

# Los Alamos National Laboratory

*Environment, Safety, and Health Division*

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Date: November 20, 1998  
Refer to: ESH-DO:98-3492



Ms. Dale Doremus  
Program Manager  
Ground Water Pollution Prevention Section  
New Mexico Environment Department  
1190 St. Francis Drive, P.O. Box 26110  
Santa Fe, New Mexico 87502

**SUBJECT: OPERATIONAL PLAN, GROUND WATER DISCHARGE PLAN (DP-1132) FOR LOS ALAMOS NATIONAL LABORATORY'S RADIOACTIVE LIQUID WASTE TREATMENT FACILITY AT TA-50**

Dear Ms. Doremus:

In your September 17, 1998, letter (copy enclosed) you requested an operational plan for the discharges from Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. The enclosed operational plan proposes the following short-term solutions for compliance with New Mexico Water Quality Control Commission (WQCC) ground water standards: upstream controls to minimize the discharge of nitrogenous chemicals to the RLWTF; temporary storage of the reverse osmosis (RO) concentrate stream; and, temporary storage of the TA-55 acid stream. With the exception of the upstream controls, the proposed short-term solutions are temporary and apply only to the interim period beginning March 21, 1999, and extending until a new long-term treatment process for nitrate removal becomes operational.

A short-term operational plan is necessary because of the nonperformance of SKF, Inc., the vendor for the biodenitrification equipment. SKF has delayed for one year the completion of the Phase II upgrades (original contract delivery date: November 30, 1997). The RLWTF is moving forward by recommending termination of the SKF contract and restarting the procurement process for similar equipment. A Request for Proposals (RFP) will be issued in November 1998 to qualified vendors.



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RED LANA TA-50 (RLWTF) '98

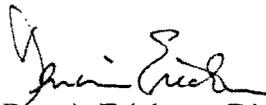
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In addition, the Laboratory is actively pursuing the option of evaporation as an additional solution for nitrate removal. If feasible, evaporation would offer the added benefit of removing salts from the RLWTF effluent, a necessary step for the Laboratory's long-term goal of zero liquid discharge. Current scheduling estimates, however, show that neither biodenitrification nor evaporation upgrades can be operational by March 21, 1999. As a result, the Laboratory proposes to institute a short-term operational plan to ensure compliance until the long-term treatment process upgrades have been completed.

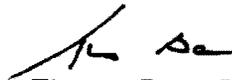
The Phase I upgrades (ultrafiltration and reverse osmosis) are scheduled to begin treating radioactive liquid waste in January 1999. The Laboratory will notify your agency once the Phase I upgrades become fully operational. Additionally, the Nitric Acid Recovery System (NARS) at TA-55 is progressing towards an estimated completion date of June 1999. NARS represents a significant step towards nitrate compliance by reducing the largest source of nitrates in the RLWTF influent.

Please contact Bob Beers of the Laboratory's Water Quality and Hydrology Group at (505)667-7969, if you require additional information on the enclosed operational plan for the Laboratory's Ground Water Discharge Plan for the RLWTF at TA-50.

Sincerely,



Dennis Erickson, Division Leader  
Environment, Safety & Health Division



Thomas Baca, Program Director  
Environmental Management Program

DJE/md

Enclosures: a/s

Cy: J. Davis, NMED SWQB, Santa Fe, New Mexico, w/enc.  
B. Garcia, NMED HRMB, Santa Fe, New Mexico, w/enc.  
P. Bustamante, NMED GWQB, Santa Fe, New Mexico, w/enc.  
D. Gurule, DOE LAAO, w/enc., MS A316  
J. Vozella, AAME, LAAO, w/enc., MS A316  
B. Koch, AAME, LAAO, w/enc., MS A316  
C. Murmane, LPMO, LAAO, w/enc., MS A316  
R. Burick, DIR, w/enc., MS A100  
B. Stein, ALDNW, w/enc., MS F629  
D. Woitte, LC/GL, w/enc., MS A187  
B. Matthews, NMT-DO, w/enc., MS E500  
S. Schreiber, NMT-2, w/enc., MS E511  
S. Yarbro, NMT-2, w/enc., MS E511  
J. Balke, NMT-7, w/enc., MS E501  
S. Hanson, EM-RLW, w/enc., MS E518

Cy: (Continued)

K. Hargis, EM/WM, w/enc., MS J591  
D. Moss, EM-RLW, w/enc., MS E518  
P. Worland, EM-RLW, w/enc., MS E518  
T. Conners, EM-RLW, w/enc., MS E518  
M. Harris, FE-6, w/enc., MS M984  
S. Rae (ESH-18/WQ&H:98-0408), ESH-18, w/enc., MS K497  
N. Williams, ESH-18, w/enc., MS K497  
B. Beers, ESH-18, w/enc., MS K497  
M. Saladen, ESH-18, w/enc., MS K497  
ESH-DO File, w/enc., MS K491  
WQ&H File, w/enc., MS K497  
CIC-10, w/enc., MS A150

## **SHORT-TERM OPERATIONAL PLAN**

Due to the nonperformance of the Laboratory's vendor for the Phase II upgrades (nitrate removal), it is necessary for the RLWTF to institute a short-term operational plan. The plan will become effective on or before March 21, 1999, and will remain active until the new long-term treatment process for nitrate removal is completed. The short-term operational plan consists of the following three programs: upstream controls to minimize the discharge of nitrogenous chemicals into the RLWTF; temporary storage of the reverse osmosis (RO) concentrate stream; and temporary storage of the TA-55 process acid stream. A description of each program follows.

### **Upstream Controls**

In November 1998, the Laboratory initiated a survey to identify generators, locations, and quantities of liquid wastes containing nitrogenous chemicals entering the RLWTF. RLWTF staff are working with each generator to devise practical means of minimizing nitrogen discharges to the collection system; methods such as waste minimization, product substitution, and temporary containerization will be employed. Initial estimates show that each pound of nitrogenous chemicals removed from the RLWTF influent will reduce the volume of RO concentrate requiring storage by several hundred gallons per day.

Survey results are due by the end of December 1998. Minimization, substitution, and containerization of nitrogenous chemicals will be implemented between January and March 1999. The upstream controls program will be conducted in coordination with the Laboratory's new Waste Certification Program, scheduled to begin in January 1999. The Laboratory's goal is to reduce nitrate concentrations in the RLWTF influent to less than 10 mg/L (nitrate as nitrogen).

### **Temporary Storage of the RO Concentrate Stream**

Using existing storage capacity at the RLWTF and, if needed, new storage tanks installed on-site, the Laboratory will temporarily store as much of the RO concentrate stream as necessary to ensure that effluent nitrate concentrations are less than 10 mg/L. Nitrate concentrations in the RLWTF influent can vary substantially throughout the day and the week depending upon the activity of generators. The RO concentrate stream will be stored whenever the RLWTF operators cannot maintain nitrate concentrations in the effluent at less than 10 mg/L. Additional information on the temporary storage of the RO concentrate stream is presented below.

#### **Duration of Temporary Storage**

Temporary storage of RO concentrate will commence on or before March 21, 1999. Storage will continue, as needed, until the new treatment process for nitrate removal is fully operational.

**Temporary Storage of the RO Concentrate Stream (con't)**

**Estimated Daily Volume of RO Concentrate to be Temporarily Stored**

Estimated recovery rates for the RO treatment process range from 70 to 90 percent, depending upon scale formation and cleaning frequencies. Current estimates of the daily RO reject volume range from 2,500 to 7,500 gallons per day. It is expected that upstream controls combined with the efficient management of off-peak, low-nitrate, influent will reduce the actual storage volume to less than 2,000 gallons per day.

**Estimated Quality of RO Concentrate in Temporary Storage**

Attachment 1 presents the estimated concentration of NM WQCC Section 3103. ground water contaminants in the RO concentrate stream at 70, 80, and 90 percent recovery rates.

**Estimated Quality of RO Permeate Discharge to Mortandad Canyon**

Attachment 2 presents the estimated concentration of NM WQCC Section 3103. ground water contaminants in the RO permeate stream at 70, 80, and 90 percent recovery rates. RO permeate will be discharged to Mortandad Canyon under the Laboratory's NPDES Outfall Permit No. 0028355 after pH adjustment in the effluent tank. As needed, RO reject and permeate will be blended in the effluent tank such that no ground water standard is exceeded in the RLWTF effluent.

**Description of Existing Storage**

The RLWTF has 200,000 gallons of existing storage capacity that can be used to store the RO concentrate stream. This storage capacity is described below.

- 25,000 gallon clarifier tank. This is an inspectable, single-walled, concrete tank located inside building 01 at TA-50. This tank was nondestructively tested (NDT) in 1994 and refurbished in 1996.
- 75,000 gallon influent tank. This is a belowground, single-walled, concrete tank that was tested (NDT) in 1994.
- 100,000 gallon WM-90 tank. This is an aboveground, single-walled, steel tank that has a concrete berm surrounding it.

**Description of New Storage**

If necessary, new storage tanks will be installed for the temporary storage of the RO concentrate. The following general specifications will apply to each new temporary storage tank installed:

- Approximately 100,000 gallons in capacity;
- Above ground construction;
- Flexible geomembrane lining;
- Double containment with leak detection monitoring;
- Supplied with RO concentrate via tank trucks; and
- Sited on DOE property in close proximity to TA-50.

**Temporary Storage of the RO Concentrate Stream (con't)**

**Final Disposition of the Stored RO Concentrate**

Once the new treatment process for nitrate removal is operational, the stored RO concentrate will be treated to remove nitrates and then discharged through the NPDES Outfall 051 at Mortandad Canyon. All discharges will be in compliance with the NM WQCC Section 3103. ground water standards.

**Storage of Room 60 Process Acid Stream from TA-55**

The process acid stream from TA-55 represents approximately 90 percent of the total nitrogen load in the RLWTF influent. This stream will, beginning on or before March 21, 1999, be temporarily stored in approximately 12,500 gallons of existing storage capacity at TA-50. This capacity will permit temporary storage for a minimum of six months or until the Nitric Acid Recovery System (NARS) at TA-55 becomes operational. NARS, as described in the original Ground Water Discharge Plan Application (August 19, 1996), is a system to recover the nitric acid used in plutonium stabilization operations. NARS is expected to reduce nitrate concentrations in the TA-55 process acid stream to less than 10 mg/L (nitrate as nitrogen). NARS is currently scheduled for completion in June 1999.

RLWTF AT TA-50  
ESTIMATED QUALITY  
OF THE  
REVERSE OSMOSIS CONCENTRATE STREAM

CONSTITUENTS	UNITS	RO REJECT 70% RECOVERY*	RO REJECT 80% RECOVERY*	RO REJECT 90% RECOVERY*
ALUMINUM	mg/liter	0.34	0.51	1.02
ARSENIC	mg/liter	0.008	0.012	0.025
BARIUM	mg/liter	0.10	0.10	0.20
BORON	mg/liter	0.49	0.73	1.47
CADMIUM	mg/liter	0.003	0.005	0.010
CHLORIDE	mg/liter	1,722	2,586	5,162
CHROMIUM	mg/liter	0.05	0.07	0.15
COPPER	mg/liter	0.68	1.02	2.03
CYANIDE	mg/liter	0.049	0.074	0.148
FLUORIDE	mg/liter	4.60	6.90	13.70
IRON	mg/liter	1.25	1.87	3.74
LEAD	mg/liter	0.016	0.024	0.047
MERCURY	mg/liter	0.001	0.001	0.002
NITRATE-N	mg/liter	113	168	336
pH	units	7.48	7.65	7.94
SELENIUM	mg/liter	0.002	0.003	0.005
SULFATE	mg/liter	159	239	477
TDS	mg/liter	4,797	7,193	14,365
URANIUM	mg/liter	0.0004	0.0005	0.0011
ZINC	mg/liter	0.29	0.44	0.88

## Notes:

\*Temperature = 80°F

## Data Source:

- Merrick Influent Design Basis #4.
- RLW Collection System with caustic from Room 60 but with acid storage.

RLWTF AT TA-50  
ESTIMATED QUALITY  
OF THE  
REVERSE OSMOSIS PERMEATE STREAM

CONSTITUENTS	UNITS	RO PERMEATE 70% RECOVERY	RO PERMEATE 80% RECOVERY	RO PERMEATE 90% RECOVERY	NM WQCC 3103. GROUND WATER STANDARDS
ALUMINUM	mg/liter	0.0077	0.0067	0.0060	5
ARSENIC	mg/liter	0.0001	0.0001	0.0001	0.1
BARIUM	mg/liter	0	0	0	1
BORON	mg/liter	0.090	0.079	0.070	0.75
CADMIUM	mg/liter	0.00003	0.00002	0.00002	0.01
CHLORIDE	mg/liter	10.6	13.9	26.1	250
CHROMIUM	mg/liter	0.0003	0.0003	0.0003	0.05
COPPER	mg/liter	0.0059	0.25	0.23	1
CYANIDE	mg/liter	0.0018	0.0016	0.0014	0.2
FLUORIDE	mg/liter	0	0	0	1.6
IRON	mg/liter	0.0054	0.4675	0.0042	1
LEAD	mg/liter	0.0003	0.0002	0.0002	0.05
MERCURY	mg/liter	5.15E-06	4.50E-06	4.00E-06	0.002
NITRATE-N	mg/liter	2.24	2.89	5.53	10
pH*	units	5.7	5.8	6.1	6 to 9
SELENIUM	mg/liter	0.00004	0.00004	0.00003	0.05
SULFATE	mg/liter	0.4	0.6	1.1	600
TDS	mg/liter	42	54	102	1000
URANIUM	mg/liter	0.00001	0.00001	0.00001	5
ZINC	mg/liter	0.0052	0.0046	0.0041	10

## Notes:

Temperature = 80°F.

\* pH adjustment will occur in the effluent tank prior to discharge.

## Data Source:

- Merrick Influent Design Basis #4
- RLW Collection System with caustic from Room 60 but with acid storage.



GARY E. JOHNSON  
GOVERNOR

State of New Mexico  
**ENVIRONMENT DEPARTMENT**  
Ground Water Quality Bureau  
Harold Runnels Building  
1190 St. Francis Drive, P.O. Box 26110  
Santa Fe, New Mexico 87502  
(505) 827-2918 phone  
(505) 827-2965 fax



PETER MAGGIORE  
Secretary

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

September 17, 1998

Mr. David Gurule, Area Manager  
Department of Energy  
528 35<sup>th</sup> Street  
Los Alamos, New Mexico 87544

**RE: Letter of Non-Compliance, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (RLWTF), DP-1132**

Dear Mr. Gurule:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) has determined that the Los Alamos National Laboratory (LANL) Radioactive Liquid Waste Treatment Facility (RLWTF) is not operating in compliance with the Water Quality Control Commission (WQCC) Regulations. Based on the WQCC discharge plan application that was submitted by LANL, August 16, 1996 and subsequent correspondence between LANL and the GWQB, NMED has determined that the RLWTF is in violation of WQCC Regulations 3104, 3106.A, and 3106.C. The violations and corrective actions required by LANL are described below.

1. In accordance with WQCC Regulation 3106.A, NMED notified LANL, April 3, 1996, that a ground water discharge plan was required for discharges from the RLWTF and allowed LANL to discharge without an approved discharge plan for 240 days. A discharge plan was submitted on August 16, 1996 and NMED has allowed LANL to continue discharging without an approved plan based on requests for extensions to conduct pilot studies and implement proposed upgrades. LANL's letter dated September 3, 1998 indicates that they cannot meet previous extension deadlines and has requested that further engineering studies be conducted before a completion date is proposed. WQCC Regulations 3104 and 3106.A have been violated by LANL's discharge from the RLWTF beyond the allowed time frames without an approved WQCC discharge plan.

In order to comply with WQCC regulations 3104 and 3106.A, LANL must submit within 60

days of receipt of this letter, an operational plan for the discharges from RLWTF which demonstrates that WQCC Regulation 3103 standards will be met. A final extension for LANL to discharge without an approved discharge plan will be granted for 180 days from your receipt of this letter. The only extension to this deadline will be made if a public hearing on DP-1132 is granted by the secretary.

2. WQCC Regulation 3106.C, requires that discharge plans set forth in detail the methods and or techniques the discharge proposes to use or processes expected to naturally occur which will ensure compliance with these regulations. WQCC Regulation 3106.C has been violated by LANL's withdrawal, in its September 3, 1998 letter, of its selection of a biodenitrification unit as the method to ensure compliance with WQCC Regulation 3103. Because LANL has not set forth in detail an operational plan for discharges from the RLWTF, NMED does not have a complete discharge plan application to consider for approval.

In order to comply with WQCC regulation 3106.C, LANL must submit within 60 days an operational plan that sets forth in detail the methods or techniques which will ensure that the the discharges from RLWTF will meet WQCC Regulation 3103 standards.

Failure to comply with this letter and any other WQCC Regulation may result in the issuance of a formal notice of violation, fines, a compliance order, or the filing of an action in district court.

This letter is NMED's attempt to gain your voluntary compliance. If you have any questions regarding this letter, please call me at (505) 827-2945 or Phyllis Bustamante at 827-0166.

Sincerely,



Dale M. Doremus, Program Manager  
Ground Water Pollution Prevention Section

DMD:PAB/pab

cc: James Bearzi, District Manager, NMED District II  
Glen Saums, SWQB  
John Kieling, HRMB  
DOE, Oversight Bureau