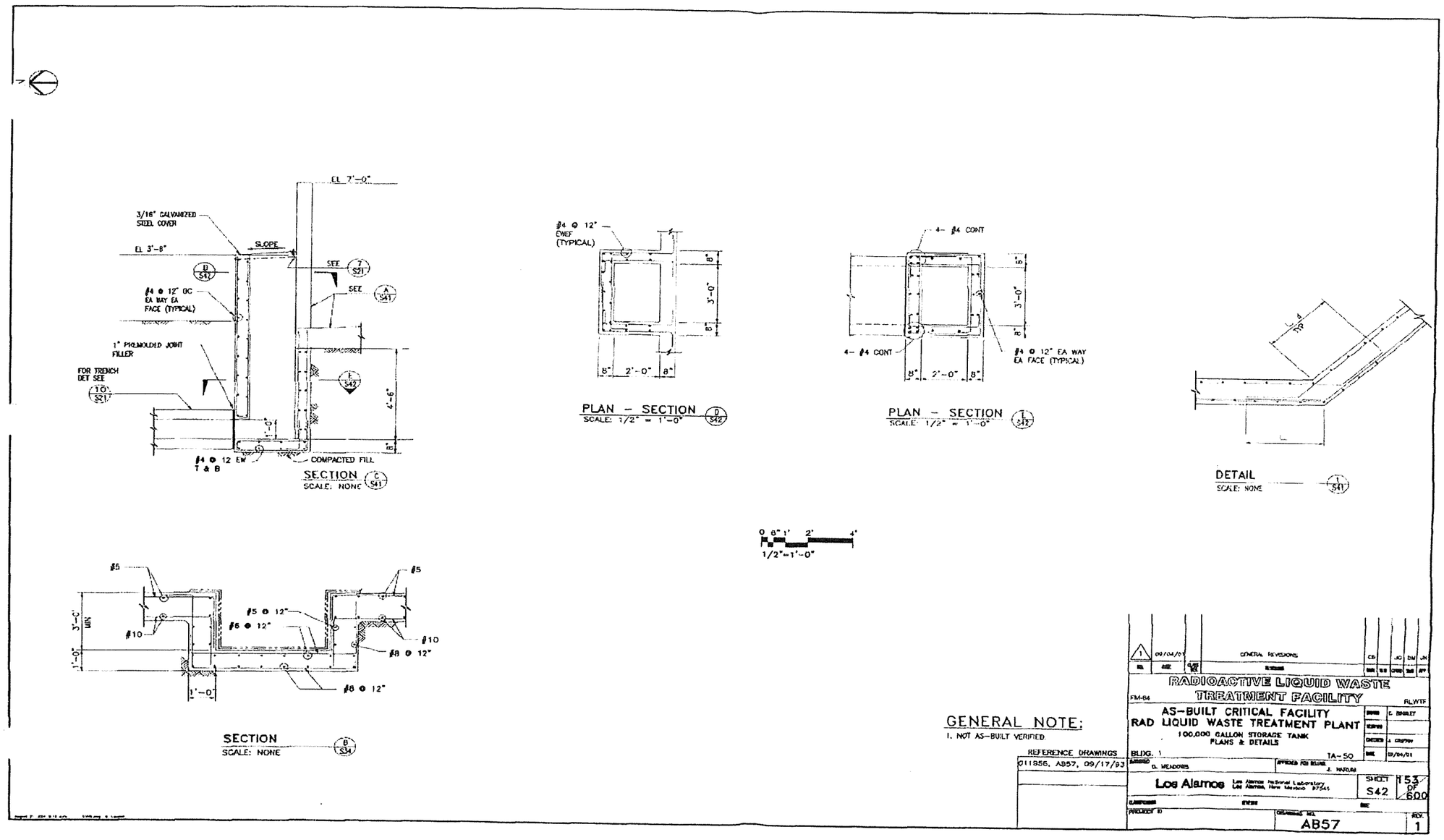
100,000 Gallon Storage Tank Plans & Details, Sheet S41. Revision 1, Sept. 2001



6.4 Attachment D

Drawing AB57, As Built Critical Facility Rad Liquid Waste Treatment Plant – Sheet S42

100,000 Gallon Storage Tank Plans & Details, Sheet S42. Revision 1, Sept. 2001



ATTACHMENT 2

DP-1132, Stabilization Plan for the Low-Level Clarifier #1

EPC-DO: 18-428

LA-UR-18-30874

Date: DEC 0 4 2018

Radioactive Liquid Waste Treatment Facility
Stabilization Plan for Low-Level Clarifier #1

Condition No. 41
Discharge Permit DP-1132

ATTACHMENT 2
EPC-DO-18-428
LA-UR-18-30874

Los Alamos
NATIONAL LABORATORY
EST 1943

Table of Contents

1.0 STABILIZATION OBJECTIVE AND CRITERIA

This Stabilization Plan describes activities that will be undertaken to stabilize Clarifier #1, a treatment unit for low-level radioactive liquid wastes (RLW). This Plan has been prepared in accordance with the provisions specified in Condition 41 of Discharge Permit DP-1132, issued by the New Mexico Environment Department (NMED). Information is presented in the same sequence as requirements are listed in Condition 41.

The primary objective of stabilizing the clarifier is to empty and isolate the unit so that it will pose no threat to the environment (groundwater and air) until closure.

2.0 DESCRIPTION OF CLARIFIER #1

Clarifier #1 is a concrete cylindrical tank with conical bottom. It has a working volume of about 28,000 gallons (gal.), and is designed to handle feed flow rates up to 120 gallons per minute (gpm). Clarifier #1 can be viewed as having five major components: (1) a concrete clarifier vessel, (2) a system for feeding treatment chemicals in a solid or powder form, (3) a liquid chemical feed system, (4) internal components, and (5) superstructure.

(1) ***Concrete vessel:*** The cylindrical portion is 11 feet (ft) 4 inches (in.) high and 20 ft in diameter; the cone has a depth of 18 in. The cement structural support for Clarifier #1 extends 16 in. below the slab floor of the building.

(2) ***System for feeding treatment chemicals:*** Solid treatment chemicals were delivered from a room one floor above the clarifier, using con-bottomed hoppers. Five hoppers were available to feed chemicals to the two clarifiers (#1 and #2). Two of the hoppers are 3 ft in diameter and 10 ft high; three are 2 ft in diameter. Hoppers extend into the room above the clarifiers. The hoppers are equipped with a motor-driven vibrator and had an air operated gate valve at the bottom of each hopper.

(3) ***Liquid chemical feed system:*** Liquid treatment chemicals were delivered from a system of two tanks, approximately 200 gal. each, located between two clarifiers.

2.0 DESCRIPTION OF CLARIFIER #1 (continued)

(4) ***Internal components:*** Internal components consist of a feed well and a solids rake. The feed well (or flocculator tank) is a 10-ft-diameter steel cylinder suspended in the middle of the clarifier. The well is open at the bottom, allowing solids to fall through the bottom of the well onto the floor of the clarifier. A solids rake moves solids to the conical central sump of the clarifier, from where they can be pumped to a collection tank, turning at a rate of approximately 2 revolutions per minute (rpm).

(5) ***Superstructure:*** A beam spans the top of the clarifier. The beam supports the suspended feed well, as well as the rake motor and drive mechanism.

Clarifier #1 went into operation in July 1963, and has been used ever since. Because it is located within Building 1 of Technical Area 50, Clarifier #1 is within SWMU 50-001(a). There are no reports of past leaks, and there is no evidence of current leaks.

2.1 Function

The clarifier system comprised the first portion of the existing Main Treatment Process in the RLWTF. It provided partial removal of metals, radioactive constituents, and other impurities from RLW influent.

The clarifier had two entry streams (RLW influent, treatment chemicals) and two exit streams (treated water, precipitated solids). Feed and chemicals entered from above through a flash mixer into the center feed well. Treated water exited at the bottom of the feed well, rose in the outer portion of the clarifier, and then overflowed the clarifier to the next treatment unit. Precipitated solids settled beneath the feed well; rakes slowly rotated across the bottom of the unit to move the settled solids to the middle of the cone. Clarifier solids were then periodically pumped from the bottom of the clarifier for storage and treatment in the Secondary Treatment Plant.

2.2 Historic Waste Streams

Chemicals and low-level RLW influent were the historic feed streams to Clarifier #1. Influent came from multiple generators at LANL, and was collected and stored in the 75,000-gal. (75K) tank at Building 50-002. Influent was then pumped from the 75K tank to the clarifiers, where chemicals such as lime (calcium hydroxide), caustic soda (sodium hydroxide), and iron sulfate were added to assist in precipitating impurities, including radionuclides.

Treatment chemicals:

- Lime: Bags of powdered lime were dissolved in water and then fed to the flash mixer where the lime and RLW influent were mixed.
- Iron sulfate: Bags of powdered iron sulfate were dissolved in water and then fed to the flash mixer where the iron sulfate and RLW influent were mixed.
- Caustic soda: Solutions of sodium hydroxide (25% or 50% strength) were fed directly into the flash mixer.

Low-level RLW influent: Radioactivity levels averaged 50-100 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the influent. Beta-emitting radionuclides averaged less than 1 nCi/L. Tritium concentrations have historically averaged 25 nCi/L, but have averaged less than 10 nCi/L in recent years.

Low-level RLW influent: Non-radioactive constituents included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate) at parts per million (ppm) concentrations. Regulated metals were also present, but always at parts per billion (ppb) concentrations, far below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of influent averaged less than 1000 ppm.

3.0 STABILIZATION ACTIVITIES FOR CLARIFIER #1

3.1 Dismantle Pilot-Scale Reverse Osmosis Unit

Upon entering Room 116, where Clarifier #1 is located, one immediately encounters a pilot-scale reverse osmosis unit that was used for testing purposes. This unit impedes access to Clarifier #1, liquid chemical feed skids, and Flash Mixer dissolution tanks. The unit also has four process lines that empty directly into the top of Clarifier #1. For both of these reasons, the pilot-scale reverse osmosis unit will be dismantled and removed. Unit components will be disposed as solid low-level radioactive waste.

Criterion:	The pilot-scale unit will be removed.
Verification:	Removal will be visually verified.
Documentation:	Before and after photographs will be taken in Room 116. Photographs and activity records will be used as input for the Stabilization Report.

3.2 Remove Unused Chemicals

Treatment chemicals in solid form were stored one floor above the clarifier, in Room 216, and fed to the clarifier via feed chute. A physical inventory of remaining solid treatment chemicals will be taken and documented. Chemicals, either will then be used in other processes at the RLWTF, or will be disposed in compliance with state and federal regulations.

Treatment chemicals in liquid form were stored in Room 116, before being fed to Clarifier #1. A physical inventory of remaining solid treatment chemicals will be taken and documented. Chemicals either will then be used in other processes at the RLWTF, or will be disposed in compliance with state and federal regulations.

Unused chemicals for both Clarifier #1 and Clarifier #2 will be removed when Clarifier #1 is stabilized. The reporting and documentation for this activity will, however, be reported in the Stabilization Reports for both clarifiers.

Criterion:	No solid or liquid clarifier treatment chemicals will remain.
Verification:	Removal will be visually verified.
Documentation:	Before and after inventory data and photographs will be taken in Rooms 116 and 216. Photographs and activity records (e.g., disposition of unused chemicals) will provide input for the Stabilization Report.

3.3 Dismantle Chemical Feed Systems

Two systems were installed to feed treatment chemicals into the clarifiers. The original (1963) system fed chemicals in solid or powder form; a system installed in 2006 fed chemicals in a liquid form.

Solid chemicals were fed from a room above Clarifier #1 via gravity feed chute. The feed system consisted of feed chutes (five total) and dissolution tanks (two). Dismantled components (chute segments, dissolution tanks, and piping) will be characterized and disposed as solid low-level radioactive waste. Details:

- Three overhead cylindrical feed hoppers from Room 216: The bins neck down from approximately 24-in. diameter to 6-in. diameter, pass through a slide valve, and then are taped shut. Vibrators above the slide valve were used to assist the flow of solid chemical. The 6-in-diameter pipe beneath the slide-valve has been truncated, the dissolution tanks have been removed, and the opening has been taped over. Stabilization will consist of confirming that the bins are empty, then removing the hoppers.

- From Room 216, two 36-in. diameter overhead feed chutes delivered solid chemicals (lime and ferric sulfate) into separate 100-gal. feed tanks. Stabilization will consist of confirming that the feed chutes are empty, them removing the hoppers. The opening into Room 216 will be sealed.

- Chemical dissolution tanks: Two feed tanks received solid chemicals (lime and ferric sulfate) from Room 216 via two feed chutes (see above). Industrial water (1963-2000) or gravity filter effluent (post-2000) was added to the tanks to dissolve the chemicals. Each tank will be rinsed with water, and the rinsate will be emptied into Flash Mixer #2, and then into Clarifier #2. Both tanks, and the 3-in.-diameter drainpipes from the tanks into the flash mixers, will be disposed as solid low-level radioactive waste. Openings into Flash Mixer #1 will be capped.

Two liquid chemical feed skids were erected in 2006 so that chemicals could be purchased in liquid form, and fed to the Flash Mixers without using the dissolution tanks. Each skid included a pump, piping, valves, and a small liquid chemical feed and storage tank (~200 gal.). One skid fed liquid chemicals to Flash Mixer #1 (for Clarifier #1), and the other fed liquid chemicals to Flash Mixer #2 (for Clarifier #2). Both skids will be dismantled, removed, and discarded as solid low-level radioactive waste. Openings into the top of Flash Mixer #1 will be capped.

3.3 Dismantle Chemical Feed Systems (continued)

Criterion: Feed systems for solid and liquid treatment chemicals will be removed.

Verification: Removal will be visually verified.

Documentation: Before and after photographs will be taken in Room 116. Dismantling, characterization, and disposal activities will be documented. Photographs and activity records will be used as input for the Stabilization Report.

Chemical feed systems for both Clarifier #1 and Clarifier #2 will be removed when Clarifier #1 is stabilized. The reporting and documentation for this activity will, however, be reported in the Stabilization Reports for both clarifiers.

3.4 Remove Process Liquids and Solids

Liquids and solids will be transferred from Clarifier #1 to other treatment units for low-level radioactive liquid wastes, where the solids and liquids will be treated, in accordance with existing operating procedures. Specifically, solids will be pumped to TK-8 in Room 61, then processed through the rotary vacuum filter. Clarifier liquids will be processed through the Main Treatment Plant (microfilter, perchlorate ion exchange, and reverse osmosis) prior to discharge to the environment. Vacuum filter solids will be characterized, then disposed. It is anticipated that vacuum filter solids will be disposed as solid low-level radioactive waste.

Criterion: Clarifier #1 will be empty.

Verification: Removal will be visually verified.

Documentation: The condition of the interior of the Clarifier #1 following removal of liquids and solids will be documented through photographs and through radiological surveys of the interior walls of the clarifier. Operating records and photographs will be used as input for the Stabilization Report.

3.5 Flush Clarifier #1 and Process Piping

Industrial water will be used to flush clarifier inlet waste lines and the interior walls of the clarifier, in order to reduce residual internal contamination. Flush water will collect in the clarifier, then be transferred the Main Treatment Plant (microfilter and reverse osmosis) prior to discharge pursuant to DP-1132. The act of transferring flush water out of Clarifier #1 will also flush outlet piping. Flushing may need to be repeated until the stabilization criterion is met.

Criterion: Flushing will be adequate when flush water concentration decreases to <20 nCi/L.

Verification: Analytical results for flush water samples will be used to verify that the flush criterion has been met.

Documentation: Operating records and analytical data will be used as input for the Stabilization Report.

3.6 Remove Superstructure and Internal Components

Superstructure: The beam that spans the top of the clarifier, and the rake motor and drive mechanism, will be removed. The 10-ft-diameter feed well, the solids rake, and their support mechanisms will then be removed from inside the clarifier. Components will be discarded as low-level radioactive waste.

Criterion: The superstructure and internal components of Clarifier #1 will be gone, leaving only the walls and floor of the concrete vessel.

Verification: Removal will be visually verified.

Documentation: Before and after photographs will be taken of the inside of Clarifier #1. Photographs and activity records will provide input for the Stabilization Report.

3.7 Clean and Seal Interior Clarifier Surfaces

Interior surfaces will then be cleaned using measures such as low-pressure spraying or a high-pressure spray wand. Cleaning materials such as water will collect in the clarifier, then be transferred the Main Treatment Plant for processing through the microfilter. Cleaning measures may need to be repeated until the stabilization criterion is met. Residual contamination will then be fixed by applying a brush/roll-on fixative (e.g., paint) to the interior clarifier surfaces

Criterion: Cleaning will be complete when interior surfaces have no residual solids and liquids. Sealing of residual contamination will be complete when contamination levels of painted surfaces have been reduced to <20 dpm per 100 cm^2.

Verification: Cleaning will be visually verified. Radioactive survey results will be used to verify that the sealing criterion has been met.

Documentation: Photographs of the interior walls of the clarifier will be taken prior to cleaning, after cleaning, and after sealing. Radiological surveys will be taken after surfaces have been sealed. Operating records, photographs and radioactive survey data will be used as input for the Stabilization Report.

3. 8 Isolate Inlet and Outlet Lines

Piping that carried chemicals, process materials, and industrial water into or from clarifier will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that materials can no longer enter Clarifier #1, and that Clarifier #1 will be in a stable condition until closure in accordance with the RLWTF Closure Plan (*LANL 2016*). Section 4.1 of this Stabilization Plan has a detailed list of the lines and how each will be isolated.

Criterion: All inlet and outlet lines will be isolated either by removing the line, by capping the line, or by applying a blind flange.

Verification: Isolation will be visually verified.

Documentation: Before and after photographs will be taken of process pipe connections. Photographs and activity records will be used as input for the Stabilization Report.

3.9 Isolate Support Systems

Industrial Water: Water lines into Clarifier are discussed in Section 4.1.

Compressed Air: Not applicable. Compressed air was not used to operate Clarifier #1 components (e.g., clarifier rakes, sludge pumps).

Ventilation: Not applicable. Rooms 16 and 116 receive general room ventilation. There are no clarifier-specific systems to stabilize.

4.0 OTHER STABILIZATION INFORMATION

4.1 Clarifier #1 Conveyance Lines

Process streams enter Clarifier #1 directly (into the top of the Clarifier #1) and indirectly (via Flash Mixer #1). All chemical streams, both solid and liquid, entered indirectly via the Flash Mixer #1. One industrial water line enters directly.

A. Lines into the top of Clarifier #1:

1. Four process lines enter from a pilot-scale reverse osmosis unit installed adjacent to Clarifier #1 (three PVC and one carbon steel). The pilot unit and these lines will be disposed as solid low-level radioactive waste.

2. One industrial water line comes down from the ceiling of Room 116, then elbows into the top of the clarifier. This line will be removed back to Isolation Valve #2, and will then be capped.

3. Reverse osmosis concentrate entered through a 1-in. PVC line. The line raises overhead, then drops back to floor level where influent first enters Room 116. This line will be removed back to its intersection with the influent line.

B. Lines into Flash Mixer #1:

Eight pipes enter Flash Mixer #1. Three are process lines, and five are chemical feed lines. Process influent and clarifier recycle enter the sides of the Flash Mixer; all other lines enter at the top of the Flash Mixer #1.

1. RLW Influent (a 3-in. steel pipe into the side of Flash Mixer #1): Remove the pipe back to a spool piece that is ~2 ft upstream of 116-INF-V20. Then remove the spool piece, and blind flange both open ends. Cap or plug the opening into the side of the Flash Mixer.

2. Reverse osmosis concentrate (a 1-in. PVC pipe into the top of Flash Mixer #1): Remove the pipe back to where it tees into the influent line to Flash Mixer #2, leaving a short (4-in. to 6-in.) stub. Then cap the stub, and cap or plug the opening into Flash Mixer #1.

3. Clarifier recirculation line into the side the Flash Mixer #1: The pipe will be removed back to valve 116-SRL-V01. The valve will be capped, and the opening into Flash Mixer #1 will be capped.

4.1 Clarifier #1 Conveyance Lines (continued)

4. Dissolved lime (a 3-in.-diameter pipe into the top of Flash Mixer #1): The tank that fed Flash Mixer #1, and the dissolved lime pipe, will be removed. The opening into Flash Mixer #1 will be capped.

5. Dissolved ferric sulfate (a 3-in.-diameter pipe into the top of Flash Mixer #1): The tank that fed Flash Mixer #1, and the dissolved ferric sulfate pipe, will be removed. The opening into Flash Mixer #1 will be capped.

6. Liquid sodium hydroxide (a 3/8-in. line into the top of Flash Mixer #1): This line will be removed back to the first flange, and then opening closed with a blind flange. The opening into the top of Flash Mixer #1 will be capped.

7. Liquid chemicals from Skid #1 (a 3/8-in. line into the top of Flash Mixer #1): This line will be removed back to Skid #1, and Skid #1 will then be removed. The opening into the top of Flash Mixer #1 will be capped.

8. Liquid chemicals from Skid #2 (a 3/8-in. line into the top of Flash Mixer #1): This line will be removed back to Skid #2, and Skid #2 will then be removed. The opening into the top of Flash Mixer #1 will be capped.

C. Process Lines Out of Clarifier #1:

NOTE Sludge from the bottom of Clarifier #1 can be sent to the 75K, the WM2 sludge tank, or TK8. The three lines share a common drain line located at floor level. Capping the drain line before it splits will block these three lines.

1. Sludge to 75K tank: Remove the tee located ~8 in. from the exterior wall of Clarifier #1. Apply blind flanges to the three openings.

2. Sludge to the WM2 sludge tank: Remove the tee located ~8 in. from the exterior wall of Clarifier #1. Apply blind flanges to the three openings.

3. Sludge to TK8: Remove the tee located ~8 in. from the exterior wall of Clarifier #1. Apply blind flanges to the three openings.

4.1 Clarifier #1 Conveyance Lines (continued)

4. Feed to the gravity filter: This 10-in. steel pipe drops into Room 16. The 10-in. pipe runs directly from Clarifier #1 to Clarifier #2, about 10 ft above the floor of Room 16. Feed to the gravity filter drops vertically into either a 10-in. feed line to the gravity filter, or into a 6-in. line, that bypasses the gravity filter. Stabilization will be achieved by removing valves 016-GFB-V04 (10-in. diameter), 016-GFB-V02 (four-in. diameter) and 016-ISOL-V08 (10-in. diameter), and by applying blind flanges to the two openings that result when each valve is removed (total of six openings). Stabilization will occur when the gravity filter is stabilized and is, therefore, not considered part of the Stabilization of Clarifier #1.

5. Drain for Flash Mixer #1: This 4-in. steel pipe drops into Room 16, then makes a 60-degree turn to travel horizontally. This will be stabilized by removing the spool piece (~3-ft in length) that is located immediately after the 90-degree turn. Apply blind flanges to the two openings.

6. CL#1 overflow: Overflow is directed to a sump in the floor of Room 16, from which overflow would be pumped to the 75K influent tank in Building 50-02. The overflow line size reduces, from 6-in. diameter to 2-in. diameter, about 8 ft above the sump. A blind flange will be inserted at this size-reduction flange.

4.2 Portions of the Closure Plan to be Implemented

Stabilization of Clarifier #1 pursuant to this Stabilization Plan will execute the following portions of Closure Plan-related activities at the RLWTF:

DP-1132, Condition 42.d, Methods to be used for decontamination of the site and equipment:

- Sludge and liquids will be removed within Clarifier #1 and processed (treated) in the existing RLWTF;
- The interior surfaces of the clarifier will be cleaned (e.g., low-pressure and/or high-pressure wash; and
- Residual contamination will be fixed by applying a brush/roll-on fixative such as paint to the interior clarifier surfaces.

4.2 Portions of the Closure Plan to be Implemented (continued)

DP-1132, Condition 42.h, Methods to be used to characterize waste generated during closure:

- Samples of sludge removed from the clarifiers will be sampled and analyzed for radioactivity (alpha radionuclides, beta radionuclides, and tritium) and RCRA toxicity-characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).

DP-1132, Condition 42.j, Methods to be used to remove, transport, treat, recycle, and dispose of waste generated during closure:

- Liquids and sludge from within the clarifiers will be removed and treated in accordance with existing operating procedures for Clarifier #1, for the Main Treatment Plant, and for the vacuum filter in the Secondary Treatment Plant.

4.3 Interim Measures and Controls for Clarifier #1

The activities described in Section 3 of this Stabilization Plan will prevent all future releases of (a) water contaminants to the environment, (b) water contaminants from moving into the groundwater, and (c) water contaminants from posing a threat to human health.

Succinctly, process solids and liquids will be removed from the clarifier, so that it is empty. Inlet and outlet lines will be removed or capped, or will have blind flanges applied so that new water and process wastes cannot be introduced to the unit. And chemical feed systems will be removed and discarded so that chemicals cannot be re- introduced to Clarifier #1.Soil and Groundwater Investigation

There are no reports of past leaks for Clarifier #1, and no evidence of current leaks. Clarifier #1 is a part of SWMU 50-001(a), defined as all of Building 50-001.

In addition, Clarifier #1 itself is located within Rooms 16 and 116 of Building 50-001. Walls of the unit are visible to operators and other personnel. Had the clarifier developed a leak, then water would have been visible on the floor of Room 16, and the origin of the leak would have been evident.

However, the structural support for Clarifier #1, the process line that brought low-level RLW influent to Clarifier #1, and the process line that removed sludge from Clarifier #1 extend beneath the floor of Room 16 (Note: the floor of Room 16 is part of the slab for Building 50-001).

The investigation, characterization, cleanup and corrective action requirements for potential releases of contaminants into soil, groundwater and other environmental media from solid waste management units (SWMUs) and areas of concern (AOCs) associated with the RLWTF are contained within the Compliance Order of June 2016 entered into between the NMED and the DOE pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978, §74-9-36(D). Accordingly, sampling will be conducted per an investigation work plan approved by the Hazardous Waste Bureau under the Consent Order during final closure.

4.4 Stabilization Report

Within 30 days of completion of stabilization activities, a Stabilization Report will be submitted to the NMED for approval. The report will describe stabilization activities, and will contain photographs, radioactive survey data, and other documentation specified in Section 3 of this Plan as evidence that stabilization has been completed.

4.5 Stabilization Schedule

Stabilization is expected to require approximately 30 months. Funding for the stabilization of Clarifier #1 was requested for fiscal year 2019 (FY2019 began on October 1, 2019). Stabilization was initiated in October 2019 (planning and start of the procurement process). Removal of excess chemicals, and treatment of process liquids and solids will occur during 2019. Removal of feed systems, superstructure, and internal components will occur in 2020. The Stabilization Report will be submitted to NMED in early to mid 2021.

5.0 REFERENCES

New Mexico Environment Department, June 2016. *Compliance Order on Consent U.S.Department of Energy Los Alamos National Laboratory.*

New Mexico Environment Department, 08-29-2018. *Groundwater Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory.*

LANL, April 2010. *Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1,* EP-2010-0149, page 98.

6.0 ATTACHMENT A

Attachment A, Stabilization Criteria and Documentation for Clarifier #1

Activity	Criteria	Documentation
1. Dismantle Pilot-Scale Reverse Osmosis Unit	Remove the unit.	Before and after photographs
2. Remove unused chemicals	No solid or liquid chemicals remain.	Before and after inventory data and photographs
3. Dismantle chemical feed systems	Remove solid and liquid systems.	Before and after photographs
4. Remove process liquids and solids	Clarifier #1 will be empty.	Before and after photographs
5. Flush Clarifier #1 and process piping	Flush water < 20 nCi/L	Flush water analytical results
6. Remove Superstructure and internal components	Remove feed well, solids rake and motor, and support beam.	Before and after photographs
7. Clean and seal interior clarifier surfaces	• Cleaning: No residual solids • Sealing: Contamination < 20 dpm/100 cm^2	• Cleaning: before and after photographs • Sealing: radiation survey results
8. Isolate inlet and outlet lines	Remove or cap the line, or apply a blind flange.	Before and after photographs

In addition to above-listed documentation, activity logs and records will be used as documentation for all activities.

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 665-7314/Fax (505) 667-5948

Symbol: EPC-DO: 18-449
LA-UR: 18-31369
Locates Action No.: U1801172
Date: DEC 18 2018

GROUND WATER
DEC 18 2018
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: DP-1132, Condition No. 20, Summary of Emergency Response Procedures

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy (DOE) and Los Alamos National Security, LLC for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Discharge Permit DP-1132 was transferred to Triad National Security, LLC (Triad) on November 1, 2018. Pursuant to Condition No. 20 of Discharge Permit DP-1132, *Emergency Response Procedures,* DOE/Triad must maintain emergency response procedures at the RLWTF at all times. Condition No. 20 also requires that DOE/Triad provide a written summary of the emergency response procedures to NMED by December 27, 2018. Attachment 1 provides a summary list of all emergency response procedures applicable to the TA-50 RLWTF.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding Attachment 1.

Very truly yours,

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC

Very truly yours,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy

ET/KEA/MTS/RSB:jdm

Attachment(s): Attachment 1 DP-1132, Summary of Emergency Response Procedures

Copy: Shelly Lemon, NMED/SWQB, Shelly.Lemon@state.nm.us, (E-File)
John E. Kieling, NMED/HWB, john.kieling@state.nm.us, (E-File)
Gerald Knutson, NMED/GWQB, Gerald.Knutson@state.nm.us, (E-File)
Andrew Romero, NMED/GWQB, AndrewC.Romero@state.nm.us, (E-File)
Karen E. Armijo, NA-LA, Karen.Armijo@nnsa.doe.gov, (E-File)
Michael W. Hazen, ALDESHQSS, mhazen@lanl.gov, (E-File)
William R. Marison, ADESH, wmairson@lanl.gov, (E-File)
Enrique Torres, EPC-DO, etorres@lanl.gov, (E-File)
William H. Schwettmann, IPM, bills@lanl.gov, (E-File)
Raelynn Romero, PM6, raelynn@lanl.gov, (E-File)
Randal S. Johnson, DESHF-TA55, randyj@lanl.gov, (E-File)
Denise C. Gelston, TA-55-RLW, dgelston@lanl.gov, (E-File)
Alvin M. Aragon, TA-55-RLW, alaragon@lanl.gov, (E-File)
John C. Del Signore, TA-55-RLW, jcds@lanl.gov, (E-File)
Michael T. Saladen, EPC-CP, saladen@lanl.gov, (E-File)
Robert S. Beers, EPC-CP, bbeers@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ATTACHMENT 1

DP-1132, Summary of Emergency Response Procedures

EPC-DO: 18-449

LA-UR-18-31369

Date: DEC 18 2018

Summary of Emergency Response Procedures Applicable to the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF)

Procedure Document #	Procedure Name	Procedure Purpose
ENV-CP-QP-007	Spill Investigations	To assure the immediate mitigation and timely notification of appropriate regulatory organizations in the event of a spill or unplanned discharge that has or may affect the environment.
PD1200	Emergency Management	This procedure institutes the management framework for SEO-DO-PLAN-100, *Los Alamos National Laboratory (LANL) and Los Alamos Field Office Hazardous Materials Emergency Management Plan, (Emergency Plan).*
P1201-4	LANL Incident Reporting and Protective Actions	The purpose of this procedure is to provide requirements and guidance to Laboratory workers and visitors on reporting emergency incidents and taking protective actions in response to emergencies. This document identifies the four general protective actions (i.e., evacuate, Shelter in Place [SIP], remain indoors, and lockdown [including actions during an active threat situation]). It also identifies other incident-specific actions that can be taken in response to specific types of incidents such as a Hazardous Materials (HAZMAT) release, fire, or natural phenomena such as an earthquake and the responsibilities of Laboratory workers and visitors regarding emergency preparedness and response.
SEO-DO-PLAN-100	Emergency Plan	This procedure integrates emergency planning, preparedness, training, response, and recovery activities into a comprehensive, Emergency Management (EM) Program to protect Laboratory employees, emergency responders, neighboring communities, national security information, facilities, lands, and the environment from the consequences of an emergency incident. Compliance with the *Emergency Plan* ensures safe Laboratory operations and the protection of the environment and DOE property, while meeting regulatory requirements.
PD1220	Fire Protection Program	The purpose of this procedure is to provide the management and operations framework for Los Alamos National Laboratory in support of ongoing Lab-wide implementation of a comprehensive LANL Fire Protection Program.

14266

Summary of Emergency Response Procedures Applicable to the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF)

PA-AERI-01031	RLW Emergency Response	This procedure is specific to the RLWTF. It identifies emergency equipment and locations, provides a diagram of emergency evacuation routes and assembly areas, and defines and describes different response actions: shelter-in-place, evacuation, and remain indoors).
PA-AERI-01032	RLW Facility Command Operations	This procedure defines the Facility Team that forms when an evacuation is necessary: Facility Leader, Accountability Officer, Communications Officer, Scribe, and Deputy. The Deputy assembles subject matter experts (radiological protection, industrial hygiene, and engineering) should information that is more detailed be required. Facility Team members done safety vests stored at the assembly areas to indicate their status. When outside agencies arrive, incident command is transferred to the outside agency (typically, Los Alamos Fire Department; sometimes the LANL Emergency Operations). The Facility Response Team remains intact, reporting to the Incident Commander. The Incident Commander will have other expert organizations (e.g., the LAFD, or the LANL Hazardous Materials Response Team) reporting as needed.
ENV-DO-QP-111.3	Reporting Environmental Releases to Pueblo Governments	This procedure describes how to report environmental releases and other emergency events to Pueblo governments.

14267

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.env.nm.gov

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

CERTIFIED MAIL – RETURN RECEIPT REQUESTE

December 27, 2018

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC
PO Box 1663, K490
Los Alamos, New Mexico 87545

Karen E. Armijo
Permitting and Compliance
National Nuclear Security A
U.S. Department of Energy
3747 West Jemez Road, A3
Los Alamos, New Mexico 87544

RE: Approval of Stabilization Work Plans for the 100K Tank and Clarifier #1, Los Alamos National Laboratory Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Mr. Torres and Ms. Armijo:

On December 4, 2018, the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) received workplans from the U.S. Department of Energy and Triad National Security, LLC (DOE/Triad) pursuant to Condition #41 of Discharge Permit 1132 (DP-1132), for the stabilization of the following units that have ceased operations and are being removed from service: (1) 100,000-gallon steel influent tank (100K tank), and (2) Low-Level Clarifier #1.

The primary objective of stabilizing the 100K Tank is to decommission the tank. The work plan proposes the following measures for the stabilization of the 100K Tank:

- Liquids will be transferred from the 100K Tank to the Main Treatment Plant (microfilter, perchlorate ion exchange, and reverse osmosis) or shipped offsite for third-party treatment and disposal.
- Process solids will be removed, then either placed in approved waste containers or sent through the Secondary Treatment Plant to be processed through the vacuum filter. Solids removed from the 100K Tank will be sampled and analyzed for radioactivity (alpha radionuclides, beta radionuclides, and tritium) and RCRA toxicity characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).
- The 100K Tank will be flushed with industrial water, which may include the removal of solids adhering to tank walls. Flush water will be transferred to the Main Treatment Plant. The act of transferring flush water in and out of the 100K Tank will flush process piping.

- Piping that carried process materials into or from the 100K Tank will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that materials can no longer enter the 100K Tank.
- The secondary containment wall will be removed and disposed of as municipal or industrial solid waste.
- Prior to the 100K Tank removal, an enclosure with approved high-efficiency particulate air (HEPA) filtration will be constructed around the tank. The 100K Tank will then be removed and disposed of as solid low-level radioactive waste.
- The secondary containment floor will be removed and disposed of as municipal or industrial solid waste.

The primary objective of stabilizing Clarifier #1 is to empty and isolate the unit so that it will pose no threat to the environment until closure. The work plan proposes the following measures for the stabilization of Clarifier #1:

- The pilot-scale reverse osmosis unit will be dismantled and removed. Unit components will be disposed of as solid low-level radioactive waste.
- Treatment chemicals in solid and liquid form will either be used in other processes at the RLWTF or will be disposed of in compliance with state and federal regulations.
- Solid and liquid chemical feeds will be dismantled, removed, and disposed of as solid low-level radioactive waste.
- Liquids and solids will be transferred from Clarifier #1 to other treatment units for low-level radioactive liquid wastes, where the solids and liquids will be treated, in accordance with existing operating procedures.
- Industrial water will be used to flush the clarifier inlet waste lines and the interior walls of the clarifier. The act of transferring flush water out of Clarifier #1 will also flush outlet piping.
- The beam that spans the top of the clarifier, and the rake motor and drive mechanism will be removed from inside the clarifier and be discarded as low-level radioactive waste.
- Interior surfaces will then be cleaned using measures such as low-pressure spraying or a high-pressure spray wand. Cleaning materials such as water will collect in the clarifier and transferred to the Main Treatment Plant for processing through the microfilter.
- Piping that carried chemical, process materials, and industrial water into or from the clarifier will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that materials can no longer enter Clarifier #1.

The information submitted in the work plans satisfies Condition #41 of your Discharge Permit. Stabilization of the 100K Tank and Clarifier #1 must be implemented as described in the work plans and in accordance with applicable portions of the Closure Plan in DP-1132. The Stabilization Work Plans for the 100K Tank and Clarifier #1 are hereby approved.

Approval of these work plans does not relieve the DOE/Triad of the responsibility to comply with any other applicable federal, state, and/or local laws and regulations. This approval does not relieve DOE/Triad of liability should operations associated with these Work Plans result in actual pollution of ground or surface waters.

If you have any questions, please contact Andrew Romero at (505) 827-0076. Thank you for your cooperation.

Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

MH:ar

cc (e-version):
Steve Pullen, NMED/GWQB
Shelly Lemon, NMED/SWQB
John Kieling, NMED/HWB
Michael W. Hazen, ALDESHQSS
William H. Schwettmann, IPM
Raelynn Romero, PM6
Randal S. Johnson, DESHF-TA55
Denise C. Gelston, TA-55-RLW
Alvin M. Arahon, TA-55-RLW
John C. Del Signore, TA-55-RLW
Michael T. Saladen, EPC-CP
Robert S. Beers, EPC-CP
Steven G. Pearson, EPC-CP

MICHELLE LUJAN GRISHAM
Governor

HOWIE MORALES
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.env.nm.gov

JAMES KENNEY
Cabinet Secretary - Designate

January 18, 2019

John C. Bretzke, Division Leader
Environmental Protection & Compliance Division
Los Alamos National Security LLC
PO Box 1663, K491
Los Alamos, New Mexico 87545

Cheryl L. Rodriguez, Program Manager, FPD-II
Environmental Management
Los Alamos Field Office
3747 West Jemez Road
Los Alamos, New Mexico 87544

RE: Updated Discharge Permit with 2016 Closure Plan, DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory

Dear Mr. Bretzke and Ms. Rodriguez:

On August 29, 2018, the New Mexico Environment Department (NMED) Ground Water Quality Bureau issued a Discharge Permit (DP-1132 or Permit) to the United States Department of Energy and to Los Alamos National Security, LLC (collectively the Permittees) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Ground and Surface Water Protection Regulations, 20.6.2 NMAC.

In the version of the Permit provided to the Permittees, the September 2016 Radioactive Liquid Waste Treatment Facility Closure Plan was inadvertently not included. NMED hereby provides the version of the Permit inclusive of the Closure Plan. This complete Permit reflects the document public noticed by the NMED on May 7, 2017, and the document presented by the NMED at the public hearing on April 19, 2018.

If you have any questions, please contact Andrew Romero at (505) 827-0076.

Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

MH:AR

Encs: DP-1132

cc: Robert Italiano, District Manager, NMED District II (electronic copy)
John Romero, Office of the State Engineer (electronic copy)
Anne Keller, DWB, UOCP (electronic copy)
John Kieling, NMED/HWB (electronic copy)
Shelly Lemon, NMED/SWQB (electronic copy)
Steven Yanicak, NMED/DOEOB (electronic copy)
Bob Beers, EPC-CP, bbeers@lanl.gov (electronic copy)

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 665-7314/Fax (505) 667-5948

Symbol: EPC-DO-19-010
LA-UR: 19-20278
Locates Action No.: U1801172
Date: JAN 2 2 2019

GROUND WATER
JAN 23 2019
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **DP-1132, Condition No. 53, Request for an Extension of Time to Complete Outfall 051 Pipeline Water Tightness Testing**

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy and Los Alamos National Security, LLC for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Subsequently, on November 1, 2018, DP-1132 was transferred to Triad National Security, LLC (DOE/Triad). Under Discharge Permit DP-1132, Condition No. 53, *Extensions of Time,* DOE/Triad may request from NMED an extension of time in which to perform a permit obligation. DOE/Triad must send a written request to NMED that states the length of the requested extension and describes the basis for the extension. Pursuant to permit Condition No. 53, DOE/Triad request an extension of time to complete water tightness testing of the pipeline connecting the TA-50 RLWTF and Outfall 051 in Mortandad Canyon.

Permit Condition No. 8 requires that DOE/Triad demonstrate that the pipeline conveying treated wastewater from the TA-50 RLWTF to Outfall 051—a pipeline without secondary containment—is not leaking. Further, Condition No. 8 stipulates that the tightness test shall be completed by February 25, 2019, 180 days after permit issuance. DOE/Triad request an extension of time for conducting water tightness testing for the following two reasons:

1. Between December 15, 2018, and January 15, 2019, Los Alamos National Laboratory received in excess of 36 inches of snow. The terminus of the outfall pipeline is down a north facing, very steep, dirt road. Access to the outfall prior to spring snow melt could presents significant safety concerns for LANL workers.

2. NPDES Outfall 051 is located within the Mexican Spotted Owl core habitat in Mortandad Canyon. The Mexican Spotted Owl is listed as a threatened species by the U.S. Fish and Wildlife Service. During the Mexican Spotted Owl's breeding season, noise disturbance is not permitted in its core habitat. Conducting work with heavy equipment or other noise-generating machinery is prohibited between March 1 and May 15.

Due to the factors listed above, DOE/Triad estimate that an additional four months will be required to complete water tightness testing of the pipeline to Outfall 051. Accordingly, DOE/Triad request an extension of time until June 25, 2019.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding this request.

Very truly yours,

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC

Very truly yours,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy

TVV/KEA/MTS/RSB:jdm

Copy: Shelly Lemon, NMED/SWQB, Shelly.Lemon@state.nm.us, (E-File)
John E. Kieling, NMED/HWB, john.kieling@state.nm.us, (E-File)
Gerald Knutson, NMED/GWQB, Gerald.Knutson@state.nm.us, (E-File)
Andrew Romero, NMED/GWQB, AndrewC.Romero@state.nm.us, (E-File)
Karen E. Armijo, NA-LA, Karen.Armijo@nnsa.doe.gov, (E-File)
Michael W. Hazen, ALDESHQSS, mhazen@lanl.gov, (E-File)
William R. Marison, ADESH, wmairson@lanl.gov, (E-File)
Enrique Torres, EPC-DO, etorres@lanl.gov, (E-File)
William H. Schwettmann, IPM, bills@lanl.gov, (E-File)
Raelynn Romero, PM6, raelynn@lanl.gov, (E-File)
Randal S. Johnson, DESHF-TA55, randyj@lanl.gov, (E-File)
Denise C. Gelston, TA-55-RLW, dgelston@lanl.gov, (E-File)
Alvin M. Aragon, TA-55-RLW, alaragon@lanl.gov, (E-File)
John C. Del Signore, TA-55-RLW, jcds@lanl.gov, (E-File)
Michael T. Saladen, EPC-CP, saladen@lanl.gov, (E-File)
Robert S. Beers, EPC-CP, bbeers@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

Los Alamos NATIONAL LABORATORY EST 1943

COPY

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

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, New Mexico, 87544
(505) 665-7314/Fax (505) 667-5948

Symbol: EPC-DO: 19-007
LA-UR: 19-20039
Locates Action No.: U1801172
Date: JAN 25 2019

GROUND WATER
JAN 28 2019
BUREAU

Ms. Michelle Hunter, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2261
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Subject: **DP-1132, Condition No. 41, Stabilization Plans for RLWTF Clarifier #2, Gravity Filter, WM2-North/South Tank, and 75K Tank**

Dear Ms. Hunter:

On August 29, 2018, the New Mexico Environment Department (NMED) issued Discharge Permit DP-1132 to the U.S. Department of Energy (DOE) and Los Alamos National Security, LLC for discharges of treated effluent from the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Subsequently, DP-1132 was transferred to Triad National Security, LLC (DOE/Triad) on November 1, 2018. Pursuant to Discharge Permit Condition No. 41, *Stabilization of Individual Units and Systems,* DOE/Triad is required to submit a stabilization plan for a unit or system that has ceased operations. Stabilization plans are attached for the following four units that have been removed from service pursuant to Discharge Permit Condition No. 40, *Cessation of Operation of Specific Units*:

- Attachment 1: Clarifier #2
- Attachment 2: Gravity Filter
- Attachment 3: WM2-North/South Tank
- Attachment 4: 75K Tank

Upon NMED approval of the attached stabilization plans, DOE/Triad will implement the plans in accordance with the approved scope and schedule.

Please contact Karen E. Armijo by telephone at (505) 665-7314 or by email at Karen.Armijo@nnsa.doe.gov, or Robert S. Beers by telephone at (505) 667-7969 or by email at bbeers@lanl.gov if you have questions regarding the attached stabilization plans.

Very truly yours,

Enrique "Kiki" Torres
Division Leader
Environmental Protection & Compliance
Triad National Security, LLC

Very truly yours,

Karen E. Armijo
Permitting and Compliance Program Manager
National Nuclear Security Administration
U.S. Department of Energy

ET/KEA/MTS/RSB:jdm

Attachment(s): Attachment 1 DP-1132 Stabilization Plan for Low-Level Clarifier #2
Attachment 2 DP-1132 Stabilization Plan for Gravity Filter
Attachment 3 DP-1132 Stabilization Plan for WM2-North/South Tank
Attachment 4 DP-1132 Stabilization Plan for 75K Tank

Copy: Shelly Lemon, NMED/SWQB, Shelly.Lemon@state.nm.us, (E-File)
John E. Kieling, NMED/HWB, john.kieling@state.nm.us, (E-File)
Gerald Knutson, NMED/GWQB, Gerald.Knutson@state.nm.us, (E-File)
Andrew Romero, NMED/GWQB, AndrewC.Romero@state.nm.us, (E-File)
Karen E. Armijo, NA-LA, Karen.Armijo@nnsa.doe.gov, (E-File)
Michael W. Hazen, ALDESHQSS, mhazen@lanl.gov, (E-File)
William R. Marison, ADESH, wmairson@lanl.gov, (E-File)
Enrique Torres, EPC-DO, etorres@lanl.gov, (E-File)
William H. Schwettmann, IPM, bills@lanl.gov, (E-File)
Raelynn Romero, PM6, raelynn@lanl.gov, (E-File)
Randal S. Johnson, DESHF-TA55, randyj@lanl.gov, (E-File)
Denise C. Gelston, TA-55-RLW, dgelston@lanl.gov, (E-File)
Alvin M. Aragon, TA-55-RLW, alaragon@lanl.gov, (E-File)
John C. Del Signore, TA-55-RLW, jcds@lanl.gov, (E-File)
Michael T. Saladen, EPC-CP, saladen@lanl.gov, (E-File)
Robert S. Beers, EPC-CP, bbeers@lanl.gov, (E-File)
locatesteam@lanl.gov, (E-File)
epc-correspondence@lanl.gov, (E-File)

ATTACHMENT 1

DP-1132 Stabilization Plan for Low-Level Clarifier #2

EPC-DO: 19-007

LA-UR-19-20039

Date: JAN 2 5 2019

Attachment 1

Radioactive Liquid Waste Treatment Facility Stabilization Plan for Low-Level Clarifier #2

Discharge Permit DP-1132

Condition No. 41

LA-UR-19-20039

Table of Contents

1.0 STABILIZATION OBJECTIVE AND CRITERIA

This Stabilization Plan describes activities that will be undertaken to stabilize Clarifier #2, a treatment unit for low-level radioactive liquid wastes (RLW). This Plan has been prepared in accordance with the provisions specified in Condition 41 of Discharge Permit DP-1132, issued by the New Mexico Environment Department (NMED). Information is presented in the same sequence as requirements are listed in Condition 41.

The primary objective of stabilizing the clarifier is to empty and isolate the unit so that it will pose no threat to the environment (groundwater and air) until closure.

2.0 DESCRIPTION OF CLARIFIER #2

Clarifier #2 is a concrete cylindrical tank with conical bottom. It has a working volume of about 28,000 gallons, and is designed to handle feed flow rates up to 120 gpm. Clarifier #2 can be viewed as having five major components: (1) the concrete clarifier vessel (2) a system for feeding treatment chemicals in a solid or powder form (3) a liquid chemical feed system (4) internal components, and (5) superstructure.

1. ***Concrete vessel:*** The cylindrical portion is 11 feet 4 inches high and 20 feet in diameter; the cone has a depth of 18 inches. The cement structural support for Clarifier #2 extends sixteen inches below the slab floor of the building.

2. ***System for feeding treatment chemicals:*** Solid treatment chemicals were delivered from a room one floor above the clarifier using cone-bottomed hoppers. Five hoppers were available to feed chemicals to the two clarifiers (#1 and #2). Two of the hoppers are three feet in diameter and ten feet high; three are two feet in diameter. Hoppers extend into the room above the clarifiers. The hoppers are equipped with a motor-driven vibrator, and had an air-operated gate valve at the bottom of each hopper.

3. ***Liquid chemical feed system:*** Liquid treatment chemicals were delivered from a system of two tanks, approximately 200 gallons each, located between the two clarifiers.

2.0 DESCRIPTION OF CLARIFIER #2 (continued)

4. ***Internal components:*** Internal components consist of a feed well and solids rake. The feed well (or flocculator tank) is a 10-foot-diameter steel cylinder suspended in the middle of the clarifier. The well is open at the bottom, allowing solids to fall through the bottom of the well onto the floor of the clarifier. A solids rake moves solids to the conical central sump of the clarifier, from where they can be pumped to a collection tank, turning at the rate of approximately two RPM.

5. ***Superstructure:*** A beam spans the top of the clarifier. The beam supports the suspended feed well, and the rake motor and drive mechanism.

Clarifier #2 went into operation in July 1963, and has been used ever since. Because it is located within Building 1 of Technical Area 50, Clarifier #2 is within SWMU 50-001(a). However, there are no reports of past leaks, and there is no evidence of current leaks.

2.1 Function

The clarifier system comprised the first portion of the existing Main Treatment Process in the RLWTF. It provided partial removal of metals, radioactive constituents, and other impurities from RLW influent.

The clarifier had two entry streams (RLW influent, treatment chemicals) and two exit streams (treated water, precipitated solids). Feed and chemicals entered from above through a flash mixer into the center feed well. Treated waters exited at the bottom of the feed well, rose in the outer portion of the clarifier, and then overflowed the clarifier to the next treatment unit.

Precipitated solids settled beneath the feed well; rakes slowly rotated across the bottom of the unit to move the settled solids to the middle of the cone. Clarifier solids were then periodically pumped from the bottom of the clarifier for storage and treatment in the Secondary Treatment Plant.

2.2 Historic Waste Streams

Chemicals and low-level RLW influent were the historic feed streams to Clarifier #2. Influent came from multiple generators at LANL, and was collected and stored in the 75K tank at Building 50-002. Influent was then pumped from the 75K Tank to the clarifier, where chemicals such as lime (calcium hydroxide), caustic soda (sodium hydroxide), and iron sulfate were added to assist in precipitating impurities, including radionuclides.

Treatment chemicals:

- Lime - Bags of powdered lime were dissolved in water and then fed to the flash mixer where the lime and RLW influent were mixed.
- Iron sulfate - Bags of powdered iron sulfate were dissolved in water and then fed to the flash mixer where the iron sulfate and RLW influent were mixed.
- Caustic soda - Solutions of sodium hydroxide (25% or 50% strength) were fed directly into the flash mixer.

Low-level RLW influent: Radioactivity levels averaged 50-100 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the influent. Beta-emitting radionuclides averaged less than 1 nCi/L. Tritium concentrations have historically averaged 25 nCi/L, but have averaged less than 10 nCi/L in recent years.

Low-level RLW influent: Non-radioactive constituents included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate) at parts-per-million (ppm) concentrations. Regulated metals were also present, but always at parts-per-billion concentrations, far below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of influent averaged less than 1000 ppm.

3.0 STABILIZATION ACTIVITIES FOR CLARIFIER #2

3.1 Remove Unused Chemicals

NOTE Unused chemicals for both Clarifier #1 and Clarifier #2 will be removed when Clarifier #1 is stabilized. The reporting and documentation for this activity will, however, be reported in both Stabilization Reports.

Treatment chemicals in solid form were stored one floor above the clarifier, in Room 216, and fed to the clarifier via feed chute. A physical inventory of remaining solid treatment chemicals will be taken and documented. Chemicals either will then be used in other processes at the RLWTF, or will be disposed in compliance with state and federal regulations.

Treatment chemicals in liquid form were stored in Room 116, before being fed to Clarifier #2. A physical inventory of remaining solid treatment chemicals will be taken and documented. Chemicals either will then be used in other processes at the RLWTF, or will be disposed in compliance with state and federal regulations.

Criterion: No solid or liquid clarifier treatment chemicals will remain.

Verification: Removal will be visually verified.

Documentation: Before and after inventory data and photographs will be taken in Rooms 116 and 216. Photographs and activity records (e.g., disposition of unused chemicals) will provide input for the Stabilization Report.

3.2 Dismantle Chemical Feed Systems

NOTE Chemical feed systems for both Clarifier #1 and Clarifier #2 will be removed when Clarifier #1 is stabilized. The reporting and documentation for this activity will, however, be reported in both Stabilization Reports.

Two systems were installed to feed treatment chemicals to the clarifiers. The original (1963) system fed chemicals in solid or powder form; a system installed in 2006 fed chemicals in a liquid form.

3.2 Dismantle Chemical Feed Systems (continued)

Solid chemicals were fed from a room above Clarifier #2 via gravity feed chute. The feed system consisted of feed chutes (five total) and dissolution tanks (two). Dismantled components (chute segments, dissolution tanks, and piping) will be characterized and disposed as solid low-level radioactive waste. Details:

- Three overhead cylindrical feed hoppers from Room 216: The bins neck down from approximately 24" diameter to 6" diameter, pass through a slide valve, and then are taped shut. Vibrators above the slide valve were used to assist the flow of solid chemical. The 6" diameter pipe beneath the slide-valve has been truncated, the dissolution tanks have been removed, and the opening has been taped over. Stabilization will consist of confirming that the bins are empty, then removing the hoppers.

- From Room 216, two overhead feed chutes 36" in diameter delivered solid chemicals (lime and ferric sulfate) into separate 100-gallon feed tanks. Stabilization will consist of confirming that the feed chutes are empty, them removing the hoppers. The opening into Room 216 will be sealed.

- Chemical dissolution tanks: Two feed tanks received solid chemicals (lime and ferric sulfate) from Room 216 via two feed chutes (see above). Industrial water (1963-2000) or gravity filter effluent (post-2000) was added to the tanks to dissolve the chemicals. Each tank will be rinsed with water, and the rinsate will be emptied into Flash Mixer #2, and then into Clarifier #2. Both tanks, and the 3-inch-diameter drainpipes from the tanks into the flash mixers, will be disposed as solid low-level radioactive waste. Openings into Flash Mixer #1 will be capped.

Two liquid chemical feed skids were erected in 2006 so that chemicals could be purchased in liquid form, and fed to the Flash Mixers without using the dissolution tanks. Each skid included a pump, piping, valves, and a small liquid chemical feed and storage tank (~200 gallons).

One skid fed liquid chemicals to Flash Mixer #1 (for Clarifier #1), and the other fed liquid chemicals to Flash Mixer #2 (for Clarifier #2). Both skids will be dismantled, removed, and discarded as solid low-level radioactive waste. Openings into the top of Flash Mixer #1 will be capped.

3.2 Dismantle Chemical Feed Systems (continued)

Criterion: Feed systems for solid and liquid treatment chemicals will be removed.

Verification: Removal will be visually verified.

Documentation: Before and after photographs will be taken in Room 116. Dismantling, characterization, and disposal activities will be documented. Photographs and activity records will be used as input for the Stabilization Report.

3.3 Remove Process Liquids and Solids

Liquids and solids will be transferred from Clarifier #2 to other treatment units for low-level radioactive liquid wastes, where the solids and liquids will be treated, in accordance with existing operating procedures. Specifically, solids will be pumped to TK-8 in Room 61, and then processed through the rotary vacuum filter. Clarifier liquids will be processed through the Main Treatment Plant (microfilter, perchlorate ion exchange, and reverse osmosis) prior to discharge to the environment. Vacuum filter solids will be characterized, and then disposed. It is anticipated that vacuum filter solids will be disposed as solid low-level radioactive waste.

Criterion: Clarifier #2 will be empty.

Verification: Removal will be visually verified.

Documentation: The condition of the interior of the Clarifier #2 following removal of liquids and solids will be documented through photographs and through radiological surveys of the interior walls of the clarifier. Operating records and photographs will be used as input for the Stabilization Report.

3.4 Flush Clarifier #2 and Process Piping

Industrial water will be used to flush clarifier inlet waste lines and the interior walls of the clarifier, in order to reduce residual internal contamination. Flush water will collect in the clarifier, then be transferred the Main Treatment Plant (microfilter and reverse osmosis) prior to discharge pursuant to DP-1132. The act of transferring flush water out of Clarifier #2 will also flush outlet piping. Repeated flushing may be required until the stabilization criterion is met.

Criterion: Flushing will be adequate when flush water concentration decreases to <20 nCi/L.

Verification: Analytical results for flush water samples will be used to verify that the flush criterion has been met.

Documentation: Operating records and analytical data will be used as input for the Stabilization Report.

3.5 Remove Superstructure and Internal Components

Superstructure: The beam that spans the top of the clarifier, and the rake motor and drive mechanism, will be removed. The 10-foot-diameter feed well, the solids rake, and their support mechanisms will then be removed from inside the clarifier. Components will be discarded as low-level radioactive waste.

Criterion: The superstructure and internal components of Clarifier #1 will be gone, leaving only the walls and floor of the concrete vessel.

Verification: Removal will be visually verified.

Documentation: Before and after photographs will be taken of the inside of Clarifier #1. Photographs and activity records will provide input for the Stabilization Report.

3.6 Clean and Seal Interior Clarifier Surfaces

Interior surfaces will then be cleaned using measures such as low-pressure spraying or a high-pressure spray wand. Cleaning materials such as water will collect in the clarifier, then be transferred the Main Treatment Plant for processing through the microfilter. Cleaning measures may need to be repeated until the stabilization criterion is met. Residual contamination will then be fixed by applying a brush/roll-on fixative (e.g., paint) to the interior clarifier surfaces.

Criterion: Flushing will be adequate when flush water concentration decreases to <20 nCi/L.

Verification: Cleaning will be visually verified. Radioactive survey results will be used to verify that the sealing criterion has been met.

Documentation: Photographs of the interior walls of the clarifier will be taken prior to cleaning, after cleaning, and after sealing. Radiological surveys will be taken after surfaces have been sealed. Operating records, photographs, and radioactive survey data will be used as input for the Stabilization Report.

3.7 Isolate Inlet and Outlet Lines

Piping that carried chemicals, process materials, and industrial water into or from the clarifier will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that materials can no longer enter Clarifier #2, and that Clarifier #2 will be in a stable condition until closure in accordance with the RLWTF Closure Plan (*LANL 2016*). Section 4.1 of this Stabilization Plan has a detailed list of the lines and how each will be isolated.

Criterion: All inlet and outlet lines will be isolated either by removing the line, by capping, or by applying a blind flange.

Verification: Isolation will be visually verified.

Documentation: Before and after photographs will be taken of process pipe connections. Photographs and activity records will be used as input for the Stabilization Report.

3.8 Isolate Support Systems

Industrial Water: Enters Clarifier #2 via recirculation line. This will be isolated as part of the Flash Mixer #2 recirculation line isolation.

Compressed Air: Not applicable. Compressed air was not used to operate Clarifier #2 components (e.g., clarifier rakes, sludge pumps).

Ventilation: Not applicable. Rooms 16 and 116 receive general room ventilation. There are no clarifier-specific systems to stabilize.

4.0 OTHER STABILIZATION INFORMATION

4.1 Clarifier #2 Conveyance Lines

All process and chemical streams enter Clarifier #2 indirectly, via Flash Mixer #2. No streams are fed directly into the top of Clarifier #2.

A. Lines into Flash Mixer #2:

Seven pipes enter Flash Mixer #2. Two are process lines, and five are chemical feed lines. All seven lines enter at the top of Flash Mixer #2.

1. RLW influent (a 3-inch steel pipe into the side of Flash Mixer #2): Remove the pipe back to the tee where influent divides to either Clarifier# or Clarifier #2. This tee is upstream of the Clarifier #2 flow meter, and upstream of valve 116-INF-V18, both of which will be removed. The tee itself will be removed, and blind flanges placed on the three openings. Cap the opening into the top of Flash Mixer #2.
2. Clarifier recirculation (a 2-inch steel pipe into the top of Flash Mixer #2): The pipe will be removed back to valve 116-SRC-V06 against the wall. The open end of the valve will be capped, and the opening into Flash Mixer #2 will be capped.
3. Dissolved lime (a 3-inch-diameter pipe into the top of Flash Mixer #2): The tank that fed Flash Mixer #2, and the dissolved lime pipe, will be removed. The opening into Flash Mixer #2 will be capped.
4. Dissolved ferric sulfate (a 3-inch-diameter pipe into the top of Flash Mixer #2): The tank that fed Flash Mixer #2, and the dissolved ferric sulfate pipe, will be removed. The opening into Flash Mixer #2 will be capped.
5. Liquid sodium hydroxide (a 3/8-inch line into the top of Flash Mixer #2): This line will be removed back to its transition to plastic tubing. The tubing will then be removed back to the point of its entry into its source tank (CST-2) in Room 16. The opening into the top of Flash Mixer #2 will be capped.
6. Liquid chemicals from Skid #1 (a 3/8-inch line into the top of Flash Mixer #2): This line will be removed back to Skid #1, and Skid #1 will then be removed. The opening into the top of Flash Mixer #2 will be capped.

4.1 Clarifier #2 Conveyance Lines

7. Liquid chemicals from Skid #2 (a 3/8-inch line into the top of Flash Mixer #2): This line will be removed back to Skid #2, and Skid #2 will then be removed. The opening into the top of Flash Mixer #1 will be capped.

B. Process Lines Out of Clarifier #2:

NOTE Sludge drains from Clarifier #2 in two locations. One drain line is at floor level; the other exits Clarifier #2 about 10 feet above the floor.

1. Floor-level sludge drain: Remove the tee located ~six inches from the exterior wall of Clarifier #2. Apply blind flanges to all three openings.

2. Drain at the ten-foot level: Sludge to the WM2 sludge tank: Remove the spool piece located ~ten inches from the exterior wall of Clarifier #2. Apply blind flanges to both openings.

3. Feed to the gravity filter: This 10-inch steel pipe drops into Room 16. The 10-inch pipe runs directly from Clarifier #2 to Clarifier #1, about 10 feet above the floor of Room 16. Either feed to the gravity filter drops vertically into a 10-inch feed line to the gravity filter, or into a six-inch line, that bypasses the gravity filter. Stabilization will be achieved by removing valves 016-GFB-V04 (10-inch diameter), 016-GFB-V02 (four-inch diameter), and 016-ISOL-V08 (10-inch diameter), and by applying blind flanges to the two openings that result when each valve is removed (total of six openings). Stabilization will occur when the gravity filter is stabilized and is, therefore, not considered part of the Stabilization of Clarifier #2.

4. Drain for Flash Mixer #2: This 4-inch steel pipe drops into Room 16, then makes a 60-degree turn to travel horizontally. This will be stabilized by removing the spool piece (~six feet in length) that is located immediately after the 90-degree turn. Apply blind flanges to the two openings.

5. CL#2 overflow: This line descends from the top of Clarifier #2 to a point about ten feet above floor level, then makes a 90-degree turn. Remove the elbow spool piece, and apply blind flanges to both openings.

4.2 Implementation: Portions of the Closure Plan

Stabilization of Clarifier #2 pursuant to this Stabilization Plan will execute the following portions of Closure Plan-related activities at the RLWTF:

DP-1132, Condition 42.d, Methods to be used for decontamination of the site and equipment:

- Sludge and liquids will be removed within Clarifier #2 and processed (treated) in the existing RLWTF;
- The interior surfaces of the clarifier will be cleaned (e.g., low-pressure and/or high-pressure wash; and
- Residual contamination will be fixed by applying a brush/roll-on fixative such as paint to the interior clarifier surfaces.

DP-1132, Condition 42.h, Methods to be used to characterize waste generated during closure:

- Samples of sludge removed from the clarifiers will be sampled and analyzed for radioactivity (alpha radionuclides, beta radionuclides, and tritium) and RCRA toxicity-characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).

DP-1132, Condition 42.j, Methods to be used to remove, transport, treat, recycle, and dispose of waste generated during closure:

- Liquids and sludge from within the clarifiers will be removed and treated in accordance with existing operating procedures for Clarifier #2, for the Main Treatment Plant, and for the vacuum filter in the Secondary Treatment Plant.

4.3 Interim Measures and Controls for Clarifier #2

The activities described in Section 3 of this Stabilization Plan will prevent all future releases of (a) water contaminants to the environment, (b) water contaminants from moving into the ground water, and (c) water contaminants from posing a threat to human health.

Succinctly, process solids and liquids will be removed from the clarifier, so that it is empty. Inlet and outlet lines will be removed or capped, or will have blind flanges applied so that new water and process wastes cannot be introduced to the unit. And chemical feed systems will be removed and discarded so that chemicals cannot be re-introduced to Clarifier #2.

4.4 Soil and Groundwater Investigation

There are no reports of past leaks for Clarifier #2, and no evidence of current leaks. Clarifier #2 is a part of SWMU 50-001(a), defined as all of Building 50-001.

In addition, Clarifier #2 itself is located within Rooms 16 and 116 of Building 50-001. Walls of the unit are visible to operators and other personnel. Had the clarifier developed a leak, then water would have been discovered on the floor of Room 16, and the origin of the leak would have been obvious.

However, the structural support for Clarifier #2, the process line that brought low-level RLW influent to Clarifier #2, and the process line that removed sludge from Clarifier #2 extend beneath the floor of Room 16.[1]

The investigation, characterization, cleanup and corrective action requirements for potential releases of contaminants into soil, groundwater and other environmental media from solid waste management units (SWMUs) and areas of concern (AOCs) associated with the RLWTF are contained within the Compliance Order of June 2016 entered into between the NMED and the DOE pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978, §74-9-36(D). Accordingly, sampling will be conducted per an investigation work plan approved by the Hazardous Waste Bureau under the Consent Order during final closure.

[1] The floor of Room 16 is part of the slab for Building 50-001.

4.5 Stabilization Report

Within 30 days of completion of stabilization activities, a Stabilization Report will be submitted to the NMED for approval. The report will describe stabilization activities, and will contain photographs, radioactive survey data, and other documentation specified in Section 3 of this Plan as evidence that stabilization has been completed.

4.6 Stabilization Schedule

Funding for the stabilization of Clarifier #2 has been requested for fiscal year 2021 and stabilization is anticipated to require 24 months. Milestone dates would be as follows:

- As part of the Stabilization of Clarifier #1, removal of excess chemicals, and treatment of process liquids and solids, and removal of feed systems would occur during 2019.
- Stabilization of Clarifier #2 itself would be initiated October 2021 (planning and start of the procurement process).
- Removal of the superstructure and internal components would occur in 2022, and the Stabilization Report would be submitted to NMED in October 2022.

5.0 REFERENCES

New Mexico Environment Department, June 2016. *Compliance Order on Consent U.S. Department of Energy Los Alamos National Laboratory.*

New Mexico Environment Department, 08-29-2018. *Ground Water Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory.*

LANL, April 2010. *Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1*, EP-2010-0149, page 98.

LANL, September 2016. *Radioactive Liquid Waste Treatment Facility Closure Plan*, LA-UR-16-27050.

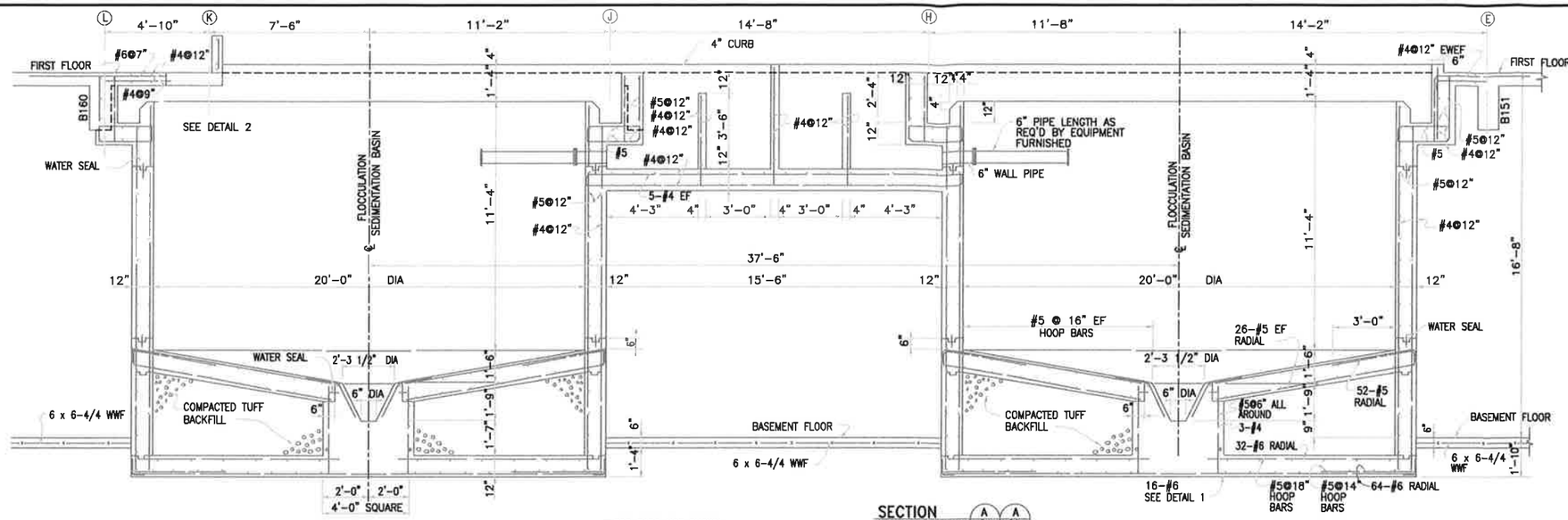
6.0 ATTACHMENTS

Attachment	Title
A	*Stabilization Criteria and Documentation for Clarifier #2*
B	*Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Equipment Sections, Sheet S11. Revision 1, Sep 2001*
C	*Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Piping Basement Area D, Sheet M115. Revision 1, Sep 2001*
D	*Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Piping and Details, Sheet M136. Revision 1, Sep 2001*

Attachment A, Stabilization Criteria and Documentation for Clarifier #2

Activity	Criteria	Documentation
1. Remove unused chemicals	No solid or liquid chemicals remain.	Before and after inventory data and photographs
2. Dismantle chemical feed systems	Remove solid and liquid systems.	Before and after photographs
3. Remove process liquids and solids	Clarifier #2 will be empty.	Before and after photographs
4. Flush Clarifier #2 and process piping	Flush water <20 nCi/L	Flush water analytical results
5. Remove superstructure and internal components	Remove feed well, solids rake and motor, and support beam.	
6. Clean and seal interior clarifier surfaces	• Cleaning: No residual solids • Sealing: Contamination < 20 dpm/100 cm^2	• Cleaning: Before and after photographs • Sealing: Radiation survey results
7. Isolate inlet and outlet lines	Remove or cap the line, or apply a blind flange	Before and after photographs

In addition to above-listed documentation, activity logs and records will be used as documentation for all activities.



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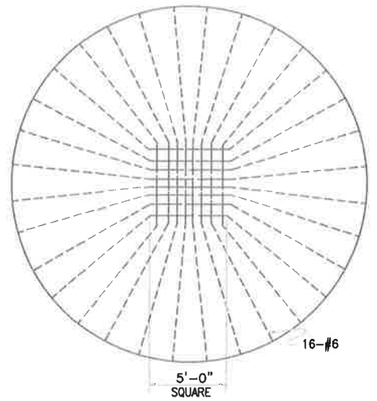
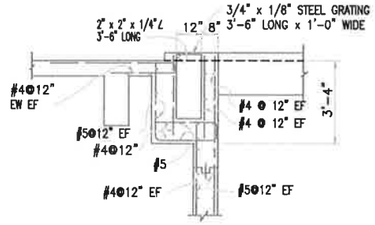
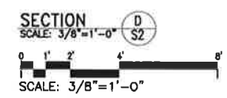
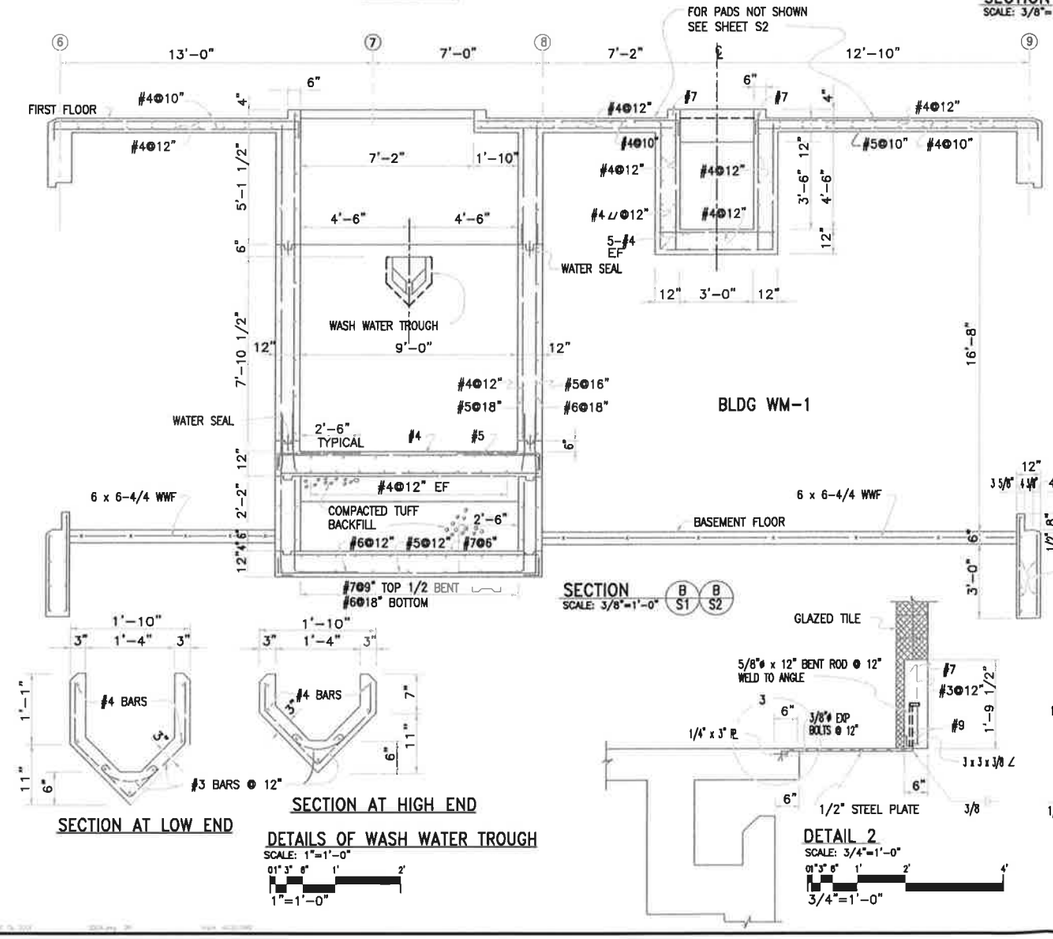


CLARIFER DETAIL
SCALE: NONE

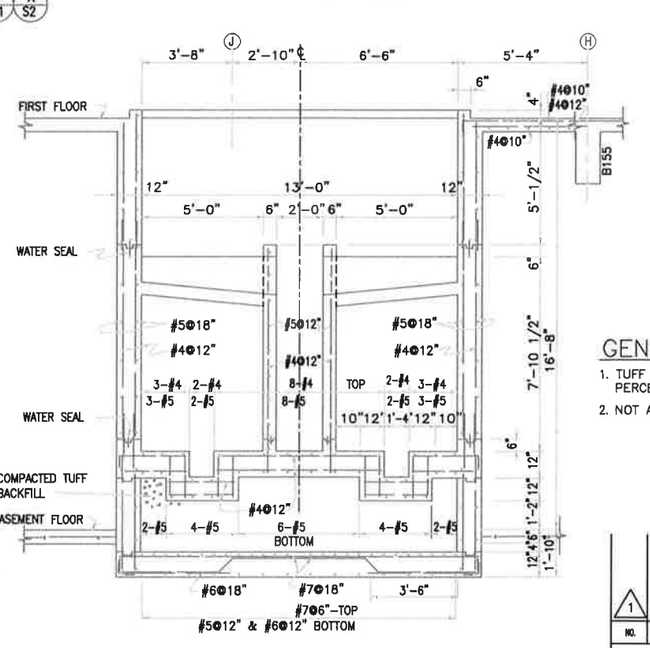


SECTION (D S2)
SCALE: 3/8"=1'-0"





SECTION (B S1 / B S2)
SCALE: 3/8"=1'-0"



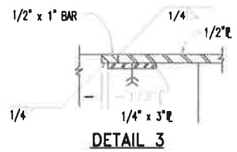
SECTION (C S1 / C S2)
SCALE: 3/8"=1'-0"

SECTION AT LOW END

SECTION AT HIGH END

DETAILS OF WASH WATER TROUGH
SCALE: 1"=1'-0"
1"=1'-0"

DETAIL 2
SCALE: 3/4"=1'-0"
3/4"=1'-0"



DETAIL 3

GENERAL NOTES:

1. TUFF BACKFILL TO BE COMPACTED TO 95 TO 100 PERCENT MAXIMUM DENSITY. SEE SPECIFICATIONS.
2. NOT AS-BUILT VERIFIED.

NO.	DATE	CLASS REV.	REVISIONS	DRWN	VER	CHKD	SUB	APP
1	09/04/01		GENERAL REVISIONS	CB		JG	DM	JN

REFERENCE DRAWINGS
011955, AB57, 09/17/93

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

FM-84 RLWTF

AS-BUILT CRITICAL FACILITY
RAD LIQUID WASTE TREATMENT PLANT
PLANT EQUIPMENT SECTIONS

BLDG. 1 TA-50

DRAWN C. BINKLEY
VERIFIED
CHECKED J. GRIFFIN
DATE 09/04/01

SUBMITTED D. MEADOWS
APPROVED FOR RELEASE J. NARUM

Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545

SHEET S11 122 OF 600

CLASSIFICATION REVIEWER DATE

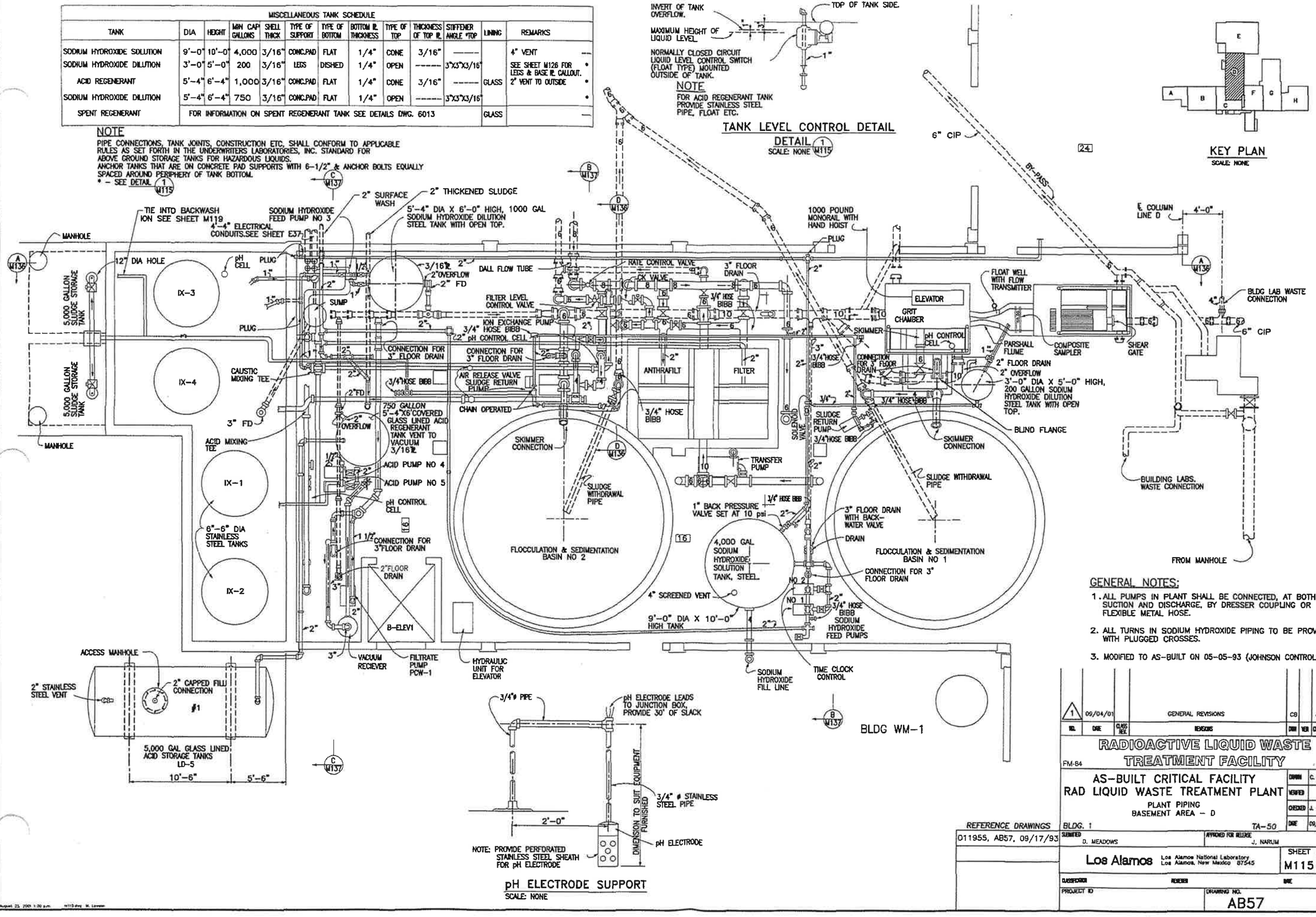
PROJECT ID
DRAWING NO. AB57
REV. 1

MISCELLANEOUS TANK SCHEDULE

TANK	DIA	HEIGHT	MIN CAP GALLONS	SHELL THICK	TYPE OF SUPPORT	TYPE OF BOTTOM	BOTTOM PL THICKNESS	TYPE OF TOP	THICKNESS OF TOP PL	STIFFENER ANGLE @TOP	LINING	REMARKS
SODIUM HYDROXIDE SOLUTION	9'-0"	10'-0"	4,000	3/16"	CONC.PAD	FLAT	1/4"	CONE	3/16"	------		4" VENT ---
SODIUM HYDROXIDE DILUTION	3'-0"	5'-0"	200	3/16"	LEGS	DISHED	1/4"	OPEN	------	3"X3"X3/16"		SEE SHEET M126 FOR LEGS & BASE PL CALLOUT. *
ACID REGENERANT	5'-4"	6'-4"	1,000	3/16"	CONC.PAD	FLAT	1/4"	CONE	3/16"	------	GLASS	2" VENT TO OUTSIDE *
SODIUM HYDROXIDE DILUTION	5'-4"	6'-4"	750	3/16"	CONC.PAD	FLAT	1/4"	OPEN	------	3"X3"X3/16"		*
SPENT REGENERANT	FOR INFORMATION ON SPENT REGENERANT TANK SEE DETAILS DWG. 6013										GLASS	---

NOTE

PIPE CONNECTIONS, TANK JOINTS, CONSTRUCTION ETC, SHALL CONFORM TO APPLICABLE RULES AS SET FORTH IN THE UNDERWRITERS LABORATORIES, INC. STANDARD FOR ABOVE GROUND STORAGE TANKS FOR HAZARDOUS LIQUIDS.
ANCHOR TANKS THAT ARE ON CONCRETE PAD SUPPORTS WITH 6-1/2" ϕ ANCHOR BOLTS EQUALLY SPACED AROUND PERIPHERY OF TANK BOTTOM.
* - SEE DETAIL 1 M115



KEY PLAN
SCALE: NONE

NOTE
FOR ACID REGENERANT TANK PROVIDE STAINLESS STEEL PIPE, FLOAT ETC.

TANK LEVEL CONTROL DETAIL
DETAIL 1 M115
SCALE: NONE

pH ELECTRODE SUPPORT
SCALE: NONE

GENERAL NOTES:

1. ALL PUMPS IN PLANT SHALL BE CONNECTED, AT BOTH SUCTION AND DISCHARGE, BY DRESSER COUPLING OR FLEXIBLE METAL HOSE.
2. ALL TURNS IN SODIUM HYDROXIDE PIPING TO BE PROVIDED WITH PLUGGED CROSSES.
3. MODIFIED TO AS-BUILT ON 05-05-93 (JOHNSON CONTROLS INC.)

REFERENCE DRAWINGS
011955, AB57, 09/17/93

NO.	DATE	CLASS REV.	REVISIONS	DRW	VER	CHKD	SUB	APP
1	09/04/01		GENERAL REVISIONS	CB		JG	DWJ	JN

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY
FM-84 RLWTF

AS-BUILT CRITICAL FACILITY
RAD LIQUID WASTE TREATMENT PLANT
PLANT PIPING
BASEMENT AREA - D

DRAWN C. BINKLEY
VERIFIED
CHECKED J. GRIFFIN
DATE 09/04/01

BLDG. 1 TA-50

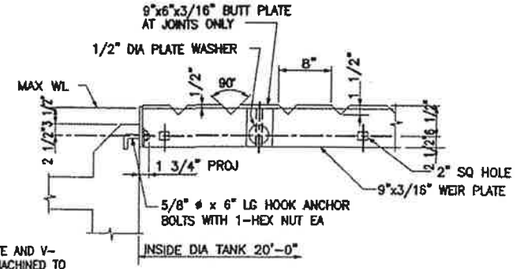
SUBMITTED D. MEADOWS
APPROVED FOR RELEASE J. NARUM

Los Alamos Los Alamos National Laboratory, Los Alamos, New Mexico 87545

SHEET M115 290 OF 600

CLASSIFICATION REVIEWER DATE

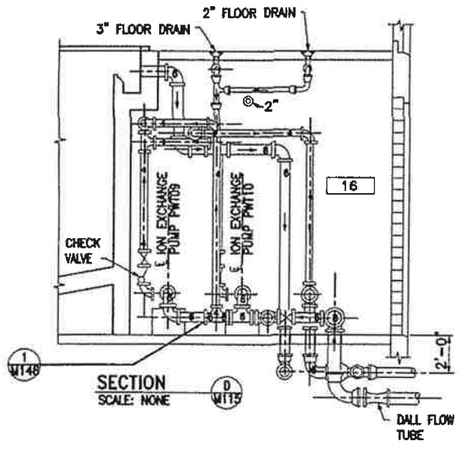
PROJECT ID DRAWING NO. AB57 REV. 1



TOP EDGE OF PLATE AND V-NOTCHES TO BE MACHINED TO A TRUE EDGE. COAT FACE OF CONCRETE AND ADJACENT SIDE OF WEIR PLATE WITH A HEAVY LAYER OF HOT ROOFING ASPHALT, BEFORE PLACING PLATE, TO INSURE A TIGHT SEAL.

FLOCCULATION SEDIMENTATION BASIN
WEIR PLATE DETAIL
SCALE: NONE

SECTION
SCALE: NONE A M115



GENERAL NOTES:

1. MODIFIED TO AS-BUILT ON 5-12-93, BY JOHNSON CONTROLS.
2. THE GRIT CHAMBER HAS BEEN DISCONNECTED AND DECOMMISSIONED IN PLACE.
3. REFER TO M115 FOR CURRENT PROCESS PIPING CONFIGURATION.

NO.	DATE	CLASS REV	REVISIONS	DRN	VER	CHD	SUB	APP
1	09/04/01		GENERAL REVISIONS	CB		JG	DM	JN

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY
FM-84 RLWTF

AS-BUILT CRITICAL FACILITY
RAD LIQUID WASTE TREATMENT PLANT
PLANT PIPING AND DETAILS

BLDG. 1 TA-50

DRAWN	C. BINKLEY
VERIFIED	
CHECKED	J. GRIFFIN
DATE	08/04/01

REFERENCE DRAWINGS
011955, AB57, 09/17/93

SUBMITTED D. MEADOWS
APPROVED FOR RELEASE J. NARUM

Los Alamos Los Alamos National Laboratory, Los Alamos, New Mexico 87545

SHEET M136 311 OF 600

CLASSIFICATION MARKER DATE

PROJECT ID DRAWING NO. AB57 REV. 1

ATTACHMENT 2

DP-1132 Stabilization Plan for Gravity Filter

EPC-DO: 19-007

LA-UR-19-20039

Date: JAN 2 5 2019

Attachment 2

Radioactive Liquid Waste Treatment Facility
Stabilization Plan for the Gravity Filter

Discharge Permit DP-1132
Condition No. 41

LA-UR-19-20039

Los Alamos
NATIONAL LABORATORY
EST. 1943

Table of Contents

1.0 STABILIZATION OBJECTIVE AND CRITERIA

This Stabilization Plan describes activities that will be undertaken to stabilize the Gravity Filter, a treatment unit for low-level radioactive liquid wastes (RLW). This Plan has been prepared in accordance with the provisions specified in Condition 41 of Discharge Permit DP-1132, issued by the New Mexico Environment Department (NMED). Information is presented in the same sequence as requirements are listed in Condition 41.

The primary objective of stabilizing the Gravity Filter is to empty and isolate the unit so that it will pose no threat to the environment (groundwater and air) until closure.

2.0 DESCRIPTION OF THE GRAVITY FILTER

The Gravity Filter is a concrete rectangular tank with 2 cells containing media (sand, anthracite), and a middle chamber in the center of the tank separating the cells (see attachments 6.2 & 6.4). The Gravity Filter has a working volume of about 7,000 gallons, and is designed to handle feed flow rates ranging from 135-225 gpm. The tank is 13 feet long, 9 feet wide, and has a height of ~13 feet. Both cells are 5 feet wide and share a ~9 foot vertical wall with the 2 foot wide middle chamber; the cells contain 1 foot of anthracite resting on top of 3 foot of sand. At the bottom of the cells there is a 1 foot high underdrain (Wheeler Bottoms), which the media rest on, with a trench in the bottom center of each cell running the width of the tank. Each cell has a trough that slopes up from the middle chamber wall to the inner tank wall and are centered at half the width of the tank. The cement structural support for the Gravity Filter extends 16 inches below the slab floor of the building.

The Gravity Filter was backwashed in order to clean the effluent piping and media so solids/sludge would not hinder its productivity. The solids/sludge backwash was sent back to TK-75 for retreatment through the plant.

The Gravity Filter went into operation in July 1963, and has been used ever since. Since it is located within Building 1 of Technical Area 50, the Gravity Filter is within SWMU 50-001(a). However, there are no reports of past leaks, and no evidence of current leaks.

2.1 Gravity Filter Function

The Gravity Filter system comprised the second treatment step of the Main Treatment Process in the RLWTF; directly downstream of Clarifier #1 and Clarifier #2. It provided removal of suspended solids >50 micron from the clarifiers.

The Gravity Filter had one entry stream (treated water from clarifiers) and three exit streams (filtered water both cells, and middle chamber drain water). Feed enters from a 10 inch pipe from either Clarifier #1 or Clarifier #2 into the middle chamber of the Gravity Filter. Treated waters filter through the media to an underdrain; exiting from a 10 inch pipe at the bottom of each cell to the next treatment unit.

NOTE The exit streams of both cells are the same lines used to introduce Gravity Filter backwash water.

2.2 Historic Waste Streams

Treated water from the Clarifier #1 and Clarifier #2 were the historic feed streams to the Gravity Filter. Influent came from multiple generators at LANL, and was collected and stored in the 75K tank at Building 50-002. Influent was then pumped from the 75K Tank to the clarifier, where chemicals such as lime (calcium hydroxide), caustic soda (sodium hydroxide), and iron sulfate were added to assist in precipitating impurities, including radionuclides. Effluent from the Clarifiers then entered the Gravity Filter removing suspended solids.

Clarifier effluent/overflow: Radioactivity levels averaged less than 10 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the effluent. Beta-emitting radionuclides averaged less than 1 nCi/L. Tritium concentrations have historically averaged 25 nCi/L, but have averaged less than 10 nCi/L in recent years.

Clarifier effluent/overflow: Non-radioactive constituents included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate) at parts-per-million (ppm) concentrations. Regulated metals were also present, but always at parts-per-billion concentrations, far below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of influent averaged less than 1000 ppm.

3.0 GRAVITY FILTER STABILIZATION ACTIVITIES

3.1 Remove Unused Chemicals

Carbon dioxide was used to adjust the Gravity Filter pH from 10-11 to 6-8. Carbon dioxide was stored in a holding tank outside of 50-0001 (north of room 16); transferred via a compressor. The tank was emptied in June of 2015. Additionally, a sodium hydroxide line that was used for the Reverse Osmosis skid CIP tank runs atop the Gravity Filter, although it was not used for treating Gravity Filter water, this line will be removed in order to mitigate potential release into the Gravity Filter.

Criterion: Carbon dioxide tank and sodium hydroxide line are empty.

Verification: Carbon dioxide - maintenance work package.

Sodium hydroxide - visually verified (before and after photographs).

Documentation: Maintenance work order #477255-01 completion which will be used for the carbon dioxide tank. Photographs will be taken of the sodium hydroxide line. The maintenance work order, photographs, and activity records (e.g., disposition of unused chemicals) will be used as input for the Stabilization Report.

3.2 Dismantle Chemical Feed Systems

Carbon dioxide (~1-inch-diameter copper lines feed at the top of the Gravity Filter): Stabilization will be achieved when valves 116-CO2-VO2, 116-CO2-VO9, and the copper elbow on the compressed air side upstream of 116-CO2-V08 are removed and openings capped. All the copper lines in-between the two valves and elbow will be removed and disposed as solid low-level radioactive waste.

The ~1-inch steel sodium hydroxide line that runs adjacent to the compressed air line has been previously severed and capped. However, this line will need to be removed back to the elbow and capped in order to allow safe entry into the Gravity Filter, and disposed as solid low-level radioactive waste.

Criterion: Feed system for chemicals will be removed.

Verification: Removal will be visually verified (before and after photographs).

Documentation: Before and after photographs will be taken in Room 116. Dismantling, characterization, and disposal activities will be documented. Photographs and activity records will be used as input for the Stabilization Report.

3.3 Flush Gravity Filter and Process Piping

Industrial water or effluent water will be used to backwash the Gravity Filter to TK-75; solids (e.g. sludge) collect in the troughs which outlet to the middle chamber (inlet waste lines will be flushed during the stabilization of the clarifiers). Flush water is transferred from the middle chamber to the Main Treatment Plant (microfilter and reverse osmosis). The act of transferring flush water out of Gravity Filter will flush outlet piping. Flushing may need to be repeated until the stabilization criterion is met.

Criterion: Flushing will be adequate when flush water concentration decreases to <10 nCi/L.

Verification: Analytical results for flush water samples will be used to verify that the flush criterion has been met.

Documentation: Operating records and analytical data will be used as input for the Stabilization Report.

3.4 Remove Process Liquids and Solids

Liquids and solids will be transferred from Gravity Filter to other treatment units for low-level radioactive liquid wastes, where the solids and liquids were treated, in accordance with existing operating procedures. Specifically, solids will be pumped to TK-8 in Room 61, then processed through the rotary vacuum filter. Gravity Filter liquids will be processed through the Main Treatment Plant (microfilter, perchlorate ion exchange, and reverse osmosis) prior to discharge to the environment. Vacuum filter solids will be characterized, then disposed. It is anticipated that vacuum filter solids will be disposed as solid low-level radioactive waste.

Criterion: Gravity Filter will no longer contain process liquids and solids.

Verification: Process records for backflush and drawings of the Gravity Filter.

Documentation: The condition of the interior of the Gravity Filter following removal of liquids and solids will be documented through process records and will be used as input for the Stabilization Report.

3.5 Remove Filter Media (Sand and Anthracite)

A structure will be constructed to allow safe entry and exit into and from the gravity filter. The filter media will then be placed in approved waste containers (e.g., 55 gallon drums) and disposed as solid low-level radioactive waste.

Criterion: Gravity Filter will be a shell.

Verification: Removal will be visually verified (before and after photographs).

Documentation: The condition of the interior of the Gravity Filter following removal of filter media will be documented through photographs and through radiological surveys of the interior walls of the Gravity Filter. Operating records and photographs will be used as input for the Stabilization Report.

3.6 Clean and Seal Interior Gravity Filter Surfaces

Interior surfaces will then be cleaned using measures such as low-pressure spraying, a high-pressure spray wand and/or stiff brushes. Cleaning materials such as water will collect in the Gravity Filter, then be transferred the Main Treatment Plant for processing through the microfilter, perchlorate ion exchange, and reverse osmosis. Cleaning measures may need to be repeated until the stabilization criterion is met. Residual contamination will then be fixed by applying a brush/roll-on fixative (e.g., paint) to the interior Gravity Filter surfaces.

Criteria: Cleaning will be complete when interior surfaces have no residual solids. Sealing of residual contamination will be complete when contamination levels of painted surfaces have been reduced to <20 dpm per 100 cm2.

Verification: Cleaning will be visually verified. Radioactive survey results will be used to verify that the sealing criterion has been met.

Documentation: Photographs of the interior walls of the clarifier will be taken prior to cleaning, after cleaning, and after sealing. Radiological surveys will be taken after surfaces have been sealed. Operating records, photographs, and radioactive survey data will be used as input for the Stabilization Report.

3.7 Isolate Inlet and Outlet Lines

Piping that carried process materials, carbon dioxide, and industrial/effluent tank water into or from the Gravity Filter will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that materials can no longer enter the Gravity Filter, and that the Gravity Filter will be in a stable condition until closure in accordance with the RLWTF Closure Plan (LANL 2016). Section 4.1 of this Stabilization Plan has a detailed list of the lines and how each will be isolated.

Criterion: All inlet and outlet lines will be isolated either by removing the line, by capping, or by applying a blind flange.

Verification: Isolation will be visually verified.

Documentation: Before and after photographs will be taken of process pipe connections. Photographs and activity records will be used as input for the Stabilization Report.

3.8 Isolate Support Systems

Industrial water: Used to backwash the Gravity Filter. This will be isolated as part of the drain line isolation in section 4.1 of this Stabilization Plan.

Compressed air: Compressed air was used to operate Gravity Filter components (e.g. air actuated valves) and was also used to purge the carbon dioxide lines. Compressed air will be stabilized when the compressed air line for carbon dioxide described in section 3.2 of this stabilization plan is stabilized and air actuated valves are removed (the compressed air lines will be capped).

Ventilation: Not applicable. Rooms 16 and 116 receive general room ventilation. There are no gravity filter-specific systems to stabilize.

Control panel: The Gravity Filter Control Panel located in room 116 (south of the Gravity Filter) was used to electronically operate equipment (e.g. valves, mixers) will be removed and disposed as solid low-level radioactive waste.

Standing line: A 4-inch diameter pipe that descends down into the Gravity Filter. This pipe has been severed and no longer poses a threat to allowing the entering/exiting of water from the Gravity Filter. The only purpose of this pipe is to support the current FAS (Fixed Air Sampler) in room 116 that collects air samples and monitors airborne contaminates. This pipe will be removed to allow cleaning activities, and disposed as solid low-level radioactive waste.

4.0 OTHER STABILIZATION INFORMATION

4.1 Gravity Filter Conveyance Lines

Four pipes enter the Gravity Filter. One is a process line, one recirculation line, and two surface wash lines. The process line enters from the north side of the Gravity Filter, the recirculation line from the top, and the surface wash lines from the south side of the Gravity Filter. A rubber purge line also enters the top of the Gravity Filter.

A. Lines into the Gravity Filter:

1. Feed to the Gravity Filter: This 10-inch steel pipe drops into Room 16. The 10-inch pipe runs directly from Clarifier #2 to Clarifier #1, about 10 feet above the floor of Room 16. Either feed to the gravity filter drops vertically into a 10-inch feed line to the gravity filter, or into a six-inch line, that bypasses the gravity filter. Stabilization will be achieved by removing valves 016-GFB-V04 (10-inch diameter), 016-GFB-V02 (four-inch diameter), and 016-ISOL-V08 (10-inch diameter), and by applying blind flanges to the two openings that result when each valve is removed (total of six openings).

2. Gravity Filter recirculation (~1-inch steel pipe into the top of the gravity filter from the top of the two chemical dissolution tanks): The pipe will be removed during the stabilization of both Clarifier #1 and Clarifier #2 and is, therefore, not considered part of the stabilization of the Gravity Filter. In addition, valve 016-GFE-VO5 will be removed; upstream end will be capped and downstream piping removed and disposed as solid low-level radioactive waste.

3. Filter surface wash lines (~4-inch-diameter pipes into the top of each cell of the Gravity Filter): Stabilization will be achieved by removing valves 016-BKW-V09 and 016-EFF-V08, and by applying blind flanges to the two openings that result when each valve is removed (total of 4 openings).

4. Purge line (~1/4 inch rubber tubing): Stabilization will be complete when the tee, located in-between valves 116-INF-V18 and 116-INF-V20, is removed, and lines capped (3 lines). This will be part of the stabilization plan for the Clarifiers in section 4.1 and is, therefore, not considered part of the stabilization of the Gravity Filter.

4.1 Gravity Filter Conveyance Lines (continued)

B. Potable Water Lines into the Gravity Filter:

1. Remove the eyewash/safety shower SHS005 located atop the Gravity Filter and cap or relocate line to new eyewash/safety shower location.

2. Remove the eyewash/safety shower SHS004 located atop the Gravity Filter and cap or relocate line to new eyewash/safety shower location.

C. Process Lines Out of the Gravity Filter:

NOTE The Gravity Filter could either be backwashed with industrial water, or north and south effluent tank water from building 50-002. The backwash lines are one in the same as the drain lines from Cell #1 and Cell #2, therefore, when the drain lines for both cells are stabilized so will be the backwash lines.

1. Middle chamber drain line (10-inch diameter): Stabilization will be achieved when the tee that is located ~15 inches from the exterior wall of the Gravity Filter is removed and blind flanges are applied to all three openings.

2. Drain line from Cell #1 (10-inch diameter): Stabilization will be achieved when the tee located ~4 inches from the exterior wall of the Gravity Filter is removed and blind flanges are applied to all 2 openings. The third opening consisting of a 6 foot long spool piece running from the tee of Cell #1 to the four-way spool piece of Cell #2; this pipe will be removed and disposed as solid low-level radioactive waste.

3. Drain line from Cell #2 (10-inch diameter): Stabilization will be achieved when the four-way spool piece that is located ~4 inches from the exterior wall of the Gravity Filter is removed and blind flanges are applied to all 3 openings. The fourth opening consisting of the same 6 foot long pipe from the tee of Cell #1; will be removed when both Cell #1 and Cell #2 are stabilized.

4. Gravity Filter recirculation (~1-inch diameter steel pipe): This line recirculated water from the bottom of the Gravity Filter to the solid chemical dissolution tanks (used for the Clarifiers) to minimize the use of industrial water for mixing of the dry chemicals; this is part of the same line in section 4.1 part A of this stabilization plan that allowed excess water from the recirculation to enter the top of the Gravity Filter. Stabilization will be achieved when the recirculation pump in-between valves 016-GFE-V-11 and 016-GFE-V-12 is removed and inlet/outlet ends from the pump are capped.

4.2 Implementation: Portions of the Closure Plan

Stabilization of the Gravity Filter pursuant to this Stabilization Plan will execute the following portions of Closure Plan-related activities at the RLW:

DP-1132, Condition 42.d, Methods to be used for decontamination of the site and equipment:

- Sludge and liquids will be removed from the Gravity Filter and treated in the existing RLW;
- The Gravity Filter media will be removed and disposed as solid low-level radioactive waste.
- The interior surfaces of the Gravity Filter will be cleaned (e.g., low-pressure and/or high-pressure wash; and
- Residual contamination will be fixed by applying a brush/roll-on fixative such as paint to the interior Gravity Filter surfaces.

DP-1132, Condition 42.h, Methods to be used to characterize waste generated during closure:

- Samples of sludge removed from the Gravity Filter will be sampled and analyzed for radioactivity (alpha radionuclides, beta radionuclides, and tritium) and RCRA toxicity-characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).

DP-1132, Condition 42.j, Methods to be used to remove, transport, treat, recycle, and dispose of waste generated during closure:

- Liquids and sludge from within the Gravity Filter will be removed and treated in accordance with existing operating procedures for the Gravity Filter, for the Main Treatment Plant, and for the vacuum filter in the Secondary Treatment Plant.

4.3 Interim Measures and Controls for the Gravity Filter

The activities described in Section 3 of this Stabilization Plan will prevent all future releases of (a) water contaminants to the environment, (b) water contaminants from moving into the ground water, and (c) water contaminants from posing a threat to human health.

Succinctly, process solids and liquids will be removed from the Gravity Filter, so that it is empty. Inlet and outlet lines will be removed or capped, or will have blind flanges applied so that new water and process wastes cannot be introduced to the unit.

4.4 Soil and Groundwater Investigation

There are no reports of past leaks for the Gravity Filter, and no evidence of current leaks. The Gravity Filter is a part of SWMU 50-001(a), defined as all of Building 50-001.

In addition, the Gravity Filter itself is located within Rooms 16 and 116 of Building 50-001. Walls of the unit are visible to operators and other personnel. Had the Gravity Filter developed a leak, then water would have been discovered on the floor of Room 16.

The structural support for the Gravity Filter and the effluent process lines to TK-71 and backwash to TK-75 from the Gravity Filter extend beneath the floor of Room 16. A below-grade leak would have been evident as a decrease in water level in the Gravity Filter.

The investigation, characterization, cleanup and corrective action requirements for potential releases of contaminants into soil, groundwater and other environmental media from solid waste management units (SWMUs) and areas of concern (AOCs) associated with the RLWTF are contained within the Compliance Order of June 2016 entered into between the NMED and the DOE pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978, §74-9-36(D). Accordingly, sampling will be conducted per an investigation work plan approved by the Hazardous Waste Bureau under the Consent Order during final closure.

4.5 Stabilization Report

Within 30 days of completion of stabilization activities, a Stabilization Report will be submitted to the NMED for approval. The report will describe stabilization activities, and will contain photographs, radioactive survey data, and other documentation specified in Section 3 of this Plan as evidence that stabilization has been completed.

4.6 Stabilization Schedule

Funding for the stabilization of the Gravity Filter has been requested for fiscal year 2021. Stabilization would be initiated October 2020 and completed September 2021. The Stabilization Report would be submitted to the NMED in October 2021.

Should funding not be received, a revision to this schedule will be required, and a revision to this Stabilization Plan would result.

5.0 REFERENCES

New Mexico Environment Department, June 2016. *Compliance Order on Consent U.S. Department of Energy Los Alamos National Laboratory.*

New Mexico Environment Department, date TBD. *Ground Water Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory.*

LANL, April 2010. *Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1, EP-2010-0149*, page 98.

LANL, September 2016. *Radioactive Liquid Waste Treatment Facility Closure Plan, LA-UR-16-27050.*

6.0 ATTACHMENTS

Attachment	Title
A	*Stabilization Criteria and Documentation for the Gravity Filter*
B	*Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Equipment Sections, Sheet S11. Revision 1, Sep 2001*
C	*Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Piping Basement Area D, Sheet M115. Revision 1, Sep 2001*
D	*Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Piping and Details, Sheet M136. Revision 1, Sep 2001*

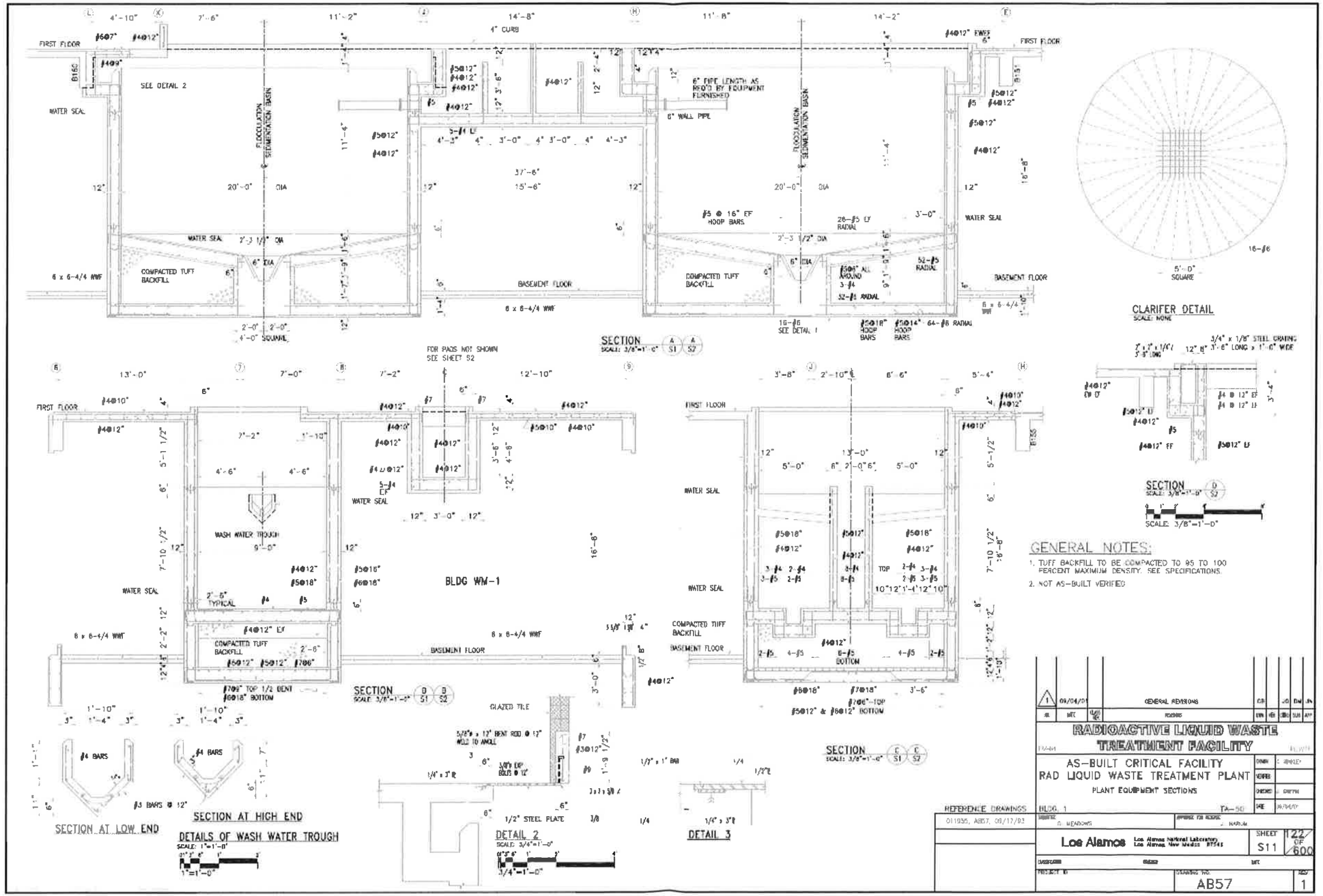
Attachment A, Stabilization Criteria and Documentation for Gravity Filter

(Page 1 of 1)

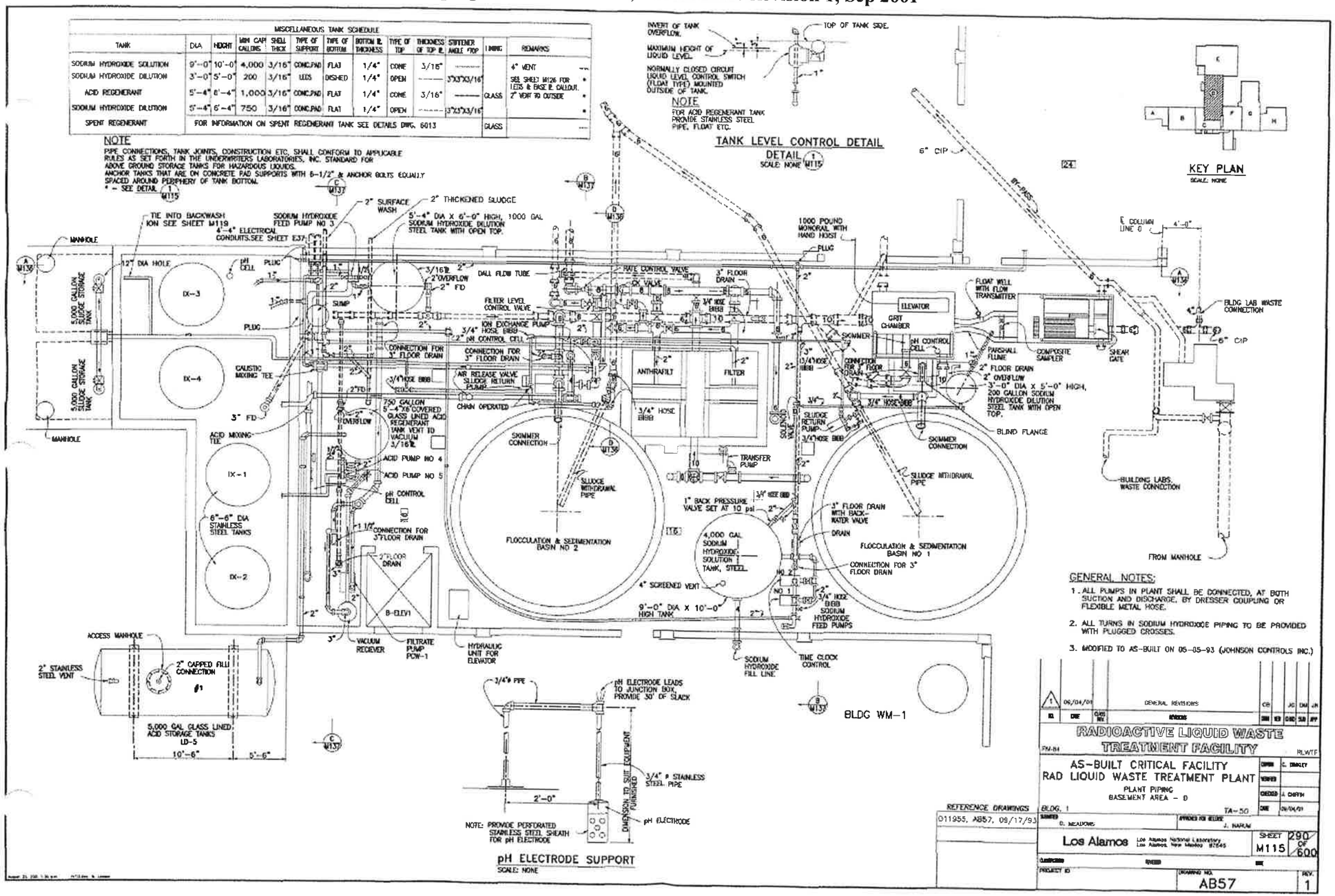
Activity	Criteria	Documentation
1. Remove unused chemicals	Carbon dioxide tank and sodium hydroxide line are empty	• Maintenance work order #477255-01 completion • Before and after photographs
2. Dismantle chemical feed system	Feed system for chemicals will be removed	Before and after photographs
3. Flush Gravity Filter and process lines	Flush water < 10 nCi/L	Flush water analytical results
4. Remove process liquids and solids	Gravity Filter will no longer contain process liquids or solids	Process records for backflush and drawings of the Gravity Filter
5. Remove filter media (sand and gravel)	Gravity Filter will be a shell	Before and after photographs
6. Clean and seal interior Gravity Filter surfaces	• Cleaning: No residual solids • Sealing: Contamination < 20 dpm/100 cm^2	• Cleaning: Before and after photographs • Sealing: Radiation survey results
7. Isolate inlet and outlet lines	Remove or cap the line, or apply a blind flange	Before and after photographs

In addition to above-listed documentation, activity logs and records will be used as documentation for all activities.

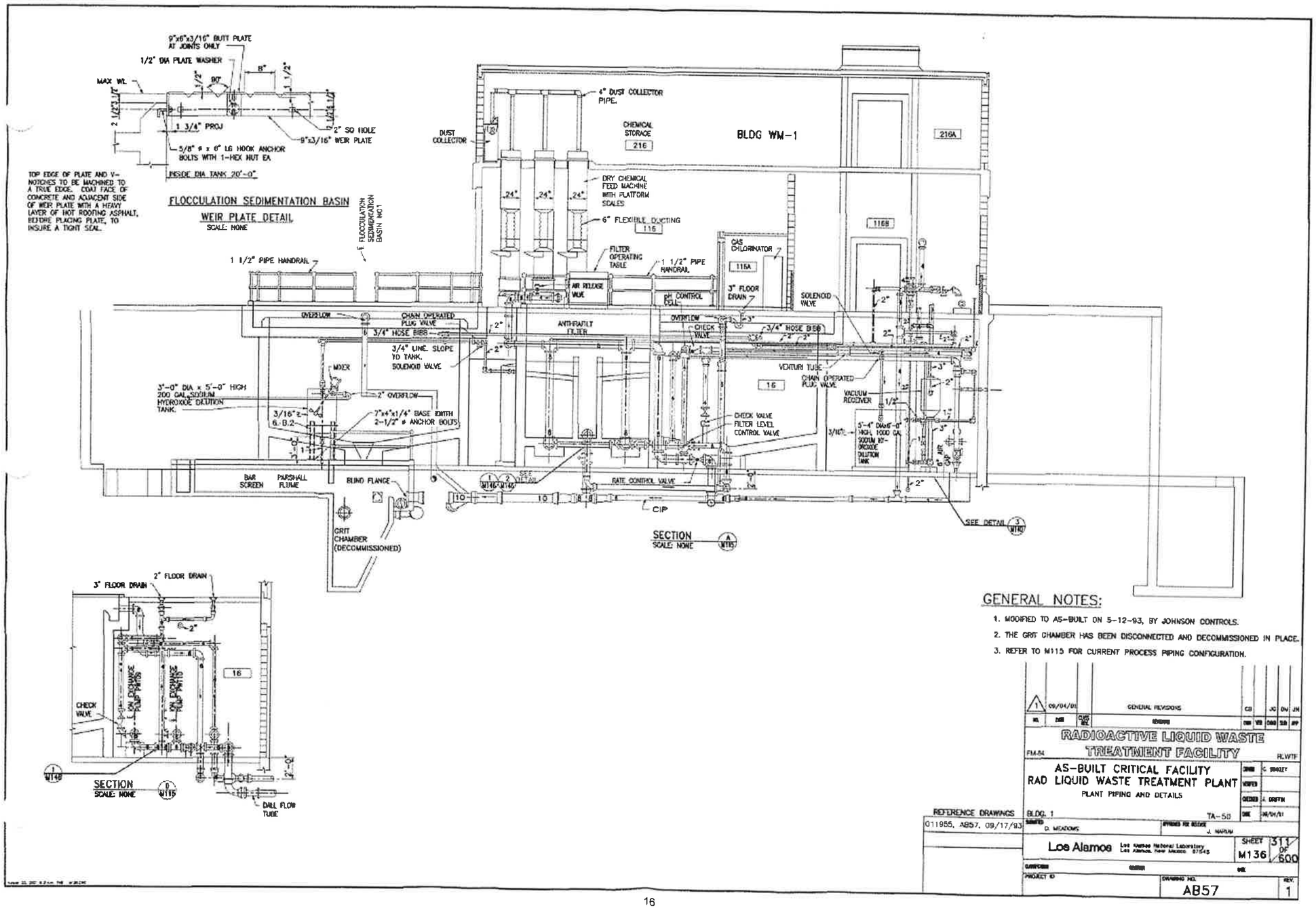
Attachment B, Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Equipment Sections, Sheet S11. Revision 1, Sep 2001



Attachment C, Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Piping Basement Area D, Sheet M115. Revision 1, Sep 2001



Attachment D, Drawing AB57, As-Built Critical Facility Rad Liquid Waste Treatment Plant, Plant Piping and Details, Sheet M136. Revision 1, Sep 2001



ATTACHMENT 3

DP-1132 Stabilization Plan for WM2-North/South Tank

EPC-DO: 19-007

LA-UR-19-20039

Date: JAN 2 5 2019

Attachment 3

Radioactive Liquid Waste Treatment Facility Stabilization Plan for the Low-Level WM2-North/South Tanks

Discharge Permit DP-1132

Condition No. 41

LA-UR-19-20039

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Table of Contents

1.0 STABILIZATION OBJECTIVE AND CRITERIA

This Stabilization Plan describes activities that will be undertaken to stabilize the WM2-North/South tanks which store evaporator drain water. This plan has been prepared in accordance with the provisions specified in Condition 41 of Discharge Permit DP-1132, issued by the New Mexico Environment Department (NMED). Information is presented in the same sequence as requirements are listed in Condition 41.

The primary objective of stabilizing the WM2-North/South tanks is to empty and isolate the units so that they will pose no threat to the environment (groundwater and air) until closure.

2.0 DESCRIPTION OF THE WM2-NORTH/SOUTH TANKS

The WM2-North/South tanks are square concrete tanks. The tanks are 15' x 15' x 15' with a total storage volume for each tank of 25,000 gallons. Both tanks have a 10-inch outlet line and a 6-inch inlet line. (See Attachment B).

The WM2-North/South tanks went into operation in 1963. The WM2-North/South tanks are within SWMU 50-002(a). There are no reports of past leaks, and there is no evidence of current leaks.

2.1 Function

The WM2-North/South tanks were used for storage of effluent from 1963 through 1999. From 1999 to 2010, they were used for waste evaporator overhead. From 2011 to the present, they have been used for effluent evaporator drain water. No treatment occurred within the tanks.

2.2 Historic Waste Streams

Effluent, waste evaporator overhead, and effluent evaporator drain water were the historic streams stored in the WM2-North/South effluent tanks.

Effluent (1963-1999):

Radioactivity levels averaged less than 1 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity. Beta-emitting radionuclides averaged less than 2.57 nCi/L. Tritium concentrations have historically averaged 211 nCi/L.

2.2 Historic Waste Streams (continued)

Non-radioactive constituents included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate) at parts-per-million (ppm) concentrations. Regulated metals were also present, but always at parts-per-billion concentrations, far below levels that would make the influent a RCRA hazardous waste. The total dissolved solids concentration of effluent averaged 1387 ppm.

Waste Evaporator Overhead (1999-2010):

Radioactivity levels averaged less than 1 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the influent. Beta-emitting radionuclides averaged less than 1 nCi/L. Tritium concentrations have historically averaged 22 nCi/L.

Non-radioactive constituents included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate), with sodium being the most prevalent metal. Regulated metals were also present, but always at parts-per-billion concentrations, below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of waste evaporator overhead were as high as 470 ppm.

Effluent Evaporator Drain Water (2011-present):

Radioactivity levels averaged less than 2 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the influent. Beta-emitting radionuclides averaged less than 2 nCi/L. Tritium concentrations have historically averaged 11 nCi/L.

Non-radioactive constituents included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate), with sodium being the most prevalent metal. Regulated metals were also present, but always at parts-per-billion concentrations, below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of effluent evaporator drain water were as high as 7,800 ppm.

All three streams were from the main treatment plant, and had little to no solids, low concentrations of radiological constituents, and low concentrations of non-radiological constituents overall.

3.0 STABILIZATION ACTIVITIES FOR THE WM2-NORTH/SOUTH EFFLUENT TANKS

3.1 Remove Process Liquids from the WM2-North/South Tanks

Liquids will be transferred from the WM2-North/South tanks to TK-71 and/or TK-72. TK-71 and TK-72 are the feed tanks for the main treatment plant, which includes microfilter, perchlorate ion exchange, and reverse osmosis. Treatment will be in accordance with existing operating procedures.

Criterion: The WM2-North/South tanks will no longer contain process liquids.

Verification: Removal will be visually verified using photographs.

Documentation: The condition of the interior of the WM2-North/South tanks following removal of liquids will be documented through process records and will be used as input for the Stabilization Report.

3.2 Remove Process Solids from the WM2-North/South Tanks

Solids are not expected. However, if solids are found, the process solids will be removed with a high-pressure spray wand, placed in approved waste containers, or sent through the main treatment plant to be processed via the vacuum filter.

Criterion: The WM2-North/South tanks will be a shell.

Verification: Removal will be visually verified (before and after photographs).

Documentation: The condition of the interior of the WM2-North/South tanks after the solids are removed will be documented through photographs and through radiological surveys of the interior walls. Operating records and photographs will be used as input for the Stabilization Report.

3.3 Flush the WM2-North/South Tanks and Process Piping

Industrial water will be used to flush the WM2-North/South tanks. Flush water will be transferred to the main treatment plant, where it will be treated through the microfilter and reverse osmosis. Transferring flush water in and out of the WM2-North/South tanks will flush process piping. Flushing may need to be repeated until the stabilization criterion is met.

Criterion: Flushing will be adequate when flush water concentration decreases to <10 nCi/L.

Verification: Analytical results for flush water samples will be used to verify that the flush criterion has been met.

Documentation: Operating records and analytical data will be used in the Stabilization Report.

3.4 Clean and Seal Interior Surfaces

Interior surfaces are expected to be clean due to quality of historic process streams. However, if cleaning is deemed necessary, then the interior surfaces will be cleaned using measures such as low-pressure spraying or a high-pressure spray wand. Cleaning materials will be collected in the WM2-North/South tanks, then transferred the main treatment plant for processing through the microfilter. Cleaning measures may need to be repeated until the stabilization criterion is met. Residual contamination will be fixed or sealed with a roll-on fixative (e.g., paint) to the interior surfaces of the WM2-North/South tanks.

Criteria: Cleaning will be complete when interior surfaces have no residual solids and liquids. Sealing of residual contamination will be complete when contamination levels of painted surfaces are reduced to <20 dpm per 100 cm^2.

Verification: Cleaning will be visually verified. Radioactive survey results will be used to verify that the sealing criterion has been met.

Documentation: Photographs of the interior walls of the WM2-North/South tanks will be taken prior to cleaning, after cleaning, and after sealing. Radiological surveys will be taken after surfaces have been sealed. Operating records, photographs, and radioactive survey data will be used as input for the Stabilization Report.

3.5 Isolate Inlet and Outlet lines

The WM2-North/South tanks have a total of four process pipes. Each of the two tanks has one influent process pipe of 10-inch diameter carbon steel and one effluent line of 6-inch diameter carbon steel.

Piping that carried process materials into or from the WM2-North/South tanks will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that materials can no longer enter the tanks, and that the tanks will be in a stable condition until closure in accordance with the RLW Closure Plan (*LANL 2016*).

Section 4.1 of this Stabilization Plan has a detailed list of the lines and how each will be isolated.

Criterion: All inlet and outlet lines will be isolated either by removing the line, by capping, or by applying a blind flange.

Verification: Isolation will be visually verified.

Documentation: Before and after photographs will be taken of process pipe connections. Photographs and activity records will be used as input for the Stabilization Report.

3.6 Isolate Support Systems

Compressed Air: Not applicable

Electrical: Electric power was used to operate the two inlet and outlet valves and will be disconnected when the valves are removed. (See Section 4.1.)

Industrial Water: Not applicable

Ventilation: Not applicable

4.0 OTHER STABILIZATION INFORMATION

4.1 The WM2-North/South Tanks Conveyance Lines

The WM2-North/South tanks each have one 10-inch outlet pipe and one 6-inch inlet pipe for a total of 4 pipes. The influent comes from either the North FRAC or South FRAC tank (evaporator drain) or TK-9.

Outlet flows primarily go to the following tanks:

- TK-71, RLW low-level influent
- TK-72, RLW low-level influent/sump water
- TK-9

However, water can be sent to tanks in addition to TK-71, TK-72, and TK-9.

The two influent valves (WM2-EFF-V10 and WM2-EFF-V09) and the two steel outlet valves (WM2-EFF-V20 and WM2-EFF-V21) will be removed and blind flanged. This will ensure no water enters or exits the WM2 North/South Effluent tanks prior to closure.

4.2 Implementation of Portions of the Closure Plan

Stabilization of the WM2-North/South tanks includes executing the following portions of Closure Plan-related activities at RLW:

DP-1132, Condition 42.d - methods to be used for decontamination of the site and equipment:

- Liquids will be removed within WM2-North/South tanks and processed (treated) in the existing RLW plant
- Solids will be removed from the WM2-North/South tanks, packaged in 55-gallon drums, and then shipped to a commercial facility for disposal as solid low-level radioactive waste.
- The interior surfaces of the WM2-North/South tanks may be cleaned with low-pressure and/or high-pressure wash.
- Residual contamination will be fixed by applying a spray-on fixative such as paint to the interior surfaces of the WM2-North/South tanks.

4.2 Implementation of Portions of the Closure Plan (continued)

DP-1132, Condition 42.h - methods to be used to characterize waste generated during closure:

- If solids are discovered, then samples from the WM2-North/South tanks will be analyzed for radioactivity (alpha radionuclides, beta radionuclides, and tritium) and RCRA toxicity-characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).

DP-1132, Condition 42.j - methods to be used to remove, transport, treat, recycle, and dispose of waste generated during closure:

- Liquids and solids from within the WM2-North/South tanks will be removed and treated in accordance with existing operating procedures.

4.3 Interim Measures and Controls for the WM2-North/South Tanks

The activities described in Section 3 of this Stabilization Plan will prevent all future releases of (a) water contaminants to the environment, (b) water contaminants from moving into the ground water, and (c) water contaminants from posing a threat to human health.

Process solids and liquids will be removed from the WM2-North/South tanks so that they will be empty. Inlet and outlet pipes will be removed or capped, or will have blind flanges applied so that new water and process wastes cannot be introduced to the units.

4.4 Soil and Groundwater Investigation

There are no reports of past leaks for the WM2-North/South tanks, and there is no evidence of current leaks. The WM2-North/South tanks are a part of SWMU 50-002(a), defined as all of building 50-0002.

In addition, the WM2-North/South tanks are located south west of building 50-0001 and are part of 50-0248. Exterior walls of the tanks are visible to operators and other personnel. Had the WM2-North/South tanks leaked, water would have been discovered inside or outside of 50-0002, and the origin of the leak would have been obvious.

The investigation, characterization, cleanup, and corrective action requirements for potential releases of contaminants into soil, groundwater, and other environmental media from solid waste management units (SWMUs) and areas of concern (AOCs) associated with RLW are contained within the Compliance Order of June 2016.

4.4 Soil and Groundwater Investigation (continued)

The Compliance Order was entered into between the NMED and the DOE pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978, §74-9-36(D). Accordingly, during final closure, sampling will be conducted as stated in the investigation work plan approved by the Hazardous Waste Bureau under the Consent Order.

4.5 Stabilization Report

Within 30 days of completion of stabilization activities, a Stabilization Report will be submitted to the NMED for approval. The report will describe stabilization activities, and will contain photographs, radioactive survey data, and other documentation specified in Section 3 of this plan as evidence that stabilization has been completed.

4.6 Stabilization Schedule

Funding for the stabilization of the WM2-North/South tanks has been requested for fiscal year 2021. Stabilization would be initiated October 2020 and completed September 2021. The Stabilization Report would be submitted to the NMED in October 2021. If funding is not received, a revision to this schedule will be required, and a revision to this Stabilization Plan would result.

5.0 REFERENCES

New Mexico Environment Department, June 2016. *Compliance Order on Consent U.S. Department of Energy Los Alamos National Laboratory.*

New Mexico Environment Department. *Ground Water Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory.*

LANL, April 2010. *Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1*, EP-2010-0149, page 98.

6.0 ATTACHMENTS

Attachment	Title
A	*Stabilization Activities, Criterion, and Documentation for The WM2 North/South Tanks*
B	*Drawing AB57, RLWTF support drawings AS-BUILT, Influent, Effluent and Sludge Holding Tanks Pumping Station Plan, Sheet S53. Revision 1, September 2001.*
C	*Drawing AB57, RLWTF support drawing AS-BUILT, Influent & Effluent Piping Plans – WM2, Sheet M148. Revision 1, November 1999*

Attachment A, Stabilization Criteria and Documentation for the WM2 North/South Tanks

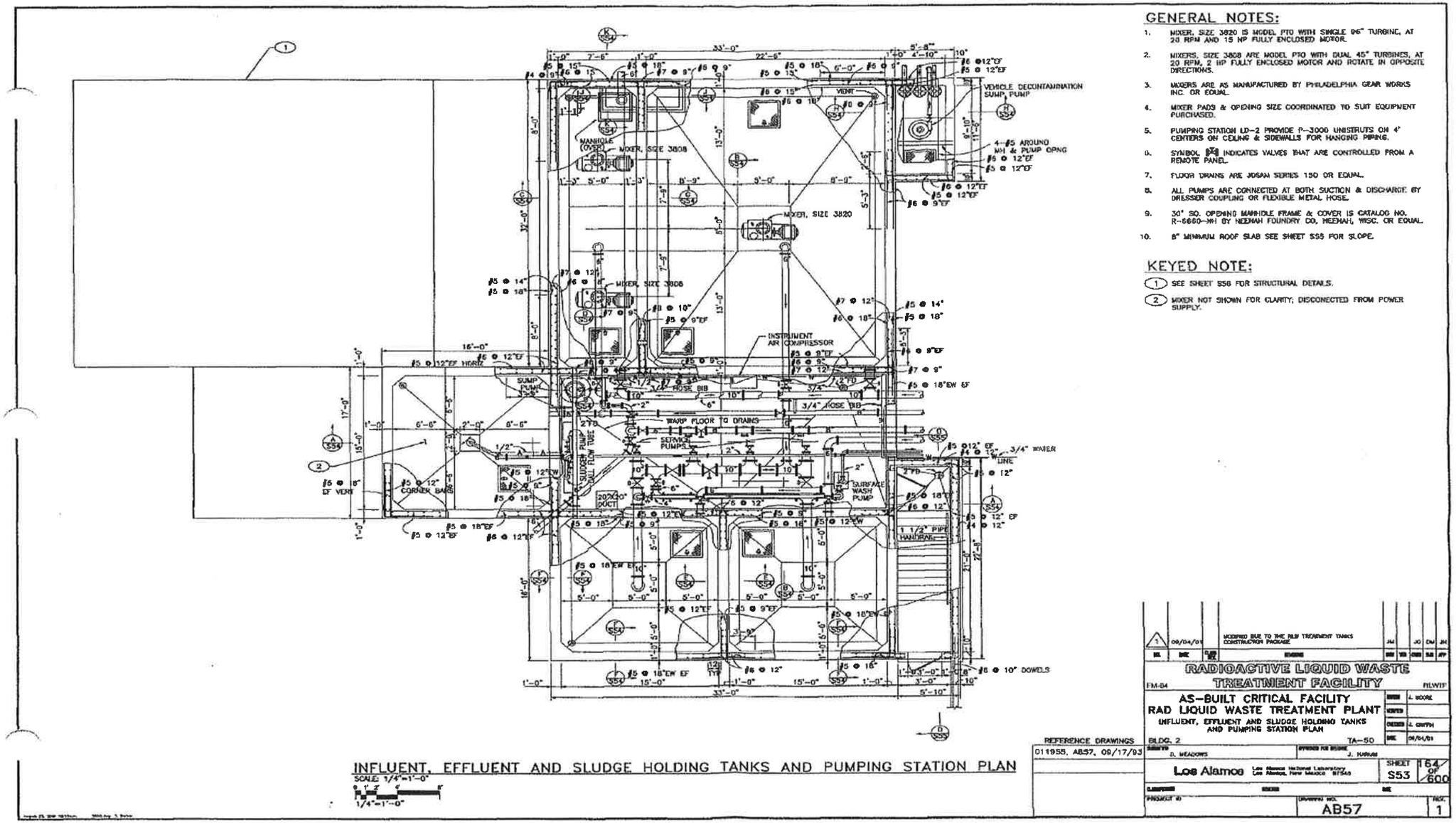
(Page 1 of 1)

Activity	Criteria	Documentation
1. Remove Process Liquids	The North/South Tanks no longer contain process liquids	Process records, including graph of tank levels over time
2. Remove Process Solids	The North/South Tanks will be empty	Before and after photographs
3. Flush The North/South Tanks and Process Piping	Flush water < 10 nCi/L	Flush water analytical results
4. Clean and Seal Interior Surfaces	• Cleaning: No residual solids • Sealing: Contamination < 20 dpm/100 cm^2	• Cleaning: Before and after photographs • Sealing: Radiation survey results
5. Isolate Inlet and Outlet Lines	Remove or cap the line, or apply blind flange	Before and after photographs

In addition to above-listed documentation, activity logs and records will be used as documentation for all activities.

Attachment B, Drawing AB57, RLW Support Drawing AS-BUILT, Influent, Effluent and Sludge Holding Tanks Pumping Station Plan, Sheet S53. Revision 1, September 2001

(Page 1 of 1)



GENERAL NOTES:

1. MIXER, SIZE 3820 IS MODEL PTO WITH SINGLE 26" TURBINE, AT 20 RPM AND 15 HP FULLY ENCLOSED MOTOR.
2. MIXERS, SIZE 3808 ARE MODEL PTO WITH DUAL 45" TURBINES, AT 20 RPM, 2 HP FULLY ENCLOSED MOTOR AND ROTATE IN OPPOSITE DIRECTIONS.
3. MIXERS ARE AS MANUFACTURED BY PHILADELPHIA GEAR WORKS INC. OR EQUAL.
4. MIXER PADS & OPENING SIZE COORDINATED TO SUIT EQUIPMENT PURCHASED.
5. PUMPING STATION LD-2 PROVIDE P-3000 UNISTRUTS ON 4' CENTERS ON CEILING & SIDEWALLS FOR HANGING PIPING.
6. SYMBOL [X] INDICATES VALVES THAT ARE CONTROLLED FROM A REMOTE PANEL.
7. FLOOR DRAINS ARE JOSAM SERIES 150 OR EQUAL.
8. ALL PUMPS ARE CONNECTED AT BOTH SUCTION & DISCHARGE BY DRESSER COUPLING OR FLEXIBLE METAL HOSE.
9. 30" SQ. OPENING MANHOLE FRAME & COVER IS CATALOG NO. R-6650-MH BY NEENAH FOUNDRY CO, NEENAH, WISC. OR EQUAL.
10. 8" MINIMUM ROOF SLAB SEE SHEET S55 FOR SLOPE.

KEYED NOTE:

(1) SEE SHEET S56 FOR STRUCTURAL DETAILS.
(2) MIXER NOT SHOWN FOR CLARITY; DISCONNECTED FROM POWER SUPPLY.

REFERENCE DRAWINGS
D11955, AB57, 09/17/93

1	09/04/01		MODIFIED DUE TO THE RLW TREATMENT TANKS CONSTRUCTION PACKAGE.	JM		JG	DM JM
NO.	DATE	CLAS WAS	REVISIONS	DES	DRN	CHKD	TLG APP

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY
FM-84 RLWTF

AS-BUILT CRITICAL FACILITY
RAD LIQUID WASTE TREATMENT PLANT
INFLUENT, EFFLUENT AND SLUDGE HOLDING TANKS AND PUMPING STATION PLAN

DESIGN L. MOORE
VERIFIED
CHECKED L. GRIFFIN
DATE 09/04/01

BLDG. 2 TA-50
SUBMITTED D. MEADOWS
APPROVED FOR ISSUE J. KARAM

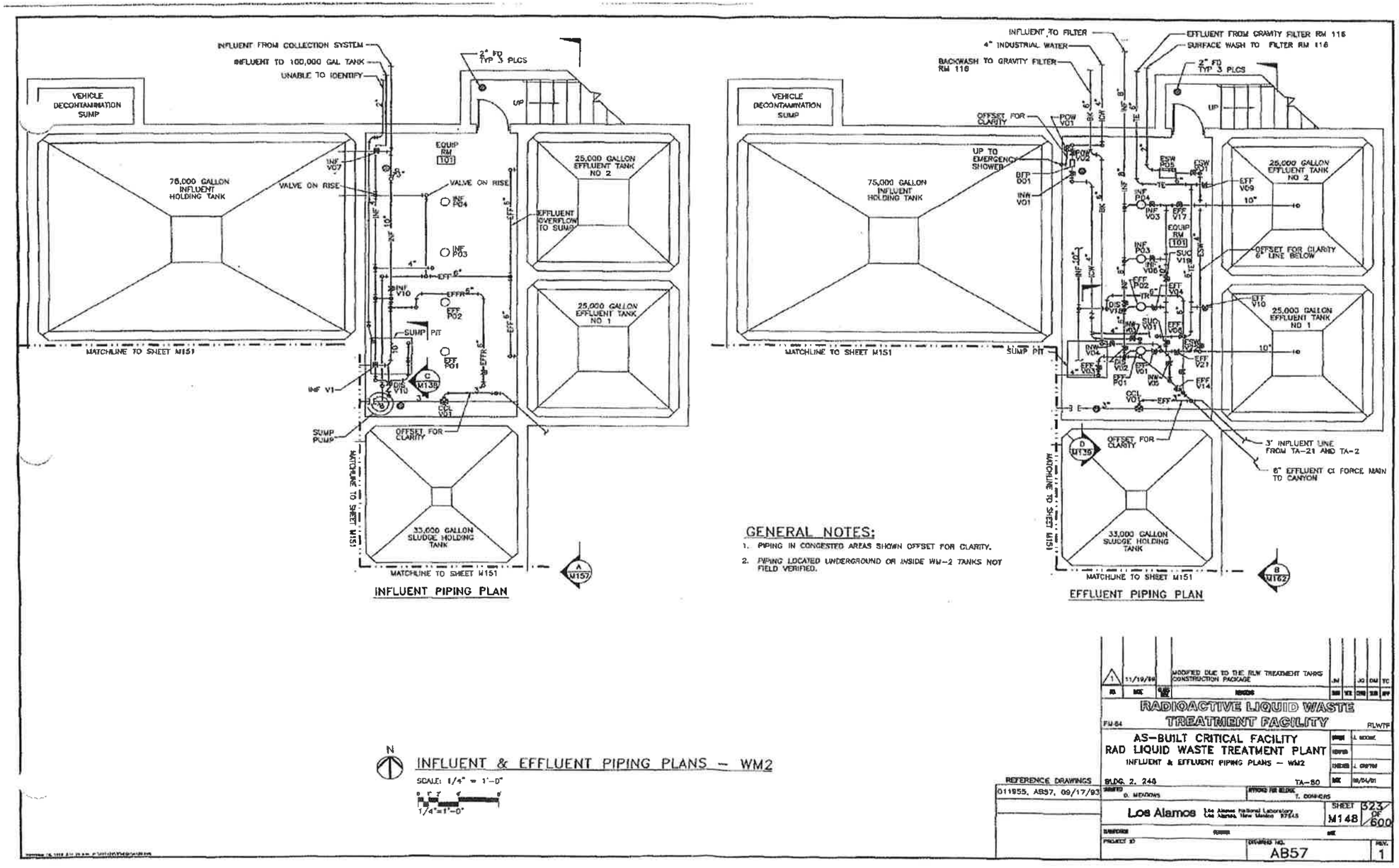
Los Alamos Los Alamos National Laboratory, Los Alamos, New Mexico 87545

SHEET S53 164 OF 600

PROJECT ID | DRAWING NO. AB57 | REV. 1

Attachment C, Drawing AB57, RLW Support Drawing AS-BUILT, Influent and Effluent Piping Plans – WM2, Sheet M148. Revision 1, November 1999

(Page 1 of 1)



ATTACHMENT 4

DP-1132 Stabilization Plan for 75K Tank

EPC-DO: 19-007

LA-UR-19-20039

Date: JAN 2 5 2019

Attachment 4

Radioactive Liquid Waste Treatment Facility Stabilization Plan for the 75K Tank

Discharge Permit DP-1132
Condition No. 41

LA-UR-19-20039

Los Alamos
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Table of Contents

1.0 STABILIZATION OBJECTIVE AND CRITERIA

This Stabilization Plan describes activities that will be undertaken to stabilize the 75K tank, an influent storage unit for low-level radioactive liquid wastes (RLW). This Plan has been prepared in accordance with the provisions specified in Condition 41 of Discharge Permit DP-1132, issued by the New Mexico Environment Department (NMED). Information is presented in the same sequence as requirements are listed in Condition 41.

The primary objective of stabilizing the 75K tank is to empty and isolate the unit so that it will pose no threat to the environment (groundwater and air) until closure.

2.0 DESCRIPTION OF 75K TANK

The 75K tank is a concrete rectangular tank that is 32 feet long, 22 feet wide, and ~ 15 feet tall with a capacity of 75,000 gallons. The tank is beneath the ground with the top visible from outside and the east wall visible from within WM2.

The 75K tank went into operation in July 1963, and has been used ever since. Since it is located within WM2 of Technical Area 50, the 75K tank is within SWMU 50-002(a). There are no reports of past leaks, and no evidence of current leaks.

2.1 Function

The 75K tank is the influent storage tank from the RLW collection system and is the main tank that feeds the existing Main Treatment Process at the RLWTF. No treatment occurred within the 75K tank.

The RLW collection system line consist of all primary and secondary containment lines that transfer Low-level radioactive waste water from other Technical Areas and converge in the WM-72 vault before entering the 75K tank.

2.2 Historic Waste Streams

Low-level RLW influent was the historic feed stream to the 75K tank. Influent came from multiple generators at LANL, and was collected and stored in the 75K tank at Building 50-002.

Low-level RLW influent: Radioactivity levels averaged 50-100 nanocuries per liter (nCi/L) alpha activity. Three alpha-emitting radionuclides (Americium-241, Plutonium-238, and Plutonium-239) accounted for more than 99% of the alpha radioactivity in the influent. Beta-emitting radionuclides averaged less than 1 nCi/L. Tritium concentrations have historically averaged 25 nCi/L, but have averaged less than 10 nCi/L in recent years.

2.2 Historic Waste Streams (continued)

Low-level RLW influent: Non-radioactive constituents included common metals (iron, sodium, silicon) and anions (nitrate, chloride, sulfate, phosphate) at parts-per-million (ppm) concentrations. Regulated metals were also present, but always at parts-per-billion concentrations, far below levels that would make the influent a RCRA hazardous waste. Total dissolved solids concentration of influent averaged less than 1000 ppm

3.0 STABILIZATION ACTIVITIES FOR 75K TANK

3.1 Remove Process Liquids and Solids

Liquids will be removed from the 75K tank, then either shipped to a commercial facility for treatment and disposal, or transferred to a WMRM influent storage tank for treatment through the new radioactive liquid waste facility, Building 50-230. Solids will be removed from the 75K tank, then shipped to a commercial facility for treatment and disposal.

Criterion: 75K tank will be empty.

Verification: Removal will be visually verified.

Documentation: The condition of the interior of the 75K tank following removal of liquids and solids will be documented through photographs and Operating records; both will be used as input for the Stabilization Report.

3.2 Flush 75K Tank

Industrial water will be used to flush the 75K tank waste lines and the interior walls of the tank, in order to reduce residual internal contamination. Flush water will collect in the 75K tank, then either shipped to a commercial facility for treatment and disposal, or transferred to a WMRM influent storage tank for treatment through the new radioactive liquid waste facility, Building 50-230. Flushing may need to be repeated until the stabilization criterion is met.

Criterion: Flushing will be adequate when flush water concentration decreases to <20 nCi/L.

Verification: Analytical results for flush water samples will be used to verify that the flush criterion has been met.

Documentation: Operating records and analytical data will be used as input for the Stabilization Report.

3.3 Clean and Seal Interior 75K Surfaces

Interior surfaces will then be cleaned using measures such as a high-pressure water wand, sand-blasting, or carbon dioxide pressure spray. Cleaning materials such as water will collect in the 75K then either shipped to a commercial facility for treatment and disposal. (If water sprays are used, the water may instead be transferred to a WMRM influent storage tank for treatment through the new radioactive liquid waste facility, Building 50-230.) Cleaning measures may need to be repeated until the stabilization criterion is met. Residual contamination will then be fixed by applying a brush/roll-on fixative (e.g., paint) to the interior 75K tank surfaces.

Criteria: Cleaning will be complete when interior surfaces have no residual solids and liquids. Sealing of residual contamination will be complete when contamination levels of painted surfaces have been reduced to <20 dpm per 100 cm2.

Verification: Cleaning will be visually verified. Radioactive survey results will be used to verify that the sealing criterion has been met.

Documentation: Photographs of the interior walls of the 75K will be taken prior to cleaning, after cleaning, and after sealing. Radiological surveys will be taken after surfaces have been sealed. Operating records, photographs, and radioactive survey data will be used as input for the Stabilization Report.

3.4 Isolate Inlet and Outlet Lines

All inlet and outlet piping to and from the 75K will be isolated by removal, by capping, or by applying blind flanges, thereby assuring that RLW influent can no longer enter or exit. These lines will be in a stable condition until closure in accordance with the RLWTF Closure Plan (LANL 2016). Section 4.1 of this Stabilization Plan has a detailed list of the lines and how each will be isolated.

Criterion: Inlet and outlet RLW Influent lines will be isolated either by removing the line, by capping, or by applying a blind flange.

Verification: Isolation will be visually verified.

Documentation: Before and after photographs will be taken of process pipe connections. Photographs and activity records will be used as input for the Stabilization Report.

3.5 Isolate Support Systems

Electrical: Electric power was used to operate valves and the mixer in the 75K. Stabilization will be achieved when valves INF-VM07 and INF-V11 are removed.

Industrial Water: Used as seal water for the service pumps that pumped water out of the 75K.

Compressed Air: Not applicable

Ventilation: Not applicable

4.0 OTHER STABILIZATION INFORMATION

4.1 The 75K Tank Conveyance Lines

The 75K tank has one carbon steel 10-inch inlet pipe and one carbon steel 6-inch outlet pipe for the receipt and discharge of RLW influent. There is also a 4-inch overflow line to the sump within WM2, a conveyance line to the 17K within 50-248, and a drain line from RM 34B into the 75K tank. Furthermore, a vehicle decontamination sump, currently out of service, with an overflow core drill and an outlet line from the sump pump to the 75K. Stabilization will be achieved:

- When Valve INF-VM-07 (inlet), valve INF-V11 (outlet), and valve WM2-75K-V58 (line to 17K tank) are removed and blind flanged (see Attachment B).
- When the overflow line flange is removed and blind flanged before it ties into the 6-inch overflow line going to the sump in WM2.
- When the vehicle decontamination sump is emptied and the 8-inch core drill overflow hole to the 75K tank is plugged and the pump discharge line to the 75 tank is severed and capped right before it enters the tank (see Attachment C).
- When RM 34B drain is severed and capped.
- When valves RLWECS-VH-181, RLWECS-VH-191 and RLWECS-VH-201 inside vault WM-72 are removed and blind flanged to prevent receipt of water from WMRM or the RLW Collection System into the 75K tank.

4.2 Portions of the Closure Plan to be Implemented

Stabilization of the 75K tank pursuant to this Stabilization Plan will execute the following portions of Closure Plan-related activities at the RLWTF:

DP-1132, Condition 42.d, Methods to be used for decontamination of the site and equipment:

- Liquids, if any, will be removed within the 75K tank by a subcontractor and shipped off-site;
- Solids will be removed from the 75K tank, packaged (e.g., 55-gallon drums), then shipped to a commercial facility for disposal as solid low-level radioactive waste.
- The interior surfaces of the 75K tank may be cleaned (e.g., low-pressure and/or high-pressure wash; and
- Residual contamination will be fixed by applying a spray-on fixative such as paint to the interior of the 75K tank surfaces.

DP-1132, Condition 42.h, Methods to be used to characterize waste generated during closure:

- If solids are discovered then samples from the 75K tank will be sampled and analyzed for radioactivity (alpha radionuclides, beta radionuclides, and tritium) and RCRA toxicity-characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).

DP-1132, Condition 42.j, Methods to be used to remove, transport, treat, recycle, and dispose of waste generated during closure:

- Liquids and solids from within the 75K tank will be removed by subcontractors and shipped to a commercial facility for disposal.

4.3 Interim Measures and Controls for the 75K Tank

The activities described in Section 3 of this Stabilization Plan will prevent all future releases of (a) water contaminants to the environment, (b) water contaminants from moving into the ground water, and (c) water contaminants from posing a threat to human health.

Succinctly, process solids and liquids will be removed from the 75K tank, so that it will be empty. Inlet and outlet pipes will be removed or capped, or will have blind flanges applied so that new water and process wastes cannot be introduced to the unit.

4.4 Soil and Groundwater Investigation

There are no reports of past leaks for the 75K tank, and no evidence of current leaks. The 75K tank is a part of SWMU 50-002(a), defined as all of building 50-002. A water tightness test was also performed in Oct 2014 with 27,000 gallons and no leaks were experienced.

In addition, the 75K tank itself is located south west of building 50-001 and a part of 50-248. Exterior walls of the tank are visible to operators and other personnel. Had the 75K developed a leak, then water would have been discovered in 50-002 or outside of 50-002, and the origin of the leak would have been obvious.

The investigation, characterization, cleanup and corrective action requirements for potential releases of contaminants into soil, groundwater and other environmental media from solid waste management units (SWMUs) and areas of concern (AOCs) associated with the RLWTF are contained within the Compliance Order of June 2016 entered into between the NMED and the DOE pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978, §74-9-36(D). Accordingly, sampling will be conducted per an investigation work plan approved by the Hazardous Waste Bureau under the Consent Order during final closure.

4.5 Stabilization Report

Within 30 days of completion of stabilization activities, a Stabilization Report will be submitted to the NMED for approval. The report will describe stabilization activities, and will contain photographs, radioactive survey data, and other documentation specified in Section 3 of this Plan as evidence that stabilization has been completed.

4.6 Stabilization Schedule

Prior to stabilization the 75K tank will be operationally emptied in fiscal year 2019, floor drains will be unplugged and the 75K will remain available for use as emergency storage until all other units in Condition 40 of DP-1132 are stabilized.

Funding for the stabilization of the 75K tank has been requested for fiscal year 2025. Stabilization would be initiated October 2024 and completed September 2026. The Stabilization Report would be submitted to the NMED in October 2026.

Should funding not be received, a revision to this schedule will be required, and a revision to this Stabilization Plan would result.

5.0 REFERENCES

New Mexico Environment Department, June 2016. Compliance Order on Consent U.S. Department of Energy Los Alamos National Laboratory.

New Mexico Environment Department, 08-29-2018. Ground Water Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory.

LANL, April 2010. Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1, EP-2010-0149, page 98.

6.0 ATTACHMENTS

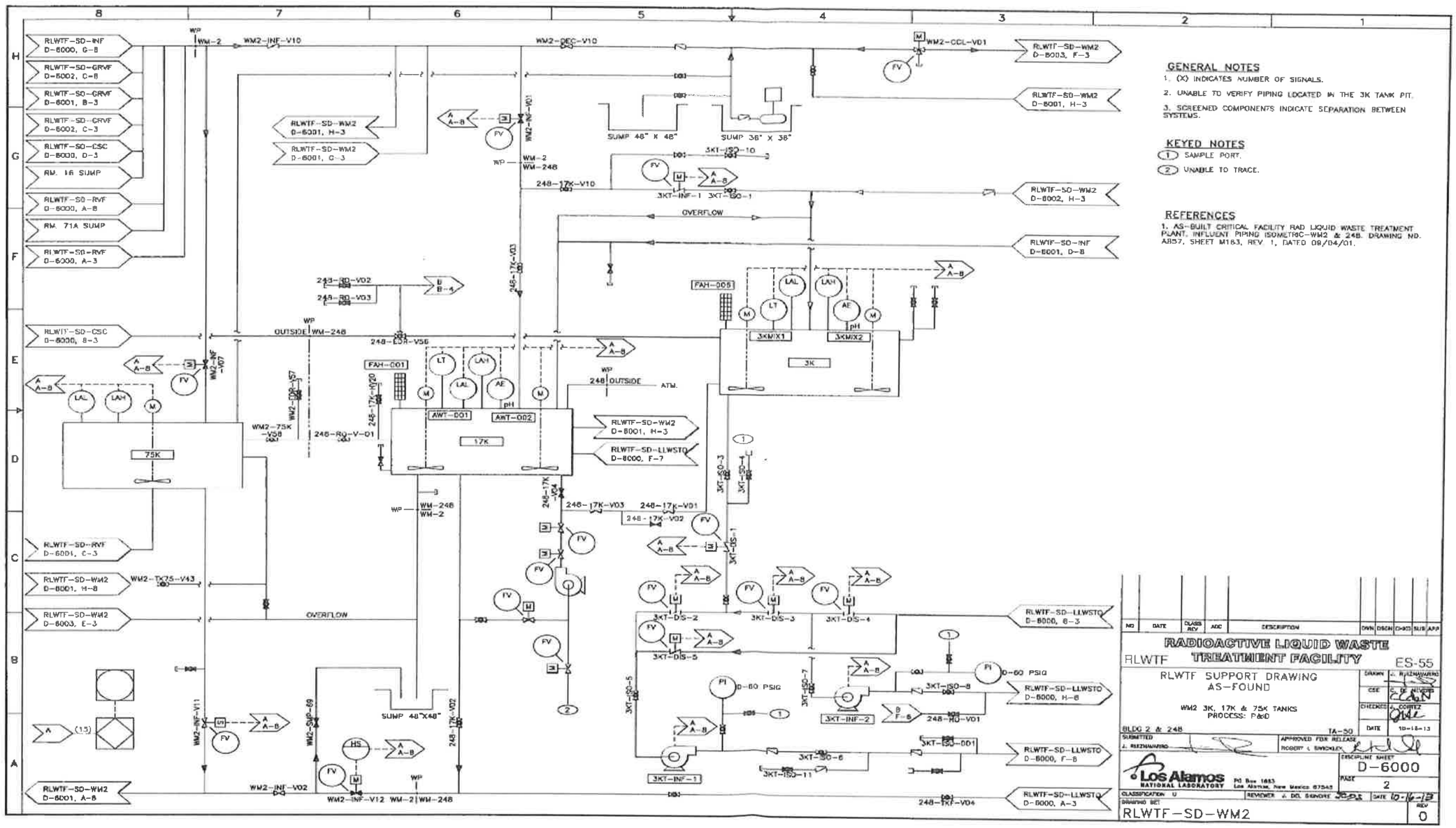
Attachment	Title
A	*Stabilization Activities, Criterion, and Documentation for the 75K Tank*
B	*Drawing RLWTF-SD-WM2, RLWTF support drawing As-Found, WM2 3K, 17K & 75K TANKS PROCESS: P&ID, Sheet D-6000. Revision 0, October 2013*
C	*Drawing AB57, RLWTF AS-BUILT, COMPOSITE PIPING ISOMETRIC-WM2, Sheet M162. Revision 1, March 2001.*

Attachment A, Stabilization Criteria and Documentation for the 75K Tank

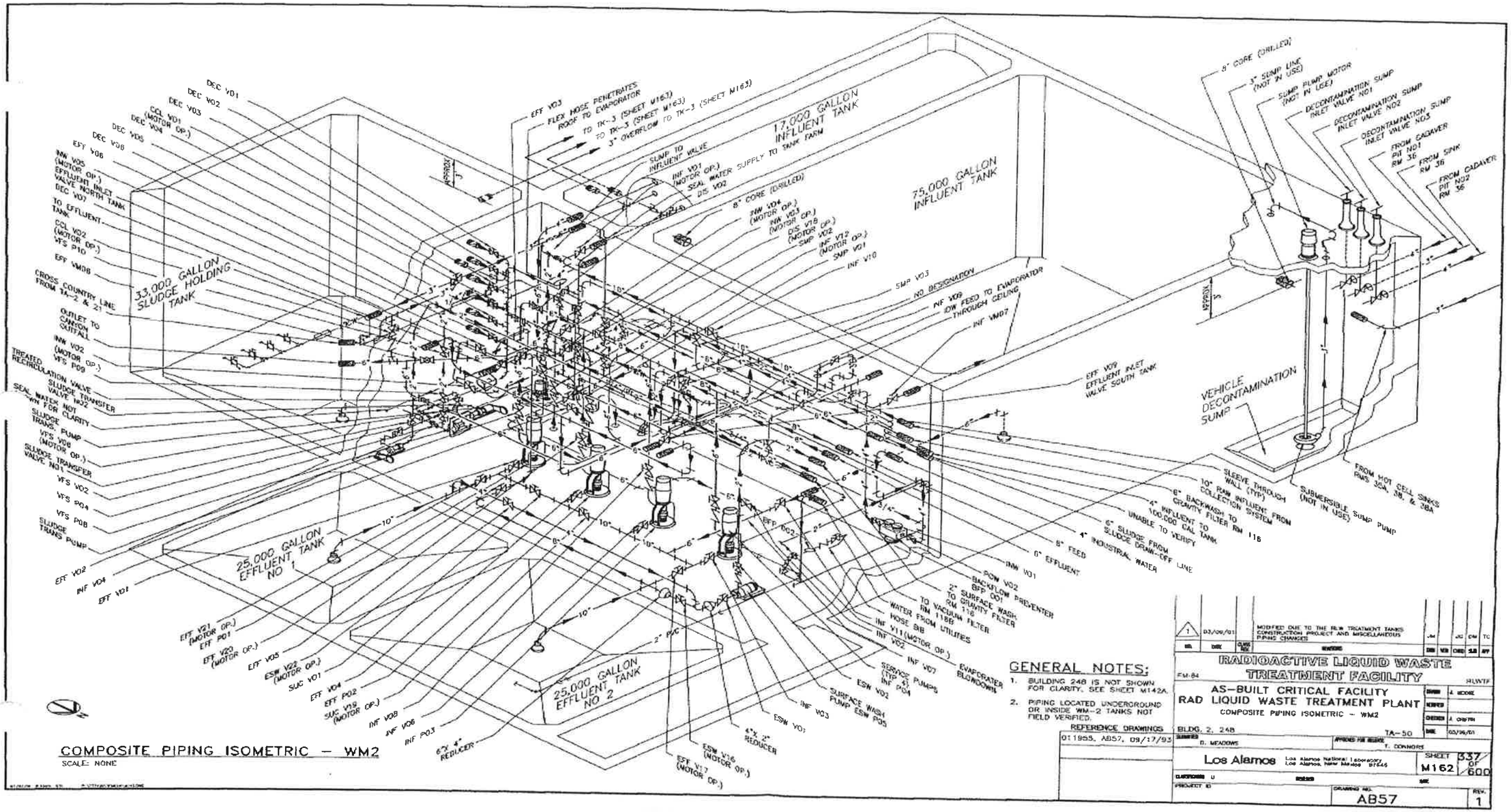
Activity	Criteria	Documentation
1. Remove Process Liquids	The 75K tank will no longer contain process liquids	Process records, including graph of tank levels over time
2. Remove Process Solids	The 75K tank will be empty	Before and after photographs
3. Flush 75K Tank	Flush water <20 nCi/L	Flush water analytical results
4. Clean and Seal Interior Surfaces	• Cleaning: No residual solids • Sealing: Contamination < 20 dpm/100 cm^2	• Cleaning: Before and after photographs • Sealing: Radiation survey results
5. Isolate Inlet and Outlet Lines	Remove or cap the line, or apply blind flange	Before and after photographs

In addition to above listed documentation, activity logs and records will be used as documentation for all activities.

Attachment B, Drawing RLWTF-SD-WM2, RLWTF support drawing As-Found, WM2 3K, 17K & 75K TANKS PROCESS: P&ID, Sheet D-6000. Revision 0, October 2013



Attachment C, Drawing AB57, RLWTF AS-BUILT, COMPOSITE PIPING ISOMETRIC-WM2, Sheet M162. Revision 1, March 2001



COMPOSITE PIPING ISOMETRIC – WM2
SCALE: NONE

GENERAL NOTES:

1. BUILDING 248 IS NOT SHOWN FOR CLARITY, SEE SHEET M142A.
2. PIPING LOCATED UNDERGROUND OR INSIDE WM-2 TANKS NOT FIELD VERIFIED.

REFERENCE DRAWINGS
011955, AB57, 09/17/93

1	03/06/01	MODIFIED DUE TO THE RLWW TREATMENT TANKS CONSTRUCTION PROJECT AND MISCELLANEOUS PIPING CHANGES	JM VB CMD SJB TC

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY
FM-84 RLWTF
AS-BUILT CRITICAL FACILITY
RAD LIQUID WASTE TREATMENT PLANT
COMPOSITE PIPING ISOMETRIC – WM2
BLDG. 2, 248 TA-50
DRAWN J. MOORE
CHECKED A. CHAVEZ
DATE 03/06/01
SUBMITTED D. MEADOWS
APPROVED FOR RECORD T. CONNORS
Los Alamos Los Alamos National Laboratory Los Alamos, New Mexico 87545
SHEET M162 337 OF 600
PROJECT ID
DRAWING NO. AB57
REV. 1