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 87502-6110
Telephone (505) 827-2918
Fax (505) 827-2965

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Office of Los Alam
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Street, Apt. No.; or PO Box No.: US Dept of Energy
City, State, ZIP+4: 528 35th Street
PS Form 3800, June 2002

7004 0750 0001 3310 4227

Robert W. Kuckuck
University of Calif
Street, Apt. No.; or PO Box No.: P.O. Box 1663 (Mail
City, State, ZIP+4: Los Alamos, NM 87
PS Form 3800, June 2002

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

December 2, 2005

Edwin Wilmott, Manager
Office of Los Alamos Site Operations
National Nuclear Security Administration
U.S. Department of Energy
528 35th Street
Los Alamos, New Mexico 87544

Robert W. Kuckuck
University of California
P.O. Box 1663
Mail Stop A100
Los Alamos, NM 87545

RE: Request for Additional Information, DP-1132, Los Alamos National Laboratory

Dear Mr. Wilmott and Mr. Kuckuck:

The New Mexico Environment Department (NMED) has reviewed Los Alamos National Laboratory (LANL) Discharge Permit application (DP-1132) dated August 16, 1996. NMED requests the following additional information, pursuant to Section 20.6.2.3109 NMAC, to evaluate the Discharge Permit application:

1. All information, including any reports and all analytical data, from studies that have evaluated impacts on soils, surface water and ground water from operations and discharge at and from TA-50.

2. Please submit the following reports:

    a. All audit reports about TA-50 operations and discharges;
    b. All Department of Energy Inspector General reports about TA-50; and
    c. Emility, L.A., *A History of Radioactive Liquid Waste Management at Los Alamos*, LA-UR-96-1283.

3. Please specify and describe the treatment process at TA-53 for evaporate distillate and RO permeate that does not meet the criteria for discharge to Mortandad Canyon.
    a. Are wastes subjected to further treatment if they are not able to meet the criteria for discharge at TA-50?
    b. How are the wastes that do not meet criteria for discharge at TA-50 treated and disposed?

c. Where are the wastes that do not meet criteria for discharge at TA-50 treated and disposed?

4. Please specify how the solids generated by treatment at TA-50 and proposed to be disposed at TA-54 are managed.

    a. How will the wastes be contained and disposed of?
    b. Is there a contingency plan for disposal of these wastes?
    c. Where are the evaporator bottoms sent for off-site treatment?

5. Please provide copies of waste management plans for all treatment of sludges, scale and other solids.

6. LANL provided NMED a document entitled, *Operational Plan, Ground Water Discharge Plan (DP-1132) for Los Alamos National Laboratory's Radioactive Liquid Treatment Waste Treatment Facility at TA-50,* on November 24, 1998.

    a. Has LANL made any changes or additions to the plan?
    b. Does the plan include maintaining the piping system, leak detection system, and secondary containment systems, such as the "leak collection vaults?"
    c. Does LANL require regularly scheduled mandatory inspections?
    d. Is the plan still in effect or has it been revised?
    e. If the plan has been revised, please submit the most recent version.

7. Please submit a proposed detailed closure plan for TA-50 wastewater treatment, conveyance and disposal system.

Please submit the requested information by January 15, 2006. If you have any comments, questions, or concerns, please contact me at (505) 827-2900 or Christopher Vick at (505) 827-0078. Thank you for your cooperation during the review process.

Sincerely,

George Schuman

George Schuman
Program Manager
Ground Water Quality Bureau

cc: James Bearzi, NMED Hazardous Waste Bureau, P.O. Box 26110, Santa Fe, NM 87502

Bret Lucas, NMED Surface Water Quality Bureau

Tim Michael, Staff Manager, NMED DOE Oversight Bureau, 2905 Rodeo Park Drive East, Bldg. 1,Santa Fe, NM 87505

Steve Yanicak, Point of Contact, NMED DOE Oversight Bureau, 134 SR 4, Suite A, Bldg. 001313, White Rock, NM 87544

Beverly Ramsey, Director, Risk Reduction and Environmental Stewardship Division, Los Alamos National Laboratory, P.O. Box 1663, MS-J591, Los Alamos, NM 87545

Steven Rae, Group Leader, Water Quality & Hydrology Group, Risk Reduction & Environmental Stewardship Division, Los Alamos National Laboratory, MS K497 Los Alamos, NM 87545

Bob Beers, Water Quality and Hydrology Group, Risk Reduction & Environmental Stewardship Division, Los Alamos National Laboratory, MS K497, Los Alamos, NM 87545

Dennis McLain, Facility Manager/Group Leader, Waste Facility Management Group, Facility & Waste Operations Division, Los Alamos National Laboratory, MS J593, Los Alamos, NM 87545

Joni Arends, Concerned Citizens for Nuclear Safety, 107 Cienega, Santa Fe, NM 87501

Kathleen Sanchez, Tewa Women United, Rt. 5, Box 298, Santa Fe, NM, 87506

Peggy Prince, Peace Action New Mexico, 226 Fiesta Street, Santa Fe, NM 87501

George Rice, Concerned Citizens for Nuclear Safety, 414 East French Place, San Antonio, TX, 78212

Brian Shields, Amigos Bravos, P.O. Box 238, Taos, NM 87571

03098

Attachment 1

No.	Title	Date	Document No.
1	Characterization Well R-13 Completion Report	Mar-03	LA-UR-03-1373
2	Hydrologic Tests at Characterization Well R-14	Aug-04	LA-14107-MS
3	Characterization Well R-15 Geochemistry Report	Mar-03	LA-13896-MS
4	Logs and Completion Data for Water and Mass Balance Wells in Mortandad Canyon	Oct-97	LA-13297-MS
5	Aquifer Test Analysis for Well R-15	May-04	LA-14074-MS
6	Assessment of Potential Contaminant Pathways in the Vicinity of Mortandad Canyon	Jul-04	LA-UR-04-4875
7	Status of Mortandad Canyon Sediment Investigations	Aug-03	LA-UR-03-5997
8	Extent of Saturation in Mortandad Canyon	May-91	LA-UR-91-1660
9	Mortandad Canyon: Elemental Concentrations in Vegetation, Streambank Soils, and Stream Sediments	Jun-97	LA-13325-MS
10	Chemical Quality of Effluents and Their Influence on Water Quality in a Shallow Aquifer	Mar-77	None
11	A Survey of SomeLA County Canyons for Radioactive Contamination Spring 1953 to Spring 1955	Jun-55	LA-MS-2038
12	Quality of Storm Water Runoff at LANL in 2000 with Emphasis on the Impacts of the Cerro Grande Fire	May-02	LA-13926
13	Impact of Strontium-90 on Surface Water and Groundwater at LANL through 2000	Dec-01	LA-13855-MS
14	Impact of Tritium Disposal on Surface Water and Groundwater at LANL through 1997	Jul-98	LA-13465-SR
15	Uranium in Waters near LANL: Concentrations, Trends, and Isotopic Composition through 1999	Mar-04	LA-14046
16	Work Plan for Mortandad Canyon	Sep-97	LA-UR-3291
17	Mortandad Canyon Groundwater Work Plan	Aug-03	LA-UR-03-6221
18	RFI Work Plan for Operable Unit 1147	May-92	LA-UR-92-969
19	Radioactive Liquid Wastewater Treatment Facility Influent Minimization Study	2001	LA-UR-01-5353
20	A History of Radioactive Liquid Waste Management at Los Alamos	1996	LA-UR-96-1283
21	Surface Water Data at Los Alamos National Laboratory 2004 Water Year	Apr-05	LA-14211-PR
22	Surface Water Data at Los Alamos National Laboratory 2003 Water Year	Mar-04	LA-14131-PR
23	Surface Water Data at Los Alamos National Laboratory 2002 Water Year	Mar-03	LA-14019-PR
24	Surface Water Data at Los Alamos National Laboratory 2001 Water Year	Apr-02	LA-13905-PR
25	Surface Water Data at Los Alamos National Laboratory 2000 Water Year	Jun-01	LA-13814-PR
26	Pilot Scale Membrane Filtration Testing at the Radioactive Liquid Waste Treatment Facility	Nov-02	LA-UR-02-7108
27	LANL, NPDES Permit Re-Application Project, DMR Outfall Data Summary (Aug , 1994-Dec 31, 1997)	1998	None
28	LANL, NPDES Permit Re-Application Project, DMR Outfall Data Summary (1/1/98-12/31/03)	2004	None
29	LANL, DMR Outfall Data Summary (1/1/2004-10/31/2005)	2005	None
30	Well R-28 Completion Report	Feb-2005	None

①

LA-UR-03- 1373

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Title: CHARACTERIZATION WELL R-13 COMPLETION REPORT

Author(s): Daniel Thompson, 178705, WGII
Cutis Schultz, 174299, RRES-GPP
Paula Schuh, 176596, RRES-R
Eric Tow, 175678, RRES-GPP
Rick Lawrenece, 116843, WGII

Submitted to: DOE

Los Alamos
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Form 836 (8/00)

58

03100

(2)

LA-14107-MS

Hydrologic Tests at Characterization Well R-14

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03100A

(3)

LA-13896-MS

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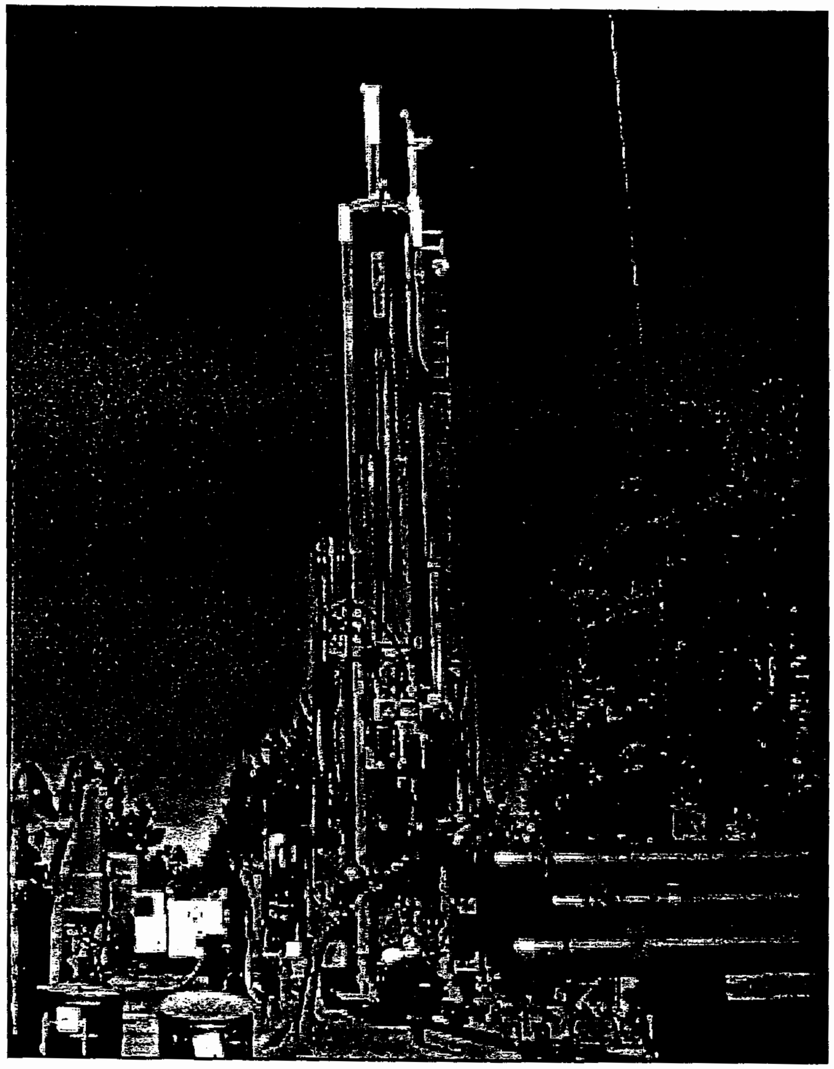
Characterization Well R-15 Geochemistry Report



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LA-13297-MS

Logs and Completion Data for Water and Mass Balance Wells in Mortandad and Ten Site Canyons

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LA-14074-MS

Aquifer Test Analysis for Well R-15

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03103

(6)

LA-UR-04-4875

Title: Assessment of potential contaminant pathways through saturated zone in the vicinity of Mortandad canyon

Author(s): Velimir V. Vesselinov, EES-6

Submitted to: Groundwater Protection Program Quarterly Meeting
Los Alamos, NM
July 13, 2004

Los Alamos
NATIONAL LABORATORY

(7)

STATUS OF MORTANDAD CANYON SEDIMENT INVESTIGATIONS

Steven Reneau, Randy Ryti, Paul Drakos, and Terre Mercier

August 26, 2003

Los Alamos National Laboratory Report LA-UR-03-5997

INTRODUCTION

Investigations of potentially contaminated sediment deposits in Mortandad Canyon and its tributary canyons by the Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project (now the Risk Reduction and Environmental Stewardship-Remediation Services Project) Canyons team have been in progress since 1998. This work has been conducted following the "Work Plan for Mortandad Canyon" (the "work plan") (LANL 1997, 56835; LANL 1999, 62777), which was approved by the New Mexico Environment Department (NMED) in December 2002 (NMED 2002, 73830). Included in this work plan are investigations of potential contamination in sediment, surface water, and groundwater in Mortandad Canyon proper, as well as in Effluent Canyon, Ten Site Canyon, and an unnamed tributary canyon that heads in Technical Area (TA) 5 (hereafter referred to collectively as the "Mortandad Canyon reaches"). A short tributary to Ten Site Canyon, "Pratt Canyon", has been investigated separately as part of characterization activities at TA-35. This report summarizes analytical results from all sediment samples collected by the Canyons team to date in implementation of the work plan, as well as results from relevant sediment samples from the Mortandad Canyon reaches and from Pratt Canyon that were collected by other ER Project investigations in TA-5, TA-35, and TA-50. An accompanying electronic data file includes all analytical results from these samples.

This report and the electronic file contain data regarding radioactive materials, the management of which is regulated by the Department of Energy under the Atomic Energy Act. The radioactive materials are specifically excluded from regulation under the Resource Conservation Recovery Act and the Hazardous Waste Act. These data are provided to the NMED for informational purposes only.

FIELD INVESTIGATIONS

Field investigations that include detailed geomorphic mapping, associated geomorphic characterization, and sediment sampling have been conducted in all reaches specified in the work

(8)

LA-UR-91-1660

C.1

Los Alamos National Laboratory
Environmental Restoration

A Department of Energy environmental clean-up program

EXTENT OF SATURATION IN MORTANDAD CANYON

A. K. Stoker
W. D. Purtymun
S. G. McLin
M. N. Maes

May 1991

03106

LA-13325-MS

Mortandad Canyon: Elemental Concentrations in Vegetation, Streambank Soils, and Stream Sediments—1979

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03107

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677 South Segoe Rd., Madison, WI 53711 USA

Chemical Quality of Effluents and Their Influence on Water Quality in a Shallow Aquifer[1]

W. D. Purtymun, J. R. Buchholz, and T. E. Hakonson[2]

ABSTRACT

The chemical quality of liquid effluent released from an industrial waste treatment plant at the Los Alamos Scientific Laboratory controls the quality of water in a shallow aquifer in the alluvium of Mortandad Canyon. The dilution of the effluent with surface flow in the canyon reduces the concentrations of the chemicals as they move down gradient into the aquifer. Mass estimates of residual chemicals in solution in the aquifer average 1-6% of the total chemicals released to the canyon from 1963-1974. The average annual concentration of sodium, nitrate, chloride, and total dissolved solids in the aquifer through a 12-year period was directly correlated with annual average concentrations in the effluent. This relationship provides a means of predicting the impact of the chemical effluents on the quality of water in the aquifer.

Additional Index Words: dilution ratios, mass inventories, regression.

Industrial liquid wastes resulting from some of the scientific programs at the Los Alamos Scientific Laboratory (LASL) are collected and processed at a waste treatment plant at Technical Area (TA) 50 located adjacent to Mortandad Canyon. The plant, which became operational in June 1963, has been the sole source of treated effluents to Mortandad Canyon. Hydrologic studies which were initiated in 1960 have continued as a part of an overall evaluation of the impact of the effluents on the environment (1, 3, 4). The purpose of this study was to investigate annual changes in the chemical quality of water in the canyon resulting from the release of effluents through the period of 1963-1974. An annual mass inventory was made of chemical additions to the canyon and of the residual chemicals in storage in the aquifer; empirical data were used in developing a predictive model for estimating the concentrations of selected constituents in the aquifer.

METHODS AND MATERIALS

The stream in the upper reach of Mortandad Canyon is perennial due to the release of effluents from TA-50 and to additions of water from TA-48 which is located upstream from TA-50. The water from TA-48 (1.7×10^4 liters/day) results from a cooling pro-

[1] Research funded under contract No. W-7405-ENG. 36 between the U. S. Energy Res. and Develop. Admin. and the Los Alamos Sci. Lab. Received 7 Nov. 1975.

[2] Hydrologist, Chemist, and Radiation Ecologist, respectively, Los Alamos Sci. Lab., Los Alamos, NM 87545.

[redacted]

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LAMS-2038

LOS ALAMOS SCIENTIFIC LABORATORY

OF THE UNIVERSITY OF CALIFORNIA ○ LOS ALAMOS NEW MEXICO

A SURVEY OF SOME LOS ALAMOS COUNTY CANYONS FOR RADIOACTIVE CONTAMINATION, SPRING 1953 TO SPRING 1955

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[redacted]

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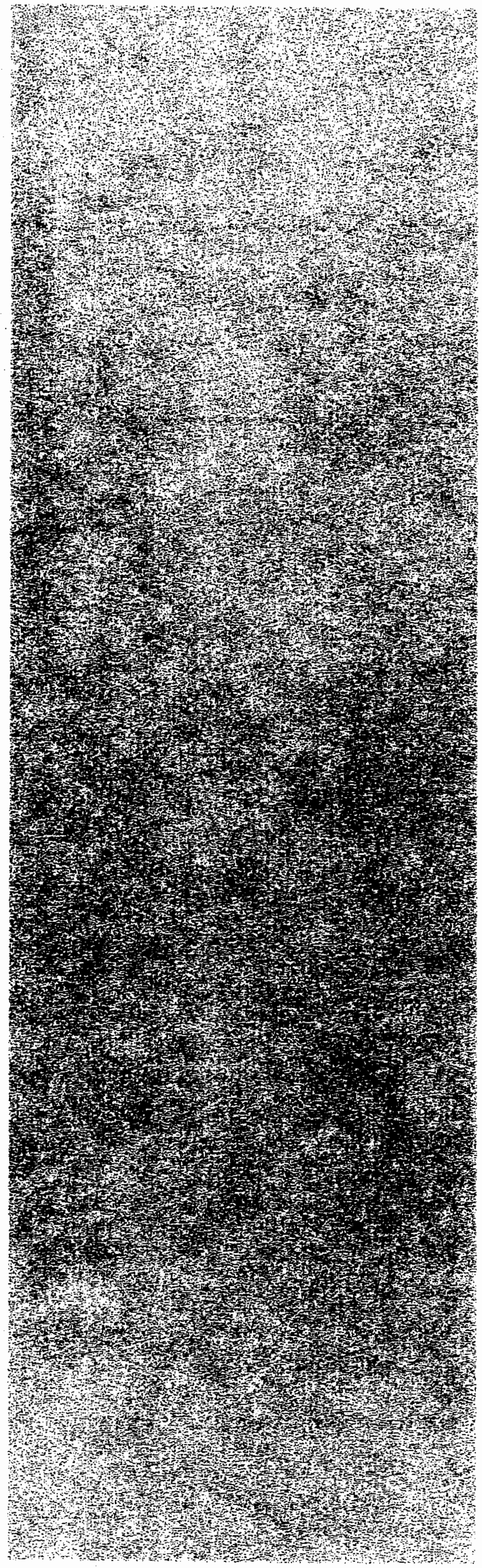
LA-13926



Quality of Storm Water Runoff at Los Alamos National Laboratory in 2000 with Emphasis on the Impacts of the Cerro Grande Fire

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Impact of Strontium-90 on Surface Water and Groundwater at Los Alamos National Laboratory through 2000

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LA-13465-SR
Status Report

(14)

Impact of Tritium Disposal on Surface Water and Groundwater at Los Alamos National Laboratory Through 1997

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(15)

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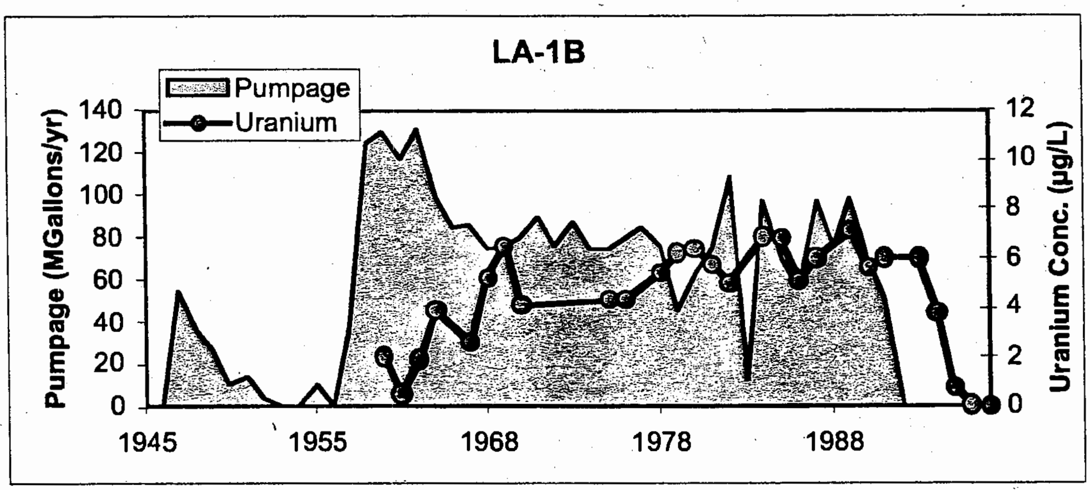
Uranium in Waters near Los Alamos National Laboratory: Concentrations, Trends, and Isotopic Composition through 1999



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03113

16

Work Plan for Mortandad Canyon

Environmental Restoration Project

September 1997

A Department of Energy
Environmental Cleanup Program

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LA-UR-97-3291

03114

(17)

LA-UR-03-6221
August 2003
ER2003-0541

Mortandad Canyon Groundwater Work Plan

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Los Alamos NM 87545

03115

RFI Work Plan for Operable Unit 1147

Environmental Restoration Program

May 1992

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Environmental Cleanup Program

(18)

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03116

(19)

LA-UR-01-5353

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Title: **Radioactive Liquid Wastewater Treatment Facility Influent Minimization Study**

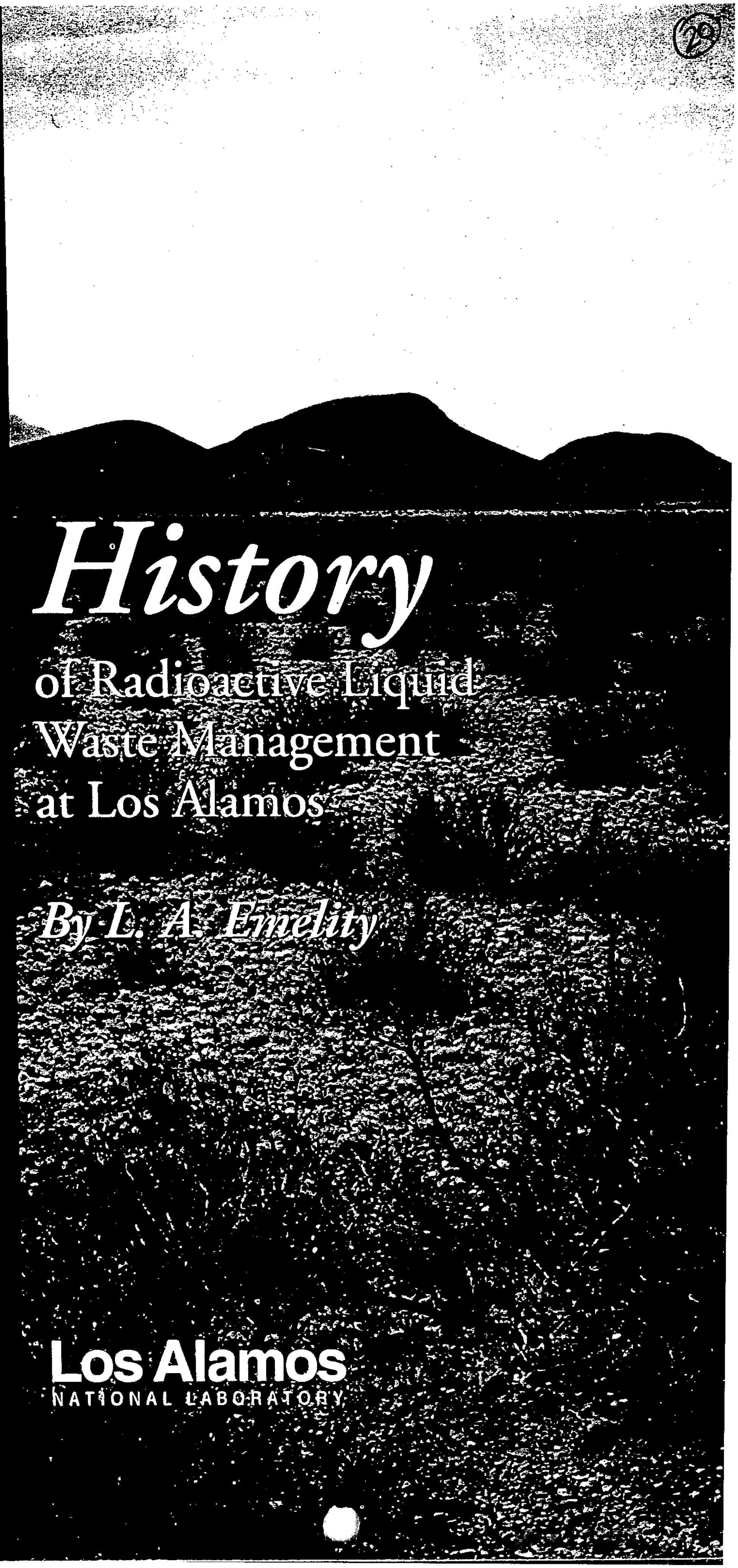
Author(s): Patricia Vardaro-Charles
Bryan J. Carlson

Submitted to: Rick Alexander, FWO-WFM

FORM 836 (10/96)

03117

LA-UR-96-1283



A History of Radioactive Liquid Waste Management at Los Alamos

By L. A. Emelity

Los Alamos
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(21)

LA-14211-PR
Progress Report

Surface Water Data at Los Alamos National Laboratory 2004 Water Year

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Surface Water Data at Los Alamos National Laboratory 2003 Water Year

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Surface Water Data at Los Alamos National Laboratory 2002 Water Year

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LA-13905-PR

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Surface Water Data at Los Alamos National Laboratory 2001 Water Year

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LA-13814-PR
Progress Report

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Surface Water Data at Los Alamos National Laboratory: 2000 Water Year

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03123

(26)

LA-UR-02-7108

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Title: Pilot Scale Membrane Filtration Testing at the Los Alamos National Laboratory Radioactive Liquid Waste Treatment Facility

Author(s): V. Peter Worland, PhD, Process Engineer
Edward L. Freer, Mechanical Technician
Rick A. Alexander, Radioactive Liquid Waste Team Leader

Submitted to: Facility and Waste Operations Division
November 2002

Los Alamos
NATIONAL LABORATORY

003124

Los Alamos National Laboratory
NPDES Permit Re-Application Project

(27)

DMR OUTFALL DATA SUMMARY (Aug 1, 1994-Dec 31, 1997)

OUTFALL #	TA-BLDG.
051051	50-1

Monthly Sampling Parameters	# of Analyses	Current Analytical Method (as of 1-1-98)	Grab/ Comp.	High Conc.	LTA Conc.	Units	High Mass	LTA Mass	Units
COD	178	EPA 410.4	Grab	145	36.22	mg/L	51	7.43	Lbs/Day
pH	Continuous	EPA 150.1	REC	9.0	7.1	su			
TSS	178	EPA 160.2	Grab				14.8	1.4320	Lbs/Day
Total Nitrogen	41	TKN:EPA 351.2 + Ammonia:EPA 350.1	Grab	175.0	29.37	mg/L			
Ammonia (as N)	41	EPA 350.1	Grab	20.7	5.38	mg/L			
Nitrate-Nitrite (as N)	41	EPA 353.2	Grab	241.1	55.95	mg/L			
Total Cadmium	178	EPA 200.8	Grab	0.1	0.000	mg/L	0.02	0.00002	Lbs/Day
Total Chromium	178	EPA 200.7	Grab	0.020	0.0002	mg/L	0.01	0.0004	Lbs/Day
Total Copper	178	EPA 200.7	Grab	0.9	0.1163	mg/L	0.17	0.0231	Lbs/Day
Total Iron	178	EPA 200.7	Grab				0.6	0.0122	Lbs/Day
Total Lead	178	EPA 200.8	Grab	0.1	0.007	mg/L	0.02	0.0007	Lbs/Day
Total Nickel	178	EPA 200.7	Grab	5.6	0.143	mg/L			
Total Zinc	178	EPA 200.7	Grab	0.2	0.057	mg/L	0.03	0.0092	Lbs/Day
Radium 226 + 228	41	Ra226:EPA 903.1 + Ra228:γ Spec.	Grab	16	4.8	pCi/L			
Flow	Continuous	Totalized	REC				0.0439	0.0247	MGD
Total Mercury	178	EPA 245.2	Grab	0.01	0.000	mg/L	0.03	0.0003	Lbs/Day
Total Toxic Organics	41	40 CFR 136	Grab	0.3	0.008	mg/L			

Yearly Water Quality Sampling Parameters	# of Analyses	Current Analytical Method (as of 1-1-98)	Grab/ Comp.	High Conc.	LTA Conc.	Units	High Mass**	LTA Mass**	Units
Total Arsenic	3	EPA 206.2	Grab	0.00	0.00	mg/L	0.000	0.000	Lbs/Day
Total Boron	3	EPA 200.7	Grab	0.2	0.20	mg/L	0.073	0.041	Lbs/Day
Total Cadmium	1	EPA 200.8	Grab	0.0	0.00	mg/L	0.000	0.000	Lbs/Day
Total Chromium	1	EPA 200.7	Grab	0.0	0.00	mg/L	0.000	0.000	Lbs/Day
Total Cobalt	3	EPA 200.7	Grab	0.0	0.00	mg/L	0.000	0.000	Lbs/Day
Total Copper	1	EPA 200.7	Grab	0.1	0.10	mg/L	0.037	0.021	Lbs/Day
Total Lead	1	EPA 200.8	Grab	0.0	0.00	mg/L	0.000	0.000	Lbs/Day
Total Vanadium	3	EPA 200.7	Grab	0.01	0.003	mg/L	0.004	0.001	Lbs/Day
Total Zinc	1	EPA 200.7	Grab	0.0	0.00	mg/L	0.000	0.000	Lbs/Day
Total Aluminum	3	EPA 200.7	Grab	0.1	0.10	mg/L	0.037	0.021	Lbs/Day
Total Selenium	3	EPA 270.2	Grab	0.00	0.00	mg/L	0.000	0.000	Lbs/Day
Radium 226+228	1	Ra226:EPA 903.1 + Ra228:γ Spec.	Grab	11.9	11.90	pCi/L			
Total Mercury	1	EPA 245.2	Grab	0.00	0.00	mg/L	0.000	0.000	Lbs/Day
Tritium	3	Liquid Scintillation Counting	Grab	147059*	103534*	pCi/L			

* Waste stream survey results for Outfall 051 indicate no accelerator-produced tritium. Tritium results are reactor-produced.

** High Mass and LTA Mass are not required or reported on DMRs for the Water Quality Parameters.

Los Alamos National Laboratory
2004 NPDES Permit Re-Application Project

(28)

DMR MONTHLY OUTFALL DATA SUMMARY (1/1/98 - 12/31/03)
YEARLY WATER QUALITY OUTFALL DATA SUMMARY (8/1/97 - 12/31/03)

OUTFALL #	TA-BLDG.
051051	50-1

Monthly Sampling Parameters	# of Analyses	Current Analytical Method	Grab/ Comp.	High Conc.	LTA Conc.	Units	High Mass	LTA Mass	Units
COD***	314	EPA 410.4	Grab	111.0	17.50	mg/L	38.0	3.80	Lbs/Day
pH	Continuous	EPA 150.1	REC	8.9(max)	6.0(min)	su			
TSS***	311	EPA 160.2	Grab	13.0	1.9	mg/L	106.2	3.2	Lbs/Day
Total Nitrogen*****	39	TKN:EPA 351.2 + Ammonia:EPA 350.1	Grab	609.0	32.80	mg/L			
Ammonia (as N)*****	40	EPA 350.1	Grab	9.3	3.10	mg/L			
Nitrate-Nitrite (as N)*****	39	EPA 353.2	Grab	607.0	28.90	mg/L			
Total Cadmium***	315	EPA 200.8	Grab	12.0	0.10	mg/L	0.00	0.000	Lbs/Day
Total Chromium***	315	EPA 200.7	Grab	0.200	0.003	mg/L	0.06	0.001	Lbs/Day
Total Copper***	315	EPA 200.7	Grab	0.3	0.040	mg/L	0.08	0.010	Lbs/Day
Total Iron******	192	EPA 200.7	Grab	1.07	0.13	mg/L	0.5	0.020	Lbs/Day
Total Lead***	315	EPA 200.8	Grab	0.017	0.0003	mg/L	0.01	0.000	Lbs/Day
Total Nickel	207	EPA 200.7	Grab	0.3	0.020	mg/L			
Total Zinc***	309	EPA 200.7	Grab	20.0	0.300	mg/L	3.40	0.100	Lbs/Day
Radium 226 + 228	37	Ra226:EPA 903.1 + Ra228:γ Spec.	Grab	13.4	2.7	pCi/L			
Flow	Continuous	Totalized	REC				0.056	0.023	MGD
Total Mercury***	312	EPA 245.2	Grab	0.0002	0.00001	mg/L	0.00	0.000	Lbs/Day
Total Toxic Organics	72	40 CFR 136 (TTOs include 86 compounds)	Grab	0.1	0.001	mg/L			

Yearly Water Quality Sampling Parameters	# of Analyses	Current Analytical Method	Grab/ Comp.	High Conc.	LTA Conc.	Units	High Mass*	LTA Mass*	Units
Total Arsenic	8	EPA 206.2	Grab	0.01	0.00	mg/L	0.005	0.000	Lbs/Day
Total Boron	9	EPA 200.7	Grab	0.9	0.10	mg/L	0.420	0.019	Lbs/Day
Total Cobalt	9	EPA 200.7	Grab	0.0	0.00	mg/L	0.000	0.000	Lbs/Day
Total Vanadium	8	EPA 200.7	Grab	0.02	0.010	mg/L	0.009	0.002	Lbs/Day
Total Aluminum	9	EPA 200.7	Grab	0.2	0.10	mg/L	0.093	0.019	Lbs/Day
Total Selenium	8	EPA 270.2	Grab	0.00	0.00	mg/L	0.000	0.000	Lbs/Day
Radium 226+228****	3	Ra226:EPA 903.1 + Ra228:γ Sp	Grab	2.00	0.07	pCi/L			
Perchlorate (CL04)	3	EPA 314.0	Grab	0.0299	0.01	mg/l			
Tritium	7	Liquid Scintillation Counting	Grab	111800**	36053**	pCi/L			

* High Mass and LTA Mass are not required or reported on DMRs for the Water Quality Parameters.

** Waste Stream Survey results for Outfall 051 indicate No Accelerator-Produced Tritium; Tritium results are reactor-produced, reported '0' on DMR.

***For COD, TSS, Cd(T), Cr(T), Cu(T), Zn(T), Fe(T), Pb(T)and Hg(T) - High Mass and LTA Mass reporting ended in 1/2001;
Continuation of High Concentration and LTA concentration reporting continued 2/2001.

****Ra 226+228 monthly reporting ended 1/2001; Ra 226+228 yearly water quality reporting became effective 2/2001.

*****Nitrogen(T), Ammonia (as N), and Nitrate-Nitrite (as N), no longer a Permit requirement effective 2/2001.

******Total Iron reporting no longer required after 8/2001, per EPA instructions (see EPA letter dated 10/5/2001).

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Los Alamos National Laboratory

DMR MONTHLY OUTFALL DATA SUMMARY (1/1/04 - 10/30/05)
YEARLY WATER QUALITY OUTFALL DATA SUMMARY (1/1/04 - 12/31/05)

OUTFALL #	TA-BLDG.
051051	50-1

Monthly Sampling Parameters	# of Analyses	Current Analytical Method	Grab/ Comp.	High Conc.	LTA Conc.	Units	High Mass	LTA Mass	Units
COD***	314	EPA 410.4	Grab	88.0	12.8	mg/L			
pH	Continuous	EPA 150.1	REC	8.7(max)	6.2(min)	su			
TSS***	311	EPA 160.2	Grab	4.0	0.2	mg/L			
Total Cadmium***	315	EPA 200.8	Grab	1.0	0.0	mg/L			
Total Chromium***	315	EPA 200.7	Grab	0.040	0.001	mg/L			
Total Copper***	315	EPA 200.7	Grab	0.073	0.023	mg/L			
Total Lead***	315	EPA 200.8	Grab	0.007	0.0002	mg/L			
Total Nickel	207	EPA 200.7	Grab	0.812	0.061	mg/L			
Total Zinc***	309	EPA 200.7	Grab	0.040	0.001	mg/L			
Flow	Continuous	Totalized	REC				0.0200	0.0195	MGD
Total Mercury***	312	EPA 245.2	Grab	0.0	0.0	mg/L			
Total Toxic Organics	72	40 CFR 136 (TTOs include 86 compounds)	Grab	0.0	0.0	mg/L			

Yearly Water Quality Sampling Parameters	# of Analyses	Current Analytical Method	Grab/ Comp.	High Conc.	LTA Conc.	Units	High Mass*	LTA Mass*	Units
Total Arsenic	8	EPA 206.2	Grab	0.01	0.00	mg/L			
Total Boron	9	EPA 200.7	Grab	0.3	0.1	mg/L			
Total Cobalt	9	EPA 200.7	Grab	0.0	0.0	mg/L			
Total Vanadium	8	EPA 200.7	Grab	0.0	0.0	mg/L			
Total Aluminum	9	EPA 200.7	Grab	0.0	0.0	mg/L			
Total Selenium	8	EPA 270.2	Grab	0.0	0.0	mg/L			
Radium 226+228****	3	Ra226:EPA 903.1 + Ra228:γ Sp	Grab	1.0	0.5	pCi/L			
Perchlorate (CL04)	3	EPA 314.0	Grab	0	0	mg/l			
Tritium	7	Liquid Scintillation Counting	Grab	0	0	pCi/L			

* High Mass and LTA Mass are not required or reported on DMRs for the Water Quality Parameters.

** Waste Stream Survey results for Outfall 051 indicate No Accelerator-Produced Tritium; Tritium results are reactor-produced, reported '0' on DMR.

** Note: Reactor Produced Tritium: (2004: 13,000 pCi/L. 2005: 9,710 pCi/L.

***For COD, TSS, Cd(T), Cr(T), Cu(T), Zn(T), Fe(T), Pb(T)and Hg(T) - High Mass and LTA Mass reporting ended in 1/2001; Continuation of High Concentration and LTA concentration reporting continued 2/2001.

****Ra 226+228 monthly reporting ended 1/2001; Ra 226+228 yearly water quality reporting became effective 2/2001.

*****Nitrogen(T), Ammonia (as N), and Nitrate-Nitrite (as N), no longer a Permit requirement effective 2/2001.

******Total Iron reporting no longer required after 8/2001, per EPA instructions (see EPA letter dated 10/5/2001).

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REVISION 1
WELL R-28 COMPLETION REPORT
LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO
PROJECT NO. 37151/16.12

Prepared for:

The United States Department of Energy and the
National Nuclear Security Administration through the
United States Army Corps of Engineers
Sacramento District

Prepared by:

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Albuquerque, New Mexico 87113

February 9, 2005

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Attachment 2

Laboratory Implementation Requirements (LIRs)

LIR404-00-02.3, General Waste Management Requirements:
LIR404-00-03.1, Hazardous and Mixed Waste Requirements
LIR404-00-04.2, Managing Solid Wastes
LIR404-00-05.3, Managing Radioactive Wastes

To All Employ●s: To Send Input for Improvement● this LIR - Click Here

General Waste Management Requirements

Los Alamos National Laboratory
Laboratory Implementation Requirement LIR 404-00-02.3
Issue Date: November 1, 1998 (Revised Date: November 30, 2000)

Mandatory Document

1.0 INTRODUCTION

LESSONS LEARNED

NOTE: *Click here* for Lessons Learned *that may apply* to the requirements contained in this LIR.

1.1 OVERVIEW

The institutional requirements relating to waste management at the Laboratory are located in a series of documents that are part of the Laboratory Implementation Requirements (LIRs). Not a stand-alone document, this LIR shall be the primary waste management document and contains the general non-waste-specific requirements that shall apply to all waste types. Four other LIRs contain requirements specific to radioactive, solid, hazardous and mixed, and polychlorinated biphenyl (PCB) waste types. See Appendix A for a reference chart of the waste management LIRs. The requirements contained in this LIR shall be followed to implement the waste portion of LPR 404-00-00, *Environmental Protection* and shall be effective upon the date of issue.

This LIR complements the expectations contained in LPR 404-00-00.

See Attachment E (Guidance) ***for Recommended Major Implementation Criteria for Self-Assessment.***

1.2 IN THIS DOCUMENT

1.2 In this Document (cont.)

2.0 PURPOSE

GUIDANCE NOTE: This document refers to other LIRs and Laboratory Implementation Guidance (LIG) documents that contain additional requirements and information for specific waste types.

This document shall be implemented to manage waste and aid in meeting the requirements of Department of Energy (DOE) Orders, federal and state regulations, and Laboratory permits; and describes the institutional waste management requirements that shall apply to all waste types, from the planning and design of waste generation, through the final disposal or permanent storage of wastes.

3.0 SCOPE & APPLICABILITY

GUIDANCE NOTE: This document does not contain technical requirements concerning waste form, content, packaging, or handling; that information is contained in *PLAN-WASTEMGMT-002, LANL Waste Acceptance Criteria*. This document does not address all conceivable situations. Contact the responsible waste management organization regarding any unusual situations, any suggestions for changes in the requirements or disputes over their interpretation, or for possible exceptions to the requirements found in this document. See Appendix B for a contact list.

The requirements contained in this document shall apply to all Laboratory individual waste generators, their Safety and Environment Responsible line-management chain, and all organizations that handle, treat, store, dispose of, transport Laboratory waste, or receive waste from off-site.

This document shall apply to all Resource Conservation and Recovery Act- (RCRA) regulated waste, Toxic Substances Control Act- (TSCA) regulated waste, low-level radioactive waste (LLW), mixed low-level waste (MLLW), transuranic (TRU) waste, wastes destined for or generated from wastewater treatment operations, administratively controlled, medical, solid waste, or other waste generated by the Laboratory and treated, stored, or disposed of by the Laboratory.

This document's requirements shall apply equally to classified and unclassified waste.

This document shall not apply to excess government property. Personnel wishing to excess government property should consult the BUS Property Manual.

For the purposes of this document, "TSDF" (treatment, storage, and disposal facility) shall refer to:

Any state or federally permitted waste facility,

Any facility covered under DOE Order 435.1, and

National Pollutant Discharge Elimination System (NPDES) facilities permitted as 13S (Sanitary Wastewater Treatment), 05A055 (High Explosive Wastewater Treatment Facility), 051 (Industrial Waste Treatment Plant Discharge).

Specific examples are:

TA-50, Radioactive Liquid Waste Treatment Facility

TA-54, Areas G, J, and L

TA-54, Radioassay and Non-Destructive Testing (RANT)

TA-50, Radioactive Materials Research Operations Demonstration (RAMROD)

TA-50, Waste Characterization Reduction & Repackaging Facility (WCRRF)

TA-46, Sanitary Waste System (SWS)

TA-16, Open Burn Units

4.0 PRECAUTIONS AND LIMITATIONS

GUIDANCE NOTE: Treatment, storage, or disposal of some waste or combinations of waste, is not allowed under existing Laboratory permits. Contact the appropriate Environment, Safety, and Health (ES&H) group (see Appendix B for guidance).

GUIDANCE NOTE: Failure to meet the requirements in this document could cause the Laboratory to incur penalties and fines due to noncompliance. Willful violation can result in criminal penalties for responsible personnel.

This document shall not relieve the Laboratory or its workers from their obligation to comply with all provisions of existing permits or permit applications, compliance orders, schedules, consent agreements, or other enforceable requirements relevant to Laboratory waste.

Waste generator organizations mis-characterizing waste shall be charged for any remediation work required to bring the waste, the site, and/or the facility into compliance with governing regulations.

For any work that could generate waste and excess materials, before work is performed the owning organization shall identify the responsible person or organization who will manage the waste and excess materials.

Waste with no disposal path shall not be generated without prior approval from DOE. For unplanned generation of waste with no disposal path, the generator shall contact the Associate Laboratory Director for Nuclear Weapons – Materials and Manufacturing (ALDNW-MM) immediately to start the approval process. See Section 5.4.10 of this document for additional information.

5.0 IMPLEMENTATION REQUIREMENTS

5.1 Division Directors, Program Managers, and Program Directors

Division Directors, Program Managers, and Program Directors shall:

- Ensure individual waste generators recognize and manage waste in accordance with state and federal regulations and Laboratory requirements.
- Provide waste management support to the waste generators in their facilities by one or a combination of the staffing options listed in Section 5.6.3 of this LIR.
- Support the waste generator and the Waste Management Coordinator (WMC) in implementing proper waste management procedures.
- Manage wastes at their facilities (not associated with the Environmental Restoration [ER] program) including any waste streams for which the generator is unknown or process knowledge is unavailable.
- If the organization is a member of the Waste Management Policy and Procedure Committee (WMPPC), appoint representatives to the WMPPC.
- Ensure designated subordinate managers maintain a waste management program at their facility that meets Laboratory and regulatory requirements.
- Support the authority of the WMC to recommend and implement requirements and changes that affect waste-generating and waste management processes and operations in the facilities in which the WMC is employed.
- Delegate waste management responsibilities in writing.
- Ensure that generators characterize wastes in accordance with treatment, storage, and disposal facility (TSDF) requirements.

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5.2 Waste Management Coordinators (WMC)

5.2.1. General

WMCs shall:

- Serve as the primary point of contact on waste-related issues.
- Provide generators with guidance and assistance in ensuring regulatory compliance.
- Assist generators in determining whether a waste has a path forward to disposal.
- Represent waste-generating organizations during audits and assessments.
- Ensure actions are initiated to eliminate non-compliances.
- Demonstrate knowledge of the waste-generating activities within the waste-generating organization and the waste disposal process.
- Ensure inspections of less than 90-day storage areas are performed as needed or at a minimum, weekly.
- Provide the waste-generating organization with assistance in implementing waste minimization/pollution prevention techniques.
- Assist waste generators with completing waste documentation.
- Prepare, sign, and submit waste documentation to Solid Waste Operations Group (FWO-SWO).
- Coordinate waste transportation from their facility.
- Ensure required transportation paperwork is signed for waste shipments.
- Maintain an auditable file of waste management documentation.
- Assist in preparing and reviewing waste management sections of hazard control plans (HCPs), waste minimization plans, management plans, and project documentation.
- Attend required training including quarterly WMC meetings.
- Be responsible for disseminating waste management information to the generators in their facility.
- Notify appropriate personnel of any spills, releases, leaks, or discharges.

5.2.2 Training

General Training

Managers are responsible for specifying any job-, facility- and/or operation-specific training needed by the waste management coordinator (WMC). WMCs are required to maintain Laboratory-wide ES&H training to be qualified as a WMC, as documented in the Employee Development System (EDS).

WMC-Specific Training

Within six months of appointment to the position, WMCs (part- and full-time) shall complete the following (or equivalent) training:

- Waste Generation Overview (course #8477).
- Waste Documentation Forms (course #8504)
- Waste Management Coordinator Requirements (course #9604)
- One or more Hazardous Materials Packaging and Transportation (HMPT) training plans, as required by job-specific responsibilities:
  - HMPT Shipper: Hazmat/Waste (training plan #68)
  - HMPT Shipper: RAM I (training plan #1448)
  - HMPT Shipper: RAM II (training plan #84)
  - HMPT Shipper: Hazmat/RAM/Waste (training plan #1471)
- The WMC Quarterly Meetings are required for WMCs as ongoing training in issues important to performing the duties of a WMC.

GUIDANCE NOTE: Failure to maintain training, including attendance at quarterly meetings, may result in disqualification as a WMC.

GUIDANCE NOTE: It is strongly encouraged that WMCs have training in the chemistry of hazardous and/or radioactive materials and college-level mathematics.

5.3 Treatment, Storage, and Disposal Facilities (TSDFs)

TSDFs shall:

- Ensure their operations meet permit, regulation, and relevant DOE order requirements.
- Provide guidance to waste management personnel, waste management coordinators (WMCs), and generators regarding completion of waste characterization documentation and acceptance criteria requirements.
- Maintain the documentation and data required by permits and regulations.
- Review waste characterization documentation and authorize waste transfers.

- Reject or order remediation of waste that is not packaged or characterized in accordance with the acceptance criteria or otherwise violates Laboratory or regulatory requirements.
- If requesting waste forecasting information, provide division directors or designees 30 days to transmit the requested information.
- Develop acceptance criteria that explicitly define requirements for and restrictions on characterization, waste form, content, packaging, and handling and provisions for excemptions/exceptions.

  Acceptance criteria shall be based on state and federal law, permits, operational safety, and the TSDF's basis documents that may include a Performance Assessment (PA) or Safety Analysis Report (SAR).

  Acceptance criteria shall be reviewed whenever changes are made to permits, regulations, or authorization basis documents that affect the acceptance criteria or should be included in the acceptance criteria.

GUIDANCE NOTE: Acceptance criteria for most LANL TSDFs are presented in a single document, PLAN-WASTEMGMT-002, *LANL Waste Acceptance Criteria*.

- Demonstrate implementation of the acceptance criteria by reviewing waste documentation and inspecting waste containers upon arrival at the TSDF.
- Establish a verification program. The level of documentation and formality shall be deteremined by the TSDF with due consideration to the TSDF's operating basis

GUIDANCE NOTE: A TSDF's operating basis may include permits, safety analysis reports, or programs required by DOE Orders.

- Develop and implement a non-conformance program.
- Be authorized to accept the waste shipment, sample and analyze, and remediate the waste at the expense of the generator, if during the receipt (including transfer through Radioactive Liquid Waste Treatment Facility [RLWTF] pipelines), inspection, or verification process, a discrepancy is found.

5.4 Generators

5.4.1 General

Waste generators shall:

- Ensure the waste generated has a disposal path or is authorized to be generated in accordance with Section 5.4.10 of this LIR.

GUIDANCE NOTE: WMCs or the LANL WAC can be consulted to determine if waste has a disposal path.

- Segregate waste streams in accordance with the treatment, storage, and disposal facility (TSDF) acceptance criteria and Section 5.4.3 of this LIR.
- Manage waste in accordance with regulations and requirements applicable to their waste and maintain records in accordance with Section 7.0 of this LIR.
- Minimize waste in accordance with Section 5.4.3 of this LIR.
- Provide accurate and complete waste characterization information as required by the TSDF's acceptance criteria, ensuring that regulated constituents in waste streams are identified.
- Ensure waste is packaged, marked, labeled, and managed in accordance with regulations applicable to their waste and receiving facility(s) acceptance criteria.
- Implement the acceptance criteria requirements of the receiving facility or facilities.
- Notify the Facility Managers (or designees) of a release of waste or wastewater to the environment or of an accidental discharge to a wastewater treatment facility. The Facility Manager (or designee) is responsible for notifying the responsible ES&H organization (See Appendix B) and, if required, the responsible wastewater treatment organization.
- If the Facility Manager or designee cannot be contacted concerning a release of wastewater as described above, notify Emergency Management &Response (EM&R).
- Certify waste in accordance with the requirements of the receiving facility or facilities.

ESH-18 and the affected wastewater treatment organization shall be notified as soon as possible, in the planning stage, of any project which is likely to include a new connection to a wastewater collections system (including holding tanks and septic systems.

5.4.2 Waste Forecasting

The generator shall provide volume projections to each treatment, storage, and disposal facility (TSDF) (for the waste applicable to that TSDF) upon request.

GUIDANCE NOTE: Any generator failing to provide the requested waste forecasting information in a timely manner may be prohibited from transferring waste to the applicable TSDF.

GUIDANCE NOTE: DOE requires waste forecasts for use in the Integrated Database and the Baseline Environmental Management Report.

5.4.3 Waste Minimization and Recycling

GUIDANCE NOTE: Reducing, reusing, or recycling of hazardous waste may constitute treatment under the Resource Conservation and Recovery Act (RCRA). Similar restrictions may exist under other environmental regulations. Additional guidance is available from the Environmental Stewardship Office (E-ESO) and ESH-19.

Waste generation at the Laboratory shall be reduced in volume by as much as is technically and economically feasible. To meet this objective:

1. Waste-minimization practices of material substitution, source reduction, treatment, good housekeeping, hazard segregation, and recycling and reuse shall be incorporated into waste-generating activities.
2. Disposal shall be used only when other options are not technically or economically feasible or safe.
3. Waste minimization practices shall be incorporated into facility/site specific certification programs and operating procedures.

EXAMPLES:

A. Maximize the packing efficiency of waste containers.

B. Decontaminate.

C. Reduce waste at the source.

D. Perform hazard segregation at the point of generation. For example, prevent the entry into any one waste stream of any combination of radioactive, non-radioactive, and hazardous wastes.

E. Recycle or reuse material whenever technically or economically feasible.

4. Waste shall be recycled or salvaged in accordance with Laboratory requirements specified in the Property Management Manual.

GUIDANCE NOTE: The following materials and items are prime candidates for recycling:

- elemental mercury,
- precious and strategic metals,
- compressed gas cylinders,
- lead-acid and gel cell batteries,
- lead and lead bricks,
- solvents,
- unused laboratory chemicals,
- scrap metal and solder waste,
- uncontaminated soil (soil to which no hazardous or radioactive constituents have been added),
- used oil from various sources, and
- empty drums.

GUIDANCE NOTE: Contact wastenot@lanl.gov for information on recyclables and salvageable materials

5.4.4 Waste Characterization

GUIDANCE NOTE: Application of acceptable knowledge (AK) that meets the regulatory requirement is described LIG 404-00-02, *Acceptable Knowledge*. The WPF by itself is usually not adequate documentation for AK.

- Waste shall be characterized by using sampling and analysis, AK, or a combination of the two methods.
- Residues from experiments with hazardous wastes (e.g., treatability studies) shall be characterized.
- If AK is used to characterize waste, then the AK shall be documented.
- When sampling is used, the samples shall be representative of the waste and shall provide confidence that the results describe the entire waste stream.
- The characterization method shall be defined for the type of waste and be in accordance with the receiving facilities' acceptance criteria.
- Individual waste generators shall complete WPFs to document the characterization of each waste stream or shall otherwise comply with the receiving facilities' required documentation. This requirement shall also apply to waste that will be shipped off-site directly from the waste generator's facility. Classified waste shall NOT be exempt from this requirement.
- Individual waste generators and organizations shall transfer only waste that is authorized by the receiving facility.

- WPFs shall be required for all wastewater transferred through pipelines to the Radioactive Liquid Waste Treatment Facility (RLWTF) and Sanitary Waste System (SWS)—except sanitary wastewater—unless characterization is requested by the receiving facility.
- Generating organizations shall review their waste characterization documentation annually or when their waste streams change, whichever comes first, to ensure that the waste characterization is correct.

5.4.5 Waste Transfer and Receipt – General

GUIDANCE NOTE: Department of Transportation (DOT) regulations apply to the transport on public-access roads of material that meets the DOT definition of a hazardous material. Contact the Laboratory Packaging and Transportation Group or refer to LIR 405-10-01, *Packaging and Transportation.*

- Chemical Waste Disposal Requests (CWDRs), Transuranic Waste Storage Records (TWSRs), or other treatment, storage, and disposal facility – (TSDF-) specific forms shall be completed for requesting transfers of waste from the generator site to a TSDF except when the waste goes through a pipeline to the Radioactive Liquid Waste Treatment Facility (RLWTF) or Sanitary Waste System (SWS).
- Individual waste generators and/or organizations shall ensure that the packaging and transportation of waste meets the receiving TSDF's acceptance criteria and the requirements of LIR 405-10-01.
- Waste shall be transported to the TSDF in any one of the following manners:

  By the TSDF for the waste generator organization

  By the waste generator organization, if approved by the receiving facility

  By the Laboratory support services subcontractor at the request of the waste generator organization

  By the Laboratory Packaging and Transportation Section at the request of the waste generator organization

- Shipments shall be scheduled with the receiving TSDF in accordance with the TSDF acceptance criteria.

5.4.6 Waste Transfer and Receipt – Radioactive Liquid Waste Treatment Facility (RLWTF) and Sanitary Waste System (SWS)

GUIDANCE NOTE: Generating sites are connected to the RLWTF by the Radioactive Liquid Waste Collection System (RLWCS) and/or to the SWS by the Sanitary Waste System Collection System (SWCS). Questions concerning the SWS may be forwarded to the Water Quality Control Group (see Appendix B).

- Generators sending containerized liquid waste to the RLWTF or the SWS shall be responsible for the disposition of their empty containers.
- Each Facility Manager shall be responsible for maintaining structures, systems, and components connected to the RLWTF or SWS within their boundaries, including components and configurations required by the RLWTF or the SWCS for system design, monitoring, and control.
- RLWTF or SWS ownership of structures, systems, and components connected to the RLWTF/SWS shall begin at the Facility Management Unit (FMU) boundary or at the first manhole, whichever is closer to the connecting building.
- Sinks, drains, and pipelines leading to a wastewater treatment collection system shall be posted and labeled in accordance with the acceptance criteria.
- Changes in waste steams (such as flow rate increases or changes in constituents) shall be evaluated to determine if a new WPF is needed.

GUIDANCE NOTE: FWO-RLW and SWS provide typical specifications and drawings for the pipelines, manholes, and electronics related to their facility. ESH-18 provides National Pollution Discharge Elimination System (NPDES) permit requirements.

- Organizations shall not alter the route of waste to a wastewater treatment facility without prior approval from the affected wastewater treatment organization and ESH-18.

5.4.7 Nonconformance Reports

GUIDANCE NOTE: Repeat violations may result in the generator being permanently banned from using a treatment, storage, and disposal facility (TSDF).

GUIDANCE NOTE: Nonconformance reports may be generated by the TSDF if waste fails to meet the requirements of the acceptance criteria.

- Generators shall respond to nonconformance reports and initiate corrective actions.
- The TSDF shall refuse or accept, at its discretion, the nonconforming waste or any further waste from the generator until corrective actions have been implemented.

- Costs associated with remediation actions shall be borne by the generator or transporter.

GUIDANCE NOTE: The TSDF's waste certification and acceptance personnel and the waste generator's management are notified of any nonconformance.

- Examples of nonconformances:

    Improperly characterized waste

    Improperly completed or missing forms

    Improperly segregated waste

    Improperly packaged waste

    Failure to schedule a transfer prior to its arrival at the TSDF

    Improperly labeled waste

    Failure to meet the acceptance criteria

5.4.8 Quality Assurance Requirements

Administrative programs and controls shall be in place for waste generating organizations to ensure that quality assurance (QA) requirements are identified and implemented for waste management activities that are commensurate with risk.

5.4.9 Training

GUIDANCE NOTE: The Division Designated Training Generalist or the ES&H Training Group is available to provide assistance in determining specific training requirements.

All persons who generate, package, certify, prepare data, perform related radiation surveys, or perform the associated quality functions shall receive training in the requirements and implementing procedures for those parts of the waste management program in which they are involved. Personnel training shall be conducted in accordance with relevant state and federal regulatory requirements, the Laboratory hazardous waste permit, and Laboratory requirements.

At a minimum, generators shall have completed Waste Generation Overview (Course #8477) before any WPFs will be accepted by Solid Waste Operations (FWO-SWO). In addition, generators shall complete an update to Waste Generation Overview within one year of the issuance of this LIR and every three years thereafter.

GUIDANCE NOTE: ESH-13 may provide equivalency to Waste Generation Overview Refresher for facility-specific waste generation training.

5.4.10 Waste with No Disposal Path

GUIDANCE NOTE: For additional information, contact nopath@lanl.gov.

- Once a waste generator has identified that a waste has no disposal path, he or she shall work with the Associate Laboratory Director for Nuclear Weapons –Materials and Manufacturing (ALDNW-MM) Office to request DOE approval.
- The generator shall submit an approval request package to the ALDNW-MM Office, who shall assist in finalizing the approval request package and in coordinating the approval with the DOE.
- The ALDNW-MM Office shall provide a formal letter with the approval request package and transmit it to the DOE Area Office, to the Waste Management Division at DOE/AL, and to the DOE Program Office points of contact.
- The waste generator shall provide an annual report for transmittal to DOE by October 1 of each year, included with the annual renewal request, documenting steps taken to manage and find disposition for any waste without a disposal path that has been previously approved by the DOE.
- The ALDNW-MM Office shall transmit the annual report and the annual renewal request to the DOE Area Office Manager and to Waste Management Division at DOE/AL.
- The DOE approval to generate waste without a disposal path is only good for the current fiscal year. *The approval shall be renewed at the beginning of each fiscal year the process continues.*

5.5 Generator Support

5.5.1 Solid Waste Operations Group (FWO-SWO)

FWO-SWO shall:

- Oversee operations related to the management of hazardous, chemical, mixed, radioactive, and other regulated waste.
- Review and approve waste documentation such as the WPF, CWDR, and TWSR.
- Provide guidance on the LANL WAC.
- Provide guidance on waste characterization, acceptance, certification, minimization, storage, segregation, packaging and transportation.
- Audit off-site treatment, storage, and disposal facilities (TSDFs) to ensure they maintain the documentation and data required by regulations and DOE Orders to ensure cradle-to-grave tracking is complete.
- Administer the waste management coordinator (WMC) program.
- Store hazardous, asbestos, and polychlorinated biphenyl (PCB) waste in accordance with regulatory and Laboratory requirements.

- Operate a waste pickup service from the generator's site to TA-54.
- Serve as the Laboratory point-of-contact (POC) for off-site shipments of hazardous and chemical waste, low-level waste (LLW), and mixed low-level waste (MLLW) for treatment or disposal.
- Store transuranic (TRU) waste, TRU-mixed waste, and MLLW in accordance with regulatory and Laboratory requirements.
- Store and/or treat applicable liquid wastes not managed by Facility & Waste Operations–Radioactive Liquid Waste (FWO-RLW).
- Dispose of LLW, including radioactively contaminated PCBs and asbestos waste.
- Maintain the TRU Waste, Waste Profile, and Chemical and Low-level Waste databases.

5.5.2 Radioactive Liquid Wastewater Group (FWO-RLW)

FWO-RLW shall

- Oversee operations related to the transfer and treatment of radioactive liquid wastewater.
- Manage, operate, and maintain the Radioactive Liquid Waste Treatment Facilities (RLWTFs) at TA-50 and TA-21.
- Treat liquid waste at the RLWTFs and maintain the Radioactive Liquid Waste Collection System (RLWCS) for transferring radioactive liquid waste from generator sites to the RLWTF.

5.5.3 Hazardous and Solid Waste Group (ESH-19)

ESH-19 shall:

- Submit reports, notices, and permit applications in accordance with permit, regulatory, and Laboratory requirements.
- Serve as the point-of-contact (POC) for Laboratory personnel regarding hazardous, solid, mixed, and Toxic Substances Control Act (TSCA)-regulated waste.
- Negotiate with regulatory agencies on hazardous, solid, mixed, and TSCA permits.
- Conduct performance assessments of generators' operations and treatment, storage, and disposal facilities (TSDFs).
- Maintain required records and data.
- Provide waste sampling, characterization, and environmental monitoring services.
- Provide technical and regulatory support to operating groups.

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5.5.4 Water Quality and Hydrology Group (ESH-18)

ESH-18 shall:

- Perform environmental monitoring activities to ensure Laboratory operations do not adversely affect public safety, health, or the environment.
- Provide technical and regulatory support to operating groups.
- Provide institutional coordination of water quality permits and documentation.
- Serve as a liaison with regulatory agencies.
- Maintain environmental monitoring records and data in accordance with regulatory and Laboratory requirements.
- Provide audits/assessments for National Pollution Discharge Elimination System (NPDES) facilities.

5.5.5 Associate Laboratory Director for Nuclear Weapons – Materials and Manufacturing (ALDNW-MM) Office

ALDNW-MM shall:

- Provide guidance on completing a request for generating waste with no path forward.

5.5.6 Training Group (ESH-13)

ESH-13 shall:

- Design, develop, deliver, and evaluate Laboratory-wide waste management training outlined in DOE orders, state and federal regulations, and Laboratory permits and requirements that apply to Laboratory operations.
- Review and grant equivalencies for outside training when appropriate.
- Assist managers in determining staff waste management training needs.
- Maintain Laboratory-wide waste management training plans and records and enter those records into the Employee Development System (EDS).
- Implement Laboratory requirements concerning waste management training.
- Maintain the Laboratory waste management testing system.

5.5.7 Environmental Sciences and Waste Technologies Group (E-ET)

E-ET shall:

- Implement the Laboratory's Transuranic (TRU) Waste Certification Program for disposal of TRU waste at the Waste Isolation Pilot Plant (WIPP).
- Coordinate TRU waste characterization and transportation activities to meet the WIPP waste acceptance criteria (WAC).
- Manage the components of TRU waste characterization, certification, and transportation activities at the Laboratory as they apply to disposal at WIPP.
- Coordinate, integrate, and ensure consistency with the DOE Carlsbad Area Office (DOE/CAO) National TRU Program (NTP), WIPP programs, policies, and guidance.
- Provide quality assurance oversight for the WIPP certification program.
- Assist TRU waste generators in the preparation of the TRU waste interface document (TWID) to meet the requirements for acceptance at WIPP.
- Obtain shipping authority from DOE/CAO for TRU waste transport from the Laboratory to WIPP.

5.5.8 Utilities and Infrastructure Group (FWO-UI)

FWO-UI shall:

- Manage the Sanitary Waste System (SWS).
- Coordinate support service subcontractor activities such as recycling and transportation of solid waste dumpsters.

5.5.9 Waste Management Policies and Procedures Committee (WMPPC)

- The WMPPC shall:

  Review and approve all Laboratory-wide waste management documents before submittal to the Laboratory Standards and Requirements Project (LSRP).

  Ensure management and potential users from affected organizations are involved in the document development, review, and revision processes.

  Serve as the Office of Institutional Coordination (OIC) for Laboratory institutional waste management requirements documents.

  Ensure that waste management institutional documents are controlled and current.

GUIDANCE NOTE: If requested and if resources are available, the WMPPC may also review facility-specific waste management documents.

- The permanent WMPPC shall be composed of representatives from FWO-RLW, FWO-SWO Chemical and Mixed Waste, FWO-SWO LLW, FWO-SWO TRU Waste, FWO-SWO Waste Services, ESH-19, E-ESO, E-ET, the WMC Administrator, ES&H Training, the Nuclear Materials Technology (NMT) Division, the Engineering Sciences and Applications (ESA) Division, the Dynamic Experimentation (DX) Division, the Laboratory Standards and Requirements Project, and other divisions as deemed necessary.
- Additional organizations shall be requested to provide subject matter experts (SMEs) when issues related to their areas of responsibility are addressed. Examples are Air Quality (ESH-17) and Health Physics Operations (ESH-1).
- Requests for SMEs shall be made to the member or invited organizations rather than to specific individuals.
- Institutional documents containing significant waste management-related issues or requirements shall be reviewed and approved by the WMPPC.
- The WMPPC shall also determine which division director(s) signature shall be required for final approval of institutional waste management documents.
- All WMPPC comments shall be resolved by majority agreement.

5.6 Waste Management Coordinator (WMC) Program

5.6.1 WMC Program Administrator

The WMC Program Administrator shall:

- Act as the primary point of contact for issues relating to the WMC Program.
- Verify WMC training records for completed training requirements and maintain a current list of authorized WMCs.
- Work with WMCs, ESH-13 and ESH-19 to ensure WMC training is appropriate, updated and accurate.
- Coordinate and host the WMC Quarterly Meetings.
- Coordinate the activities of the WMC Inter-Divisional Team.
- Interface with all levels of management to ensure that the WMC Program effectively meets the need of the Laboratory.
- Provide waste management guidance to division/facility/program WMCs.
- Provide and supervise WMCs deployed to a division/facility/program on a service by request basis, as defined in Section 5.6.3 of this LIR.

5.6.2 WMC Inter-Divisional Team

The WMC Inter-Divisional Team shall:

- Consist of the WMC Program Administrator, one WMC from each major waste generating facility/organization, one representative from ESH-19, and other representatives as needed or requested by the team.
- Meet regularly to oversee the WMC Program Laboratory-wide.
- Exchange information on best business practices, regulatory updates, and current waste management problems.
- Establish and monitor the performance objectives of the WMC Program.
- Provide information to the appropriate waste management organizations on concerns and issues that affect the WMC Program.

5.6.3 WMC Staffing Options

The WMC program allows for various staffing options to accommodate the individual needs of each organization. The following options or combination of options shall be used.

- Organizational ownership: The WMC resides within the waste generating organization.
- Service by request: The waste generating organization can obtain full- and/or part-time WMC support services on an as-needed basis from FWO-SWO. Arrangements for this service require that a Memorandum of Understanding outlining the estimated level of effort and an appropriate funding allocation be provided by the requesting organization to FWO-SWO.
- Shared services: The waste generating organization can make arrangements with other waste generating organizations to share the support services of a WMC. Agreements on funding, level of effort, authorities, etc., are left solely to the managers involved. FWO-SWO need only be advised of the WMC's area of responsibility and/or authority.

6.0 EXCEPTIONS AND VARIANCES

Exceptions or variances shall not be granted if they conflict with state or federal law, DOE, DOT, the Environmental Protection Agency (EPA), other applicable government agency regulations or permits; or with attaining the Laboratory's institutional performance goals and expectations (for example, the UC-DOE Contract Appendix F Performance Measures).

7.0 RECORDS

- Ordinarily, originals of documents must be maintained; however, if originals are unavailable, then a photocopy or carbon copy must be maintained.
- Original WPFs, CWDRs, and TWSRs shall be maintained by FWO-SWO.
- Treatment, storage, and disposal facilities (TSDFs) shall maintain the original shipping documents for waste received at their facilities.
- Generating organizations shall maintain or archive records documenting waste characterization, to include acceptable knowledge (AK) and transport/transfer documents.

8.0 OIC

The Office of Institutional Coordination for this document shall be the Waste Management Policy and Procedure Committee.

9.0 REFERENCES

20 NMAC 4.1, *New Mexico Hazardous Waste Regulations*

New Mexico Hazardous Waste Act, NM Statutes Annotated, §§74-4-1 to –13

20 NMAC 9.1, New Mexico Solid Waste Regulations

New Mexico Solid Waste Act, NM Statutes Annotated, §§74-9-1 to –42

15 U.S.C. §§ 2601-2629 et seq., *The Toxic Substances Control Act, as amended*

33 U.S.C. § 1251 et seq., *The Clean Water Act, as amended*

42 U.S.C. § 6901 et seq., *The Resource Conservation and Recovery Act of 1976, as amended*

10 CFR § 830, *Nuclear Safety Management*

29 CFR § 1910.120, Hazardous Waste Operations and Emergency Response

29 CFR § 1910.1200, Hazardous Communications

40 CFR § 61, Subpart M, National Emissions Standard for Asbestos

40 CFR § 61.154, Standard for Active Waste Disposal Sites

40 CFR § 122, *National Pollutant Discharge Elimination System*

40 CFR § 258,*Criteria for Municipal Solid Waste Landfills*

40 CFR § 261, *Identification and Listing of Hazardous Waste*

40 CFR § 264, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*

40 CFR § 268, *Land Disposal Restrictions*

40 CFR § 761, *Polychlorinated Biphenyl's (PCBs) Manufacturing, Processing, and Distribution in Commerce and Use Prohibitions*

40 CFR § 763, *Asbestos*

49 CFR § 172, *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements*

49 CFR § 173, *Shippers, "General Requirements for Shipments and Packaging"*

Executive Order 12873, Federal Acquisition, Recycling, Waste Prevention and the Pollution Prevention Act of 1990

DOE Order 435.1, *Radioactive Waste Management*

DOE Order 460.1A, Packaging and Transportation Safety

DOE Order 460.2, *Departmental Material Transportation and Packaging Management*

DOE Order 5400.1, *General Environmental Protection*

9.0 REFERENCES (cont.)

DOE Order 5400.5, Radiation Protection of the Public and the Environment

DOE Order 414.1, Quality Assurance

DOE/LLW-75T, Data Quality Objectives

NQA-1, *Quality Assurance Requirements for Nuclear Facility Application*

EPA Publication SW846; *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*

EPA QA/G-4, *Guidance for DQO Process*

LIR 301-00-02, *Exception and Variances to Laboratory Operating Implementation Requirements*

LIR404-00-03, *Hazardous and Mixed Waste Requirements for Generators*

LIR404-00-04, *Managing Solid Waste*

LIR404-00-05, *Radioactive Waste Management*

LIR404-00-06, *Managing PCBs*

LIR404-10-01.0, *Packaging and Transportation*

LIG404-00-01, *Instructions for Completing the TRU Waste Storage Record*

LIG404-00-02, *Acceptable Knowledge*

LIG404-00-03, *Instructions for Completing the Waste Profile Form*

LIG404-00-04, *Instructions for Completing the Chemical Waste Disposal Request*

10.0 APPENDICES

Appendix A. Waste Management Document Institutional Requirements and Guidance

Appendix B. Contact List

Appendix C. Definitions

Appendix D. Acronyms

Appendix E. Recommended Major Implementation Criteria for Self Assessment

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APPENDIX A

Waste Management Document Institutional Requirements and Guidance

LIR DOCUMENT NUMBER	TITLE	WASTE TYPES COVERED
LIR404-00-02	General Waste Management Requirements	General requirements that apply to all waste types
LIR404-00-03	Hazardous and Mixed Waste Requirements	Hazardous and mixed waste
LIR404-00-04	Managing Solid Waste	Commercial; construction and demolition debris; New Mexico special including: treated formerly characteristic hazardous, asbestos, sludge, spill of chemical substance or commercial product, dry chemicals which become characteristically hazardous when wetted, petroleum contaminated soils, infectious; chemical; administratively controlled; and pharmaceutical-controlled waste
LIR404-00-05	Managing Radioactive Waste	Solid low-level, mixed and TRU waste
LIR404-00-06	Managing Polychlorinated Biphenyls (PCBs)	Polychlorinated Biphenyls including PCB waste
LIG404-00-01	TRU Waste Storage Record	Guidance on completing the form
LIG404-00-02	Acceptable Knowledge	Guidance for when to use and how to document acceptable knowledge to characterize waste
LIG404-00-03	Waste Profile Form	Guidance for completing the WPF

APPENDIX B

Contact List

Air Quality Group (ESH-17), 5-0235
Biosafety Committee, 7-8229
Criticality Safety (ESH-6), 7-4789
Dynamic Experimentation (DX) Division, 7-5653
Emergency Management and Response (EM&R, S-8), 9-911 or 7-6211
Engineering Sciences and Applications (ESA) Division, 7-4136
Environment, Safety, and Health Division (ESH-DO), 7-4218
Environmental Sciences and Waste Technologies (E-ET), 5-0548
Environmental Restoration Project (E/ER), 7-0808
Environmental Stewardship Office (E-ESO), 7-6639
ES&H Training Group (ESH-13), 7-0059
Facility Risk Management Group (ESH-3), 7-3363
Facility Engineering Services (FWO-FE), 7-4657
Fire Protection Group (FWO-FIRE), 7-9045
Gas Processing Facility, 7-4406
Hazardous Materials Transfer Approvals (BUS-4), 7-4127
Hazardous and Solid Waste Group (ESH-19), 7-0666
Hazardous Material Response (ESH-10), 5-5237
Health Physics Operations Group (ESH-1), 7-7171
Industrial Hygiene and Safety Group (ESH-5), 7-5231
Johnson Controls Northern New Mexico, Redistribution and Marketing, 7-2109
SWO Waste Certification Team (FWO-SWO), 7-4504
Materials Management Group (BUS-4), 7-4127
Nuclear Materials Control and Accountability (S-4), 7-5886
Office of Legal Counsel – General Law, 7-3766
Operational Safety Section of the Industrial Hygiene and Safety Group (ESH-5), 7-4644
Packaging and Transportation Section of the Materials Management Group (BUS-4), 5-9683 or 7-4493
Radiation Protection Services (ESH-12), 7-7171
Radioactive Liquid Waste (FWO-RLW), 7-4301
Solid Waste Operations (FWO-SWO), 5-6158
Spill Prevention, Control and Countermeasure (SPCC) Plan (ESH-18), 5-4752
Sanitary Waste System, 5-0453
Waste Services (FWO-SWO), 5-4000 or 5-WAST (5-9278)
Water Quality and Hydrology Group (ESH-18), 5-0453
WIPP Certification (E-ET), 7-8532
WMC Program Administrator (FWO-SWO), 7-1948

APPENDIX C

Definitions

Additional definitions may be found on the Laboratory Official Documents web page.

(Click Here)

Laboratory Waste Management: For the purposes of this document, the Laboratory organizations responsible for establishing Laboratory waste-related requirements and guidance and the institutional treatment, storage, and disposal facilities constitute Laboratory Waste Management.

NOTE: Unless the term is immediately followed by a regulatory or DOE citation, the term is a Laboratory adaptation to clearly define the unique meaning and significance of the term at the Laboratory. Where "Solid" is capitalized the word is used as intended in RCRA, where "solid" is not capitalized, it refers to the physical state of the waste.

less than 90-day (<90 day-) accumulation area {40 CFR §262.34}**:** A designated space for accumulating hazardous or mixed waste in containers or tanks; the waste may not remain in the accumulation area longer than 90 days.

acceptable knowledge (AK): A waste stream characterization method that can be used to meet all or part of the waste analysis requirements appropriate for the waste media. The method may include documented process knowledge, supplemental waste analysis data, and/or facility records of analysis.

accumulation start date: The date on which each period of accumulation of waste in a container or tank begins.

acute hazardous waste: Discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, or technical grades of the chemical that are identified in 40 CFR §261.33 (e) as acute hazardous waste or hazardous wastes with a hazard code of "P."

administratively controlled waste: Waste that is nonhazardous and nonradioactive that may not be disposed of at a commercial or municipal solid waste landfill. This includes, but is not limited to, classified waste, sensitive waste, certain New Mexico Special Wastes, and empty containers greater than 30 gallons.

asbestos waste: Waste that contains more than 1% of any of the following naturally occurring crystalline minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, and anthrophyllite; may be friable or nonfriable.

biological waste: See "noninfectious biological waste."

compactible waste: Materials that are capable of undergoing volume reduction, such as paper, plastic, and glass.

contact-handled radioactive waste: Packaged waste with an external surface dose rate not exceeding 200 mrem/hr.

decommissioning: The permanent removal from service of surface facilities or equipment.

decontamination: The removal of unwanted material (e.g., radioactive material) from personnel, equipment, or areas.

disposal: The discharge, deposit, injection, dumping, spilling, leaking, or placing of any waste into or on any land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

EPA hazardous waste number {40 CFR §260.10}: As defined by regulations promulgated under the RCRA and New Mexico HWA, the number assigned by the Environmental Protection Agency (EPA) to each type of hazardous waste listed in 40 CFR Part 261, Subparts C and D.

environmental restoration: A term used by the DOE to describe cleanup of DOE facilities and lands.

hazardous waste {40 CFR §261.3}: A Solid waste that is not excluded from regulation as a hazardous waste and is a listed hazardous waste or exhibits any of the hazardous characteristics: ignitibility, corrosivity, reactivity, or toxicity.

high explosive (HE) waste: Any waste containing material having an amount of stored chemical energy that starts a violent reaction when initiated by impact, spark, or heat. This violent reaction is accompanied by a strong shock wave and the potential for propelling high-velocity particles.

high-level waste (HLW) {DOE Order 435.1}: The highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation.

infectious waste {20 NMAC 9.1.105AL}: A limited class of waste materials that carry a probable risk of transmitting disease to humans including, but not limited to, the following: regulated medical waste, infectious substances (etiologic agents), other potentially infectious materials (OPIM), and regulated waste.

knowledge of process: See "acceptable knowledge."

low-level radioactive waste (LLW) {DOE Order 435.1}: Radioactive waste that is not high-level waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in section 11e.(2) of the *Atomic Energy Act of 1954*, as amended), or naturally occurring radioactive material.

medical waste: See "regulated medical waste."

mixed waste (MW) {RCRA, 42 U.S.C.A. 6903(41)}: Any waste containing both hazardous waste and source, special nuclear, or by-product materials subject to the Atomic Energy Act of 1954.

New Mexico Special Waste {20 NMAC 9.1.105BZ}: The following types of Solid waste have unique handling, transportation, or disposal requirements to assure protection of the environment, public health, welfare, and safety: (treated formerly characteristic hazardous waste); packing house and killing plant offal; asbestos waste; ash; infectious waste; sludge, except compost that meets the provisions of 40 CFR Part 503; industrial Solid waste; spill of a chemical substance or commercial product; dry chemicals that when wetted become characteristically hazardous; and petroleum-contaminated soils.

noncompactible waste: Materials not capable of being compacted or undergoing volume reduction, such as solid metal materials with minimum void space and metal bricks.

nonhazardous waste: Any waste that is not regulated as a hazardous waste by RCRA/HSWA but that may present a threat to human health or the environment and requires special administrative controls.

noninfectious biological waste: A biological waste that cannot be classified as an infectious substance or a regulated medical waste and is not subject to federal or state regulations on infectious waste, is not classified as an infectious substance or a regulated medical waste, and is not subject to federal or state regulations on infectious waste.

normal waste: Waste produced from (1) any type of production operation, analytical and/or research and development laboratory operations; (2) treatment, storage, and disposal operations "work for others"; or (3) any other periodic and recurring work that is considered ongoing in nature. Such wastes arise from activities that occur regularly and that generate a waste stream of a predictable quantity and characterization and are not part of the Laboratory's environmental restoration activities.

off-normal waste: Waste that is generated or occurs on an unscheduled basis or is of unpredictable quantity and/or characteristics. Because of its unpredictable nature, this waste cannot be trended over an extended period of time.

orphaned waste: Any material or waste with an unknown origin or generator.

other potentially infectious materials (OPIM) {29 CFR §1910.1030(b)}:

(1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva (in dental procedures), any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; or other potentially infectious material that may result from the performance of the employee's duties.

(2) Any unfixed tissue or organ (other than intact skin) from a human, either living or dead.

(3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

polychlorinated biphenyl (PCB) waste: A waste containing the biphenyl molecule that has been chlorinated. PCB waste is regulated if the concentration of PCBs in the source material is greater than or equal to 50 ppm.

Radioactive Liquid Waste Collection System (RLWCS): A network of underground pipelines and associated equipment that carry radioactive liquid waste from Laboratory sites to the Radioactive Liquid Waste Treatment Facilities (RLWTF). The RLWCS was formerly referred to as the Acid or Industrial Waste Line.

Radioactive Liquid Waste Treatment Facilities (RLWTF): The radioactive liquid waste treatment plants managed and operated by the FWO-RLW: the Main Plant at TA-50-1; the Pretreatment Plant in Room 60 and 60A at TA-50-1; and the pretreatment plant at TA-21-257 (DP-257).

radioactive waste: Waste that has been determined to contain added (or concentrated Naturally Occurring Radioactive Material [NORM]) radioactive material or activation products by either monitoring and analysis, acceptable knowledge, or both; or does **not** meet radiological release criteria.

recycled {40 CFR §261.2}: A material that is used, reused, or reclaimed. A material is reclaimed if it is processed to recover usable products or if it is regenerated. A material is used or reused if it is either employed as an ingredient in an industrial process to make a product or employed in a particular function or application as an effective substitute for a commercial product.

regulated medical waste {49 CFR §173.134(a)(4)}: A waste or reusable material, other than a culture or stock of an infectious substance, that contains an infectious substance and is generated in (1) the diagnosis, treatment or immunization of human beings or animals; (2) research pertaining to the diagnosis, treatment or immunization of human beings or animals; or (3) the production or testing of biological products.

regulated waste {29 CFR §1910.1030(b)}: Liquid or semi-liquid blood or other potentially infectious materials (OPIM), contaminated items that would release blood or OPIM in a liquid or semi-liquid state if compressed, items that are caked with dried blood or OPIM and are capable or releasing these materials during handling, contaminated sharps, and pathological microbiological wastes containing blood or OPIM.

remote-handled (RH) radioactive waste: Packaged waste with an external surface radiation dose rate exceeding 200 mrem/hr.

sanitary wastewater: Human excreta and water-carried wastes from typical plumbing fixtures and activities, including, but not limited to, wastes from toilets, sinks, water fountains, bath fixtures, clothes- and dish-washing machines, and floor drains. Water-carried waste from non-residential type sources shall be considered sanitary wastewater if the composition and concentrations of waste do not differ from typical domestic waste.

satellite accumulation area {40 CFR §262.34}: A designated space for accumulating hazardous and mixed waste where the volume of hazardous waste may not exceed 55 gal. or the volume of acutely hazardous waste may not exceed one quart. The accumulation area must be located at or near the point of generation and be under the control of the generator/operator of the process generating the waste.

segregate: To separate waste from nonwaste materials; to sort waste according to type, such as sorting radioactive from nonradioactive waste or hazardous from nonhazardous waste.

Solid waste {40 CFR §261.2}: As defined by regulations promulgated under the Resource Conservation and Recovery Act (RCRA) and the New Mexico Hazardous Waste Act, unless otherwise excluded, is any discarded material, either abandoned, recycled, or inherently waste-like, including liquids, solids, semisolids, and contained gases. Solid waste can be simply Solid or special, hazardous, nonhazardous, radioactive (including transuranic), or mixed waste. Waste consisting solely of source, special nuclear, or byproduct material, as defined by the Atomic Energy Act, is exempt from the Solid waste regulations as defined by RCRA. Environmental media (for example soil or water) is not Solid waste unless it is destined for disposal. For the more extensive definition under regulations promulgated under the New Mexico Solid Waste Act, refer to 20 NMAC 9.1.105BV.

storage: The holding of waste for a temporary period, at the end of which the waste is to be treated, disposed of, or stored elsewhere.

suspect radioactive waste: Waste that is generated in an area where radioactive materials are present but that cannot be practicably verified as being nonradioactive.

transuranic (TRU) waste {DOE 435.1}: Radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for: (1) high-level radioactive waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

newly-generated TRU waste: Waste generated after the development, approval, and implementation of a transuranic (TRU) waste characterization program that meets the requirements outlined in the Transuranic Waste Characterization Quality Assurance Program Plan. Newly generated TRU waste also includes any previously generated waste (retrievable stored waste) that undergoes any form of treatment, processing, or repackaging in accordance with the LANL Quality Assurance Project Plan.

retrievable TRU waste: Waste that is not classified by the DOE as permanently buried and that has been generated before the development and implementation of a transuranic (TRU) waste characterization program that meets the requirements outlined in the Transuranic Waste Characterization Quality Assurance Program Plan and that has been identified by the DOE as a candidate waste for retrieval.

treatment: When applied to hazardous waste or hazardous components of mixed waste, any method, technique, or process, including neutralization, designed to change the physical, chemical, radiological, or biological character or composition of any waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste nonhazardous, or less hazardous; safe to transport, store or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

universal waste {40 CFR §273}**:** Certain of the following types of hazardous waste are subject to the universal waste requirements of 40 CFR §273; for example, batteries, pesticides, and mercury thermostats. The universal waste requirements ease some of the regulatory requirements for collecting and managing these common waste types.

unknown waste: See "orphaned waste."

waste acceptance criteria (WAC): Criteria that must be met before a waste is accepted for treatment, storage, or disposal. Waste acceptance criteria may involve the physical form of a waste, a waste's container, its radioactivity, packaging, labeling, etc.

waste certification program: A systematic, documented approach, used by a waste generator organization to ensure that waste is managed in a manner that provides reasonable assurance that the treatment, storage, and disposal facilities/ waste acceptance criteria are met.

waste characterization: The determination of a waste's physical, radiological, and chemical characteristics with sufficient accuracy to permit proper classification and management.

waste generator: Any individual and his/her management (for example, a research scientist or project manager) having direct responsibility for operations that generate waste. A waste generator may be a member of the organization responsible for the facility or site where the waste was generated. Waste generators have the responsibility for proper characterization, storage, and disposal of the waste they generate.

waste management: The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste, as well as associated surveillance and maintenance activities.

Waste Management Coordinator (WMC): The individual responsible for coordinating waste management activities on behalf of waste generators, line managers, facility managers, field project leaders, waste management groups, and other Laboratory organizations. This individual also coordinates resolution of waste management issues on behalf of his/her waste-generating organization and reviews documents pertaining to the management of waste.

waste stream: A waste or group of wastes from one or more processes or facilities with similar physical, chemical, and/or radiological characteristics.

APPENDIX D

Acronyms

AK	acceptable knowledge
BUS	Business Operations Division
CAO	Carlsbad Area Office
CFR	Code of Federal Regulations
CST	Chemical Science and Technology Division
CWDR	Chemical Waste Disposal Request
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DX	Dynamic Experimentation Division
ES&H	environment, safety, and health
ESH	Environment, Safety, and Health Division
ESA	Engineering Sciences and Applications Division
E-ESO	Environmental Stewardship Office
FWO	Facility & Waste Operations Division
FWO-RLW	FWO–Radioactive Liquid Waste Management Group
FWO-SWO	FWO–Solid Waste Operations Group
GWCP	Generator Waste Certification Program
HSWA	Hazardous and Solid Waste Amendments
JCNNM	Johnson Controls Northern New Mexico
LIR	Laboratory Implementation Requirement
LIG	Laboratory Implementation Guidance
LLW	low-level waste
LSRP	Laboratory Standards and Requirements Project
MLLW	mixed low-level waste
NMAC	New Mexico Administrative Code
NPDES	National Pollution Discharge Elimination System
NTP	National Transuranic Program
OBOD	open burn/open detonation
OIC	Office of Institutional Coordination
PCB	polychlorinated biphenyls
POC	point of contact
QA	quality assurance

RAMROD	Radioactive Materials Research Operations Demonstration
RANT	Radioassay and Non-Destructive Testing
RCRA	Resource Conservation and Recovery Act
RLWCS	Radioactive Liquid Waste Collection System
RLWTF	Radioactive Liquid Waste Treatment Facility
SWS	Sanitary Waste System
TRU	transuranic
TSDF	treatment, storage, and disposal facility
TSCA	Toxic Substances Control Act
TWSR	Transuranic Waste Storage Request
UHWM	Uniform Hazardous Waste Manifest
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
WMC	Waste Management Coordinator
WMPPC	Waste Management Policy and Procedure Committee
WPF	Waste Profile Form
WCRRF	Waste Characterization Reduction & Repackaging Facility

Guidance

Appendix E

Recommended Major Implementation Criteria for Self-Assessment

(Non-Mandatory)

LIR Title	LIR Number
General Waste Management Requirements	LIR 404-00-02.3

The major implementation criteria listed below are provided to assist Laboratory organizations in assessing their implementation of this LIR. These criteria provide an objective basis for self-assessing implementation of the major requirements contained in the LIR. The LIR also states requirements in other areas, such as, scope, precautions, and responsibilities that, when applied, complement the successful implementation of these major requirements.

1. **The most important criterion for assessing the implementation status of this LIR should be, if applicable: Have the requirements contained in the LIR been communicated to the individual(s) responsible for performing the work?**
2. **In addition, the recommended major implementation criteria for self-assessment of this LIR are the following:**
   - Performance of the self-assessment of waste management activities for compliance with the stated requirements of this document
   - Development of action plans for identification and implementation of corrective actions where noncompliance is identified
   - Completion and documentation of the implementation of corrective actions, including training on new or revised activities

If implemented through the recommended self-assessment, the generating organization should identify any actions required to ensure compliance with this LIR.

Hazardous and Mixed Waste Requirements

Los Alamos National Laboratory
Laboratory Implementation Requirements LIR404-00-03.1
Effective Date: 12/16/96 (Revised February 26. 2001) **Mandatory Document**

1.0 Introduction and Purpose

1.01 Lessons Learned Note: *Click here* for Lessons Learned *that may apply* to the requirements contained in this LIR.

1.1 Overview

This LIR contains the Laboratory requirements that personnel generating hazardous and mixed waste must implement when characterizing and storing the waste. Hazardous and mixed wastes are regulated by the Resource Conservation and Recovery Act (RCRA), the New Mexico Hazardous Waste Act (NMHWA), and the New Mexico Administrative Code (20.4.1 NMAC), sometimes referred to collectively as "RCRA." Compliance with these federal and state requirements is mandatory for operations at the Laboratory that generate, store, and treat hazardous or mixed waste. Three other LIRs contain requirements specific to radioactive, solid, polychlorinated biphenyl (PCB) waste types.

This LIR complements LPR404-00-00.

See Appendix C (Guidance: Recommended Major Implementation Criteria for Self-Assessment).

1.2 In this Document

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2.0 Acronyms

CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ESH-5	Industrial Hygiene and Safety Group
ESH-19	Hazardous and Solid Waste Group
ES&H	environment, safety, and health
FWO-SWO	Facility & Waste Operations Division-Solid Waste Operations
HAZWOPER	hazardous waste operations and emergency response
IRF	Inspection Record Form
JCNNM	Johnson Controls Northern New Mexico
NMED	New Mexico Environment Department
MSDS	material safety data sheet
NMAC	New Mexico Administrative Code
NMHWA	New Mexico Hazardous Waste Act
OSHA	Occupational Safety and Health Administration

RCRA	Resource Conservation and Recovery Act (also used to collectively describe this act, the New Mexico Waste Act, and regulations promulgated thereunder)
SAA	satellite accumulation area
TSDF	treatment, storage, and disposal facility
UWA	universal waste area
WAP	Waste Analysis Plan
WMC	waste management coordinator
WMPCC	Waste Management Policy and Procedure Council
WPF	Waste Profile Form

3.0 Definitions

Acceptable knowledge: (AK) A waste stream characterization method that can be used to meet all or part of the waste analysis requirements for the waste media and may include documented process knowledge, supplemental waste analysis data, and/or facility records of analysis.

EPA hazardous waste number: As defined by regulations promulgated under the RCRA and New Mexico HWA, the number assigned by the Environmental Protection Agency (EPA) to each type of hazardous waste listed in 40 CFR Part 261, Subparts C and D.

Hazardous waste: Is a solid waste that is not excluded from regulation as a hazardous waste and is a listed hazardous waste or a waste that exhibits any of the hazardous characteristics (ignitability, corrosivity, reactivity, or toxicity).

Less-than 90 day (<90 day) accumulation area: {40 CFR §262.34} A designated space for accumulating hazardous or mixed waste in containers or tanks; the waste may not remain in the accumulation area longer than 90 days.

Mixed waste: Any waste containing both hazardous waste and source, special nuclear, or by-product materials subject to the Atomic Energy Act of 1954.

No-known-owner waste: Any material or waste with an unknown origin, history, generator, or process that does not have a defined owner.

Operator: The person responsible for the overall operation of a facility.

~~**Recycled**: A material that is used, reused, or reclaimed; i.e., material is reclaimed if it is~~ processed to recover usable products or if it is regenerated. A material is used or

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reused if it is either employed as an ingredient in an industrial process to make a product or employed in a particular function or application as an effective substitute for a commercial product.

Satellite Accumulation Area: {40 CFR §262.34} A designated space for accumulating hazardous and mixed waste where the volume of hazardous waste may not exceed 55 gal. or the volume of acutely hazardous waste may not exceed one quart.

Solid waste: As defined by regulation promulgated under the Resource Conservation and Recovery Act (RCRA) and the New Mexico Hazardous Waste Act unless otherwise excluded. Any discarded material, either abandoned, recycled, or inherently waste-like material, including liquids, solids, semisolids, and contained gases.

GUIDANCE NOTE: Solid waste can be simply Solid or special, hazardous, nonhazardous, radioactive (including transuranic), or mixed waste. Waste consisting solely of source, special nuclear, or by-product material-as defined by the Atomic Energy Act-is exempt from the solid waste regulations as defined by RCRA. Environmental media (for example, soil or water) is not solid waste unless it is destined for disposal. For the more extensive definition under regulation promulgated under the New Mexico Solid Waste Act refer to 20 NMAC 9.1.105BV.

Treatment: When applied to hazardous or hazardous components of mixed waste, any method, technique, or process-including neutralization-designed to change the physical, chemical, or biological character or composition of any waste so as to neutralize such waste or so as to recover energy or material resources from the waste or so as to render such waste nonhazardous or less hazardous and safe to transport, store or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

Treatment, Storage, and Disposal Facilities. (TSDFs) As defined by RCRA in 40 CFR 264 and 265, a TSDF is a permitted or interim status hazardous waste management unit where hazardous or mixed waste may be stored or treated prior to disposal.

GUIDANCE NOTE: There are no active RCRA hazardous or mixed waste disposal units at the Laboratory. Waste subject to land disposal restrictions (40 CFR 268) will generally be subject to enforcement under the Federal Facilities Compliance Act if stored for more than one year.

Universal waste: Certain of the following types of hazardous waste are subject to the universal waste requirements of 40 CFR Part 273: batteries, pesticides, lamps and mercury thermostats.

GUIDANCE NOTE: The universal waste requirements ease some of the regulatory requirements for collecting and managing these common waste types.

Universal waste handler: A generator of universal waste or the owner or operator of a facility, including all contiguous property, that receives universal waste from other universal waste handlers, that accumulates universal waste and sends universal waste to another universal waste handler or to a destination facility or to a foreign destination.

Waste generator: Any individual and his or her line management (for example, a research scientist or project manager) having direct responsibility for operations that generate waste.

GUIDANCE NOTE: A waste generator may be a member of the organization responsible for the facility or site where the waste was generated. Waste generators have the responsibility for characterization, storage, and disposal of the waste they generate.

Waste management coordinator: (WMC) The individual responsible for coordinating waste management activities on behalf of waste generators, line managers, Facility Managers, Field Project Leaders, the Waste Management groups, and other Laboratory organizations.

GUIDANCE NOTE: This individual also coordinates resolution of waste management issues on behalf of his or her waste-generating organization and reviews documents pertaining to the management of waste.

4.0 Scope and Applicability

This document provides waste generators and TSDF operators with the requirements that must be implemented to characterize and manage waste according to state and federal regulations and Laboratory expectations.

The requirements shall apply to all Laboratory individual waste generators, their Safety and Environment Responsible line-management chain, and all organizations that handle, treat, store, dispose of, or transport Laboratory waste.

All waste generation activities, including environmental restoration waste generation activities, shall implement the requirements contained in this LIR.

The requirements for managing hazardous waste shall apply to consumer products when they are to be discarded, regardless of where they were purchased.

5.0 Precautions and Limitations

The requirements contained in this LIR do not address all conceivable situations. Any suggestions for changes in the requirements or requirements interpretations shall be referred to the Hazardous and Solid Waste Group.

GUIDANCE NOTE: Failure to implement the requirements in this LIR could cause the Laboratory to incur penalties and fines due to findings of noncompliance by the RCRA regulatory authorities.

6.0 Requirements

6.1 Division Directors

In addition to the responsibilities contained in LIR404-00-02, Division Directors, Program Managers, and Program Directors shall:

- Ensure that the federal, state, and Laboratory requirements specified in this document are implemented.
- Ensure that waste generators and TSDF operators recognize and manage hazardous and mixed wastes in accordance with the requirements contained in this LIR.
- Designate an owner for waste when no specific owner can be identified.

6.2 Waste Management Coordinators (WMC)

In addition to the responsibilities in LIR404-00-02, WMCs shall:

- Register waste accumulation/storage areas with the Hazardous and Solid Waste Group.
- Contact the Hazardous and Solid Waste Group regarding any unusual situations or possible variances or exceptions to the requirements contained in this LIR (see LIR301-00-02).

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6.3 Hazardous and Solid Waste Group (ESH-19)

In addition to the responsibilities contained in LIR404-00-02, the Hazardous and Solid Waste Group shall maintain registration records for all hazardous and mixed waste accumulation/storage areas at the laboratory.

6.4 Generators

In addition to the responsibilities contained in LIR404-00-02, waste generators shall:

- Implement the requirements contained in NMHWA, New Mexico Administrative Code (NMAC) 20.4.1, 40 CFR Part 262, "Standards Applicable to Generators of Hazardous Waste;" 40 CFR Part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities;" 40 CFR Part 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities"; and 40 CFR Part 273, "Standards for Universal Waste Management."
- Provide a detailed description of the waste to assist the waste management organizations and the regulatory organizations in determining the classification and management required for the waste.
- Identify RCRA-regulated hazardous waste

GUIDANCE NOTE: Information useful in identifying hazardous and mixed waste can often be obtained from:

- The label on the original container,
- Material safety data sheets (MSDSs),
- Manufacturers' product descriptions,
- Knowledge of the process ("acceptable knowledge" or "AK") that generated the waste,
- Past experience with the waste stream, or
- Analysis of a sample(s) of the waste.

The information in Appendix B can assist waste generators in making a hazardous waste determination.

6.4.1 No-known-owner waste

- The following actions shall be implemented when a no-known-owner waste is identified:

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- Contact WMC and safety and environment responsible manager.
- Manage it as a hazardous waste.
- Mark the waste "HAZARDOUS WASTE" and store it in an accumulation area.

- A Request-for-Analysis form shall be submitted to the Hazardous and Solid Waste Group as soon as practicable if waste with no known owner needs to be analyzed. The generator may initiate other sampling and analysis alternatives if and only if these alternate methods satisfy the requirements in SW-846 Test Methods.

6.4.2 Accumulation/storage areas

Generators shall accumulate or store waste in a registered hazardous waste accumulation or storage area.

GUIDANCE NOTE: The Laboratory has four types of accumulation/storage areas:
- Satellite Accumulation Area (SAA)
- Less-than 90 day Accumulation Area (< 90)
- Universal Waste Area (UWA)
- Treatment, Storage, and Disposal Facilities (TSDFs)

6.4.3 General Requirements for Accumulation Areas:

- Containers shall be marked with the words "HAZARDOUS WASTE" or with other words, such as "*acetone*", that specifically identify the contents.

  GUIDANCE NOTE: The contents and the words "HAZARDOUS WASTE" should be marked on the container. The container label should not have chemical formulas or abbreviations.

- If a container holds mixed waste, it shall also be labeled "RADIOACTIVE."
- If mixed waste is stored, it shall be posted in accordance with LPR402-712.
- Containers holding hazardous or mixed waste shall be closed during storage, except when it is required to add or remove waste.
- Containers shall be in good condition and compatible with the waste to be stored.
- If containers are not in good condition or are leaking, the contents shall be transferred to a container in good condition.

- All leaks or spills of hazardous or mixed waste shall be cleaned up immediately.
- All waste containers shall be segregated according to the compatibility of the types of waste held.
- The Inspection Record Forms (IRFs) for less-than 90-day accumulation areas, training records, and hazardous waste determination records shall be retained permanently, in accordance with DOE requirements (see DOE-AL Memorandum LESH:PBS:0031, "Moratorium on the Destruction of Records").
- All accumulation areas shall be identified by a prominently posted sign. The Hazardous and Solid Waste Group or your WMC shall be contacted for signs.
- Chemical waste that is not hazardous or mixed waste shall not be subject to the time or volume restrictions under RCRA.

GUIDANCE NOTE: Chemical waste that is not hazardous or mixed waste does not have to be stored or accumulated in an accumulation/storage area.

GUIDANCE NOTE: Containers holding liquids should have secondary containment.

6.4.4 Requirements for Satellite Accumulation Areas (SAAs)

- SAAs shall be under control of the operator of the process generating the waste.
- SAAs shall be at or near the point of generation and serve a process, a room, or a suite of rooms.

GUIDANCE NOTE: A suite of rooms is a group of rooms that are next to each other or across a hallway from one another.

- An SAA shall not accumulate a total of more then 55 gal. of hazardous or mixed waste or 1 qt of acutely hazardous or mixed waste.
- If the volume limit is exceeded, the generator shall mark the containers holding the excess accumulation of hazardous waste with the date the excess amount began accumulating . The generator shall ensure the waste is transferred to a <90-day accumulation area or a TSDF within three calendar days.
- The SAA shall only serve processes located on the same floor of the building as the SAA.

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- An SAA operator shall ensure that physical controls (for example, door or cabinet locks) are in place if the area is located outside a building or in an area without its own physical controls.
- An SAA operator shall ensure that administrative and/or physical controls are in place.
- Administrative controls shall include:
    - Consultation with a WMC
    - Posting of the name and phone number of the SAAs primary contact
    - The establishment of a list of "authorized users"
- All containers shall have the generator name and WPF number or a log sheet (inventory system). While WPF numbers are being acquired, containers shall be marked with "WPF Number Pending."

6.4.5 Requirements for < 90-Day Accumulation Areas

- Within a 90-day period, the generator shall transfer the waste to a TSDF or treat the waste.
- If an extension to the time limit is required for waste in a < 90 day accumulation area, the information shall be submitted to the Hazardous and Solid Waste Group by day 70 of the 90 days.

    GUIDANCE NOTE: An extension can be granted by NMED if the extension is needed due to unforeseen, temporary, and uncontrollable circumstances.

- When an extension is required, the Hazardous and Solid Waste Group shall be provided the following information:
    - Justification of why the extension is required and what has been done to-date to move the waste.
    - A written action plan that ensures the waste will be moved before the 30-day extension ends.
- Containers shall be clearly marked with the words "HAZARDOUS WASTE."
- Containers shall be clearly marked with the accumulation start date and the labels shall be visible for inspection.

- The accumulation start date shall start when the container first receives waste or when the container is first received in the accumulation area.
- Containers with a concentration of volatile organic compounds (VOCs) greater than 500 ppm by weight shall be monitored for emissions unless they meet DOT specifications under 49 CFR Part 178. Other exclusions from the emission monitoring requirement can be found in 40 CFR §265.1080.
- The < 90 day accumulation area shall be equipped with the required eyewash and safety showers, spill control equipment, communications and alarm equipment, and emergency equipment for the types of hazards posed at the site. The equipment must be tested and readiness maintained to ensure it operates as required in time of an emergency. See "Chemical Management", LIR402-510-01, for more specific eyewash and safety shower requirements.
- An Industrial Hygiene/Safety person shall determine if equipment is required and if equipment is not required, this determination shall be documented in a memo to file.
- A copy of the TSDF Contingency Plan shall be maintained at the facility.

  NOTE: The TSDF Contingency Plan applies to both TSDFs and <90-day accumulation areas.
- A copy of the Emergency/Site Specific Plan shall be present at the site.
- All operators shall be familiar with the location and contents of the above-mentioned plans.
- A minimum aisle space of 2 ft shall be maintained between stored waste containers to allow for visual inspection and entry by emergency personnel and equipment.
- Inspections shall:
  - Be performed weekly.
  - Be documented in an IRF, a copy of which shall be forwarded to the Hazardous and Solid Waste Group on a weekly basis.
  - Be performed on the day waste is actively managed (adding, removing, or treating waste).
- Any action required to correct a deficiency documented in an inspection form shall be addressed as soon as practical and the IRF must show progress and/or resolutions.

- Personnel shall not work unsupervised in a <90-day accumulation area until the individual has attended the required training.
- Personnel shall complete the required training courses within six months after the date of employment, new work assignment, or new position handling or generating hazardous or mixed waste.

GUIDANCE NOTE: Waste Generation Overview training is recommended as a prerequisite for RCRA Personnel Training

- RCRA Personnel Training and annual RCRA Refresher Training shall be required for <90-day accumulation area operators.
- Workers whose training has expired shall not work in < 90 day accumulation areas.

GUIDANCE NOTE: Hazardous Waste Workers should notify their supervisor formally of expired training.

Treatment by the Waste Generator

Treatment by the waste generator (without a permit) in tanks or containers shall be authorized, provided the following regulatory requirements are met:

- A RCRA Hazardous Waste Treatment Report Form (WTRF) and a waste analysis plan (WAP), if required , shall be completed and submitted to the Hazardous and Solid Waste Group before any hazardous waste is treated.
- A WAP must be completed and implemented when treating to meet Land Disposal Restrictions (LDR) treatment standards found in 40 CFR §268.40.
- The WAP shall contain detailed chemical and physical analysis of a representative sample of the prohibited waste(s) being treated and contain all the information required to treat the waste(s) in accordance with the requirement in 40 CFR §268.7(a)(5), including the selected testing frequency. (See the Hazardous and Solid Waste homepage for the WTRF instructions and a sample WAP by clicking here.)

6.4.6 Requirements for Universal Waste Areas (UWAs)

- All containers holding universal waste shall be marked with the words "UNIVERSAL WASTE" and any additional terms, such as "BATTERIES," "LAMPS," "PESTICIDES," or "MERCURY THERMOSTATS," or shall be marked as required by 40 CFR §273.14.

- All containers holding universal waste in a UWA shall be marked with the accumulation start date or identified as required by 40 CFR §273.35(c).
- Within one year of the accumulation start date, universal waste must be either recycled or transferred to a TSDF.
- The UWA shall be identified by a prominently posted sign. The Hazardous and Solid Waste Group or the responsible WMC shall be contacted for signs.
- All leaks or spills of universal waste shall be cleaned up immediately.

Batteries

- Batteries shall be removed from units or devices prior to placement in accumulation areas.
- The universal waste rule shall apply only to hazardous waste batteries as defined in 40 CFR §260.10 or §273.6 and shall not apply to the unit or device in which the battery is contained.
- Lead-acid batteries that are being recycled shall be managed either by the requirements contained in 40 CFR Part 266, Subpart G, or by the universal waste requirements contained in this section.

GUIDANCE NOTE: The following activities may be conducted by the handler as long as the casing of each individual battery cell is not breached and remains intact and closed (except that cells may be opened to remove electrolyte and closed immediately after removal):

  - Battery sorting by type.
  - Mixing batteries in one container.
  - Discharging batteries to remove the electric charge.
  - Regenerating used batteries.
  - Disassembling batteries or battery packs to individual batteries or cells.
  - Removing the electrolyte from batteries.

- Battery handlers who remove electrolyte or who generate other solid waste as a result, shall determine if the waste is hazardous (see Appendix B). Such handlers shall be considered the generator of the resultant material. If the resultant material is hazardous, it shall be managed in accordance with the requirements contained in 40 CFR §262.34.

Lamps

- Lamps shall be placed in a container or package.
- Containers or packages holding lamps shall be kept closed except when adding or removing waste.

Pesticides

- Pesticide containers shall be kept closed except when adding or removing waste.

Thermostats

- Handlers of universal waste thermostats shall ensure that any release to the environment is prevented.
- Handlers who remove the mercury-containing ampules from thermostats shall ensure:
  - Ampules are handled in a manner that prevents breakage:
  - Ampules are removed only over a containment device.
  - A mercury clean-up system is readily available to immediately transfer any mercury that spills or leaks from broken ampules from the containment device to a container meeting the requirements of 40 CFR §262.34.
- If mercury spills or leaks from broken ampules, the contents shall be transferred from the containment device to a container that meets requirements of 40 CFR §262.34. Additionally, the requirements below shall be met.
  - The area in which the ampules are removed shall be ventilated and monitored to ensure OSHA exposure levels for mercury are adhered to.
  - Employees removing the ampules shall be thoroughly familiar with required mercury waste handling and emergency procedures, including transfer of mercury from containment devices to specified containers.
  - Removed ampules shall be stored in closed, non-leaking containers that are in good condition.
  - Removed ampules shall be packed in the container as required to prevent breakage during storage, handling, and transportation.
- Mercury handlers who remove mercury or who generate other solid waste as a result, shall determine if the waste is hazardous (see Appendix B). Such handlers shall be considered the generator of the resultant material. If the resultant material is hazardous, it shall be managed in accordance with the requirements contained in 40 CFR §262.34.

7.0 Treatment, Storage and Disposal Facilities

GUIDANCE NOTE: For more specific information about TSDFs contact the Hazardous and Solid Waste Group (ESH-19).

TSDFs shall:

- Implement the requirements contained in NMHWA, the New Mexico Administrative Code (20.4.1 NMAC), 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities" and 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities.
- Notify the LANL Site Treatment Plan Manager before one year has passed since the generation date of mixed low level waste if the waste continues to be in storage.
- Characterize all waste.
- Ensure waste containers are in good condition.
- Identify the TSDF by prominently posting a "Danger—Unauthorized Personnel Keep Out" sign. Signs shall be in English and Spanish and must be legible from 25 feet.
- Establish and follow a written inspection schedule.
- Perform daily or weekly inspections.
- Document inspections in an IRF and forward a copy to the Hazardous and Solid Waste Group (ESH-19) on a weekly basis.
- Ensure any action required in an inspection form to correct a deficiency is addressed as soon as practicable and that the IRF indicates progress and/or resolutions.
- Perform inspections on the day waste is actively managed (adding, removing, or treating waste).
- Ensure that IRFs, training records, shipping manifests and shipping papers, and hazardous waste determination records are permanently maintained in accordance with the DOE requirements documented in DOE-AL Memorandum LESH:PBS:0031, "Moratorium on the Destruction of Records."
- Segregate ignitable and reactive waste and protect the waste from sources of ignition.

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- Conspicuously post a "No Smoking" sign when ignitable or reactive waste is being stored.
- Maintain a minimum aisle space of 2 ft between stored waste containers to allow for visual inspection and entry by emergency personnel and equipment.
- Maintain required eyewash and safety showers, spill control equipment, communication and alarm equipment, and emergency equipment as required by Section 6.4.5 of this LIR.
- Maintain a copy of the TSDF Contingency Plan. TSDF workers shall be familiar with the location and contents of this plan.
- Maintain written operating records. (Click here for details and instructions regarding the operating record.)
- Ensure that containers with free liquids have secondary containment of sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater.
- Containers with a concentration of volatile organic compounds (VOCs) greater than 500 ppm by weight shall be monitored for emissions unless they meet DOT specifications under 49 CFR Part 178. Other exclusions from the emission monitoring requirement can be found in 40 CFR §264.1080 and §265.1080.
- Establish and implement a written Waste Analysis Plan.
- Ensure that wastes shipped to an off-site TSDF are manifested in accordance with the requirements contained in 40 CFR §265.71 and §264.71 and the DOT requirements specified in LIR405-10-01.
- Ensure that each copy of the shipping manifest is signed and dated.
- Ensure that discrepancies found upon receipt are noted on the shipping manifest.
- Ensure that only personnel who have the required training or refresher are permitted to work in the TSDF.
- Ensure personnel complete the required training courses within six months after the date of employment, new work assignment, or new position if this involves handling or generating hazardous or mixed waste.
- Ensure TSDF workers complete RCRA Personnel Training and the annual RCRA Refresher Training.

GUIDANCE NOTE: Waste Generation Overview training is recommended as a prerequisite for RCRA Personnel Training

- Ensure that workers with expired training do not work in TSDF.

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GUIDANCE NOTE: Hazardous Waste Workers should formally notify their supervisor of expired training.

- Ensure TSDF workers complete Hazardous waste operations (HAZWOPER) training and refresher.

GUIDANCE NOTE: HAZWOPER Refresher for TSDF Workers (course #9575) fulfills annual refresher requirements for RCRA Refresher (course #9581).

8.0 References

"Chemical Management", Los Alamos National Laboratory Implementation Requirement, LIR402-510-01.

"General Waste Management Requirements," Los Alamos National Laboratory Implementation Requirement, LIR404-00-02.

"Managing Polychlorinated Biphenyls," Los Alamos National Laboratory Implementation Requirement, LIR404-00-06.

"Managing Radioactive Waste," Los Alamos National Laboratory Implementation Requirement, LIR404-00-05.

"Managing Solid Waste," Los Alamos National Laboratory Implementation Requirement, LIR404-00-04.

"Test Methods for Evaluating Solid Wastes," Environmental Protection Agency report SW 846 (November 1986).

"Waste Profile Form Guidance," Los Alamos National Laboratory Implementation Guidance Document, LIG 404-00-03.

Contingency Plan, The Los Alamos National Laboratory Hazardous Waste Permit, issued November 8, 1999 and subsequent revisions.

"Packaging & Transportation," Los Alamos National Laboratory Implementation Requirement LIR405-10-01.

New Mexico Administrative Code, 20.4.1 NMAC.

New Mexico Hazardous Waste Act (NMHWA).

Resource Conservation and Recovery Act, as amended, 42 U.S.C. Sec. 6901 et seq.

Title 40 CFR 261, "Identification and Listing of Hazardous Waste."

Title 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste."

Title 40 CFR 262.34, "Accumulation Time."

Title 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities."

Title 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities."

Title 49 CFR 173,"Shippers—General Requirements for Shipments and Packaging."

9.0 Document Ownership

The Office of Institutional Coordination for this document shall be the Waste Management Policy and Procedure Committee. The WMPCC is responsible for the contents of this document.

10.0 Appendices

Appendix A. Contact List

Appendix B. Supplemental Information/Guidance

Appendix C. Guidance: Recommended Major Implementation Criteria for Self-Assessment

Appendix A

Contact List

Solid Waste Operations (FWO-SWO), 5-6158

Environmental Stewardship Office (ESO), 7-6639

ES&H Training Group (ESH-13), 7-0059

Hazardous and Solid Waste Group (ESH-19), 5-9527

Industrial Hygiene and Safety Group (ESH-5), 7-5231

Johnson Controls Northern New Mexico (JCNNM), Redistribution and Marketing, 7-2109

Packaging and Transportation Section of BUS-4, 7-6122

Appendix B

Supplemental Information/Guidance

Listed Waste Listed hazardous waste consists of chemical compounds identified in 40 CFR Part 261, Subpart D.

(Click here for listed and characteristic waste.)

Characteristic Waste Waste may be hazardous if it exhibits one or more of the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

Ignitability. (40 CFR §261.21) Waste is ignitable if it

- is a liquid or waste containing a free liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 140°F (Pensky-Martens Closed Cup tester);
- is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes **and**, when ignited, burns so vigorously and persistently that it creates a hazard;
- is an ignitable compressed gas; or
- is a DOT oxidizer as defined in 49 CFR §173.151.

Ignitable waste is hazardous and has EPA hazardous waste number **D001.**

Corrosivity. In accordance with the requirements contained in 40 CFR §261.22, any liquid measured for corrosivity must contain water. An aqueous solution with a pH of 2.0 or less, or 12.5 or greater, or a liquid that corrodes steel at a rate greater than 6.35 millimeters per year at a test temperature of 130°F is a hazardous waste. The pH of a solution is the measure of hydrogen and hydroxide ions in water-containing (aqueous – waste containing at least 20% free water by volume) solutions. This waste has a EPA hazardous waste number **D002**.

Reactivity. (40 CFR §261.23) Waste is reactive if it

- is normally unstable and readily undergoes violent change without detonating at standard temperature and pressure;
- violently reacts on contact with water;

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- forms potentially explosive mixtures with water;
- when mixed with water, generates toxic gases, vapors or fumes in a quantity that will present a danger to human health or the environment;
- releases cyanide or sulfide when exposed to pH conditions between 2.0 and 12.5 and can generate toxic gas, vapors, or fumes in a quantity that will present a danger to human health or the environment;
- is capable of detonation or explosive reaction if it is subjected to strong initiating source or if heated under confinement;
- is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure; or
- is classified as an explosive or forbidden explosive as defined in 49 CFR Part 173 Subpart C.

Reactive waste is hazardous and has EPA hazardous waste number **D003**.

Toxicity. (40 CFR §261.24) Waste is toxic if it is (or is contaminated with) one of the metals, pesticides, or organic chemicals (hazardous waste numbers **D004** through **D043**), in the stated concentrations (mg/L), as determined by the toxicity characteristic leaching procedure (TCLP). (See the Hazardous and Solid Waste homepage for the listing.) Questions concerning this characteristic should be directed to the WMC or the Hazardous and Solid Waste Group.

Empty Containers

As stated by RCRA, containers shall be considered empty if:

- all wastes have been removed that can be removed using the practices commonly employed to remove materials from that type of container (pouring, pumping and aspirating), and
- no more than one inch of residue remains on the bottom of the container, or
- no more than 3 percent by weight of the total capacity of the container or inner liner if the container is less than or equal to 110 gallons in size, remains in the container, or
- no more than 0.3 percent by weight of the total capacity of the container or inner liner—if the container is greater than 110 gal. in size—remains in the container.
- For containers of compressed gases, the pressure in the container approaches atmospheric.
- For acutely hazardous wastes (P-listed), regardless of the volume of the residual product, the container or inner liner has been triple rinsed using a solvent capable of removing the commercial chemical product or manufacturing chemical intermediate. (Note: It is not recommended that this method be used because it increases the amount of waste.)

- Empty containers smaller than 30 gal. may be discarded as commercial solid waste at a municipal landfill as long as the container did not contain a P-listed (acutely hazardous) chemical.
- Empty containers larger than 30 gal. can be recycled through FWO-SWO or JCNNM Redistribution and Marketing Branch. If containers cannot be recycled they should be disposed of through FWO-SWO.

Appendix C

Guidance:
Recommended Major Implementation Criteria for Self-Assessment

LIR Title	LIR Number
Hazardous and Mixed Waste Requirements	LIR404.00.03.1

The major implementation criteria listed below are provided to assist Laboratory organization in assessing their implementation of this LIR. These criteria provide an objective basis for self-assessment implementation of the major requirements contained in the LIR. The LIR also states requirements in other areas, such as, scope, precautions, and responsibilities that, when applied, complement in successful implementation of these major requirements.

1. The most important criterion for assessing the implementation status of this LIR should be, if applicable: Have the requirements contained in the LIR been communicated to the individual(s) responsible for performing the work?
2. In addition, the recommended major implementation criteria for self-assessment of this LIR are the following:
   - Performance of the self-assessment of waste management activities for compliance with the stated requirements of this document.
   - Development of actions plans for identification and implementation of corrective actions where noncompliance is identified.
   - Completion and documentation of the implementation of corrective actions, including training on new or revised activities.

If implemented through the recommended self-assessment, the generating organization should identify any actions required to ensure compliance with this LIR.

Managing Solid Waste

Los Alamos National Laboratory
Laboratory Implementation Requirement LIR 404-00-04.2
Issue Date: January 05, 1999 (Revised: January 16, 2003) Mandatory Document

1.0 Introduction and Purpose

Lessons Learned: NOTE: *Click here* for Lessons Learned *that may apply* to the requirements contained in this LIR.

1.1 Overview

The requirements contained in this LIR complement Laboratory Performance Requirement (LPR) 404-00-00, "Environmental Protection." Institutional requirements relating to waste management at the Laboratory are compiled in a series of documents that are part of the LIRs. Not a stand-alone document, this LIR is one in a series of waste management documents. The primary waste management document that contains the general requirements that shall apply to all waste types is LIR 404-00-02, "General Waste Management Requirements."

This document only contains requirements that are unique to solid waste as defined below. Solid waste is regulated by the New Mexico Administrative Code (NMAC), Title 20, Chapter 9, Part 1 (20 NMAC 9.1 as amended), otherwise known as the New Mexico Solid Waste Management Regulations.

This document provides requirements that shall be implemented by generators in managing solid waste in accordance with state and Laboratory requirements. The requirements contained in this document shall become effective on the date of issue. This revision deletes Notices 71 and 72.

1.2 In this Document

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2.0 Scope and Applicability

The requirements contained in this document shall apply to all personnel at the Laboratory generating solid waste as defined below. It summarizes the requirements that shall be implemented to control, store, treat and dispose of the waste to protect human health and the environment, to control pollution, and to implement the state, federal and Laboratory requirements. Laboratory personnel involved in solid waste generation activities, including environmental restoration activities that generate solid waste, must implement the requirements contained in this document.

GUIDANCE NOTE: General requirements for characterization and documentation of wastes are given in LIR 404-00-02, "General Waste Management Requirements."

The requirements contained in this LIR shall not apply to hazardous, radioactive, or polychlorinated biphenyl (PCB) waste. The following LIRs provide waste management requirements that shall apply to these waste types:

- LIR 404-00-03, "Hazardous and Mixed Waste Requirements"
- LIR 404-00-05, "Managing Radioactive Waste"
- LIR 404-00-06, "Managing Polychlorinated Biphenyls"

Additional requirements for the management of Biological Waste are found in LIR 402-530-00, "Biological Safety."

3.0 Acronyms

ACM	asbestos containing material
B/BF	blood and/or bodily fluid
C&D	construction and demolition
CFR	Code of Federal Regulations
CWDR	Chemical Waste Disposal Request
LAC	Los Alamos County
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMHWA	New Mexico Hazardous Waste Act
NMSWA	New Mexico Solid Waste Act
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PCS	petroleum contaminated soil
PLM	polarized light microscopy
RACM	regulated asbestos containing material

RCRA	Resource Conservation and Recovery Act
SWSC	Sanitary Wastewater Systems Consolidation plant
TFCH	treated formerly characteristic hazardous
TSCA	Toxic Substances Control Act
WAC	Waste Acceptance Criteria
WMC	Waste Management Coordinator
WMPPC	Waste Management Policy and Procedures Committee
WPF	Waste Profile Form

4.0 Definitions

GUIDANCE NOTE: The definitions used in this document are strictly solid waste regulatory definitions from the New Mexico Administrative Code. General waste management definitions may be found in the "Waste Management Glossary," located on the Laboratory Home Page under "Official Documents."

asbestos waste - Regulated asbestos containing material (RACM) which contains more than 1% asbestos as determined using the method specified in the Code of Federal Regulations (CFR), Title 40, Appendix A, Subpart F, Part 763, Section 1, Polarized Light Microscopy (PLM) and includes:

1. Friable asbestos material that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure;
2. Category I nonfriable asbestos containing material (ACM) that has become friable, including asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1% asbestos;
3. Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading;
4. Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations, which excludes Category I nonfriable ACM.

GUIDANCE NOTE: The Laboratory manages all nonfriable asbestos as New Mexico Special Waste.

ash - Ash that results from the incineration or transformation of solid waste and includes both fly ash and bottom ash, and ash from the incineration of densified-refuse-derived fuel and refuse-derived fuel, but does not include fly ash waste, bottom ash waste, slag waste and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels and wastes produced in conjunction with the combustion of fossil fuels that are necessarily associated with the production of energy and that traditionally have been and actually are mixed with and are disposed of or treated at the same time with fly ash, bottom ash, boiler slag or flue gas emission control wastes from coal combustion.

classified waste - Classified matter determined by a generating group to be a waste that may include, but is not limited to, documents, film, parts or assemblies, safe or vault locking devices, computer tape, degaussed magnetic tape, metal parts, or classified shapes.

clean fill - Broken concrete, brick, rock, stone, glass, reclaimed asphalt pavement, or uncontaminated soil generated from construction and demolition activities. Reinforcement materials, which are an integral part of the fill, such as rebar, are included. Clean fill must not contain other solid waste or hazardous waste.

GUIDANCE NOTE: Some construction and demolition debris may be considered clean fill, provided waste documentation exists, such as documented process knowledge, acceptable knowledge, or an approved Waste Profile Form (WPF).

commercial hauler - A person transporting solid waste for hire by whatever means for the purpose of transfer, processing, storing, or disposing of the solid waste in a solid waste facility, except that the term does not include an individual transporting solid waste generated on or from his residential premises for the purpose of disposing of it in a solid waste facility.

commercial solid waste - Includes all types of solid waste generated by stores, offices, restaurants, warehouses, and other nonmanufacturing activities, excluding residential, household, and industrial wastes. These wastes may be disposed at commercial or municipal solid waste facilities.

construction and demolition debris - Materials generally considered to be not water soluble and nonhazardous in nature including, but not limited to, steel, glass, brick, concrete, asphalt roofing materials, pipe, gypsum wallboard, lumber and other materials discarded during the construction or destruction of a structure or project. It also includes rocks, soil, tree remains, trees, and other vegetative matter that normally results from land clearing.

discharge - Disposal, spilling, leaking, pumping, pouring, emitting, emptying, or dumping into water or in a location and manner where there is a reasonable probability that the discharged substance will reach surface or subsurface water.

industrial solid waste **-** Solid waste generated by manufacturing or industrial processes that is not hazardous waste regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA). This term does not include mining waste or oil and gas waste.

infectious waste **-** A limited class of substances that carry a ***probable risk of transmitting disease to humans***, including but not limited to:

1. Microbiological laboratory wastes including cultures and stocks of infectious agents from clinical research and industrial laboratories and disposable culture dishes and devices used to transfer, inoculate, and mix cultures.
2. Pathological wastes including human or animal tissues, organs, and body parts removed during surgery, autopsy, or biopsy.
3. Disposable equipment, instruments, utensils, and other disposable materials that require special precautions because of contamination by highly contagious diseases.
4. Human blood and blood products including waste blood, blood serum, and plasma.
5. Used sharps including used hypodermic needles, syringes, scalpel blades, Pasteur pipettes, and broken glass.
6. Contaminated animal carcasses, body parts, and bedding, especially those intentionally exposed to pathogens in research, in the production of biologicals or the "in vivo" testing of pharmaceuticals.

For other biological operations involving contact with pathogenic organisms, contact with blood or body fluids, or handling of animals or wildlife, refer to LIR 402-530-00, "Biological Safety."

liquid waste **-** A waste material that is determined to contain free liquids, defined by the Paint Filter Test, described in "Test Methods for Evaluating Solid Waste" (*SW-846*, test method 9095A).

municipal solid waste landfill **– A solid waste facility** that receives household waste and may also receive commercial solid waste, industrial solid waste, and construction and demolition debris, depending upon its permit.

nonputrescent **-** Not allowed to rot or decay due to the breakdown of organic matter.

pharmaceutical-controlled substance **-** A drug or substance regulated by the New Mexico Controlled Substance Act that has a high potential to be abused by the human population and can lead to substance dependency.

sanitary waste – "Municipal solid waste" generated at a private household that may be disposed at a municipal solid waste landfill. No waste generated at the Laboratory is "municipal solid waste" – items normally classified as sanitary waste at home are commercial solid waste (see definition above) if generated at the Laboratory.

sludge - Waste in a solid, semi-solid, or liquid physical form generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control device. Sludge does not include treated effluent from these plants/devices.

solid waste - Garbage, refuse, sludge (as defined above) and other discarded material including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities.

Solid waste ***does not*** include:

1. Drilling fluids, produced waters, and other nondomestic wastes associated with the exploration, development or production, transportation, storage, treatment or refinement of crude oil, natural gas, carbon dioxide gas or geothermal energy
2. Fly ash waste, bottom ash waste, slag waste and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels and wastes produced in conjunction with the combustion of fossil fuels that are necessarily associated with the production of energy and that traditionally have been and actually are mixed with and are disposed of or treated at the same time with fly ash, bottom ash, boiler slag or flue gas emission control wastes from coal combustion
3. Waste from the extraction, beneficiation and processing of ores and minerals including phosphate rock and overburden from the mining of uranium ore, coal, copper, molybdenum, and other ores and minerals
4. Agricultural waste including, but not limited to, manure and crop residues returned to the soil as fertilizer or soil conditioner
5. Cement kiln dust waste
6. Sand and gravel
7. ~~Solid or dissolved material in domestic sewage;~~ or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, 33 U.S.C. Section 1342; or source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, 42 U.S.C. Section 2011 et seq.
8. Densified-refuse-derived fuel
9. Material except petroleum contaminated soils, regulated by Subtitle C or Subtitle I, 42 U.S.C. Section 6901 et seq. of the federal RCRA of 1976; ~~substances regulated by the federal Toxic Substances Control Act (TSCA),~~ 7 U.S.C. Section 136 et seq.; or low-level radioactive waste

solid waste dumpster – Large containers, which are designed to hold large volumes of consolidated trash. These containers are located outside buildings at the Laboratory.

Special Waste (i.e., New Mexico Special Waste) - The following are types of solid wastes that have unique handling, transportation, or disposal requirements to assure protection of the environment and the public health, welfare, and safety:

1. Treated formerly characteristic hazardous wastes (TFCH)
2. Asbestos waste (see definition above)
3. Ash (see definition above)
4. Infectious waste (see definition above)
5. Sludge, except compost that meets the provisions of 40 CFR 503 (see definition above)
6. Industrial solid waste (see definition above)
7. Spill of a chemical substance or commercial product
8. Dry chemicals, which, when wetted, become characteristically hazardous
9. Petroleum contaminated soils

Special Waste landfill - A landfill that receives solid waste other than household waste. This includes, but is not limited to, commercial solid wastes or New Mexico Special Wastes as defined in 20 NMAC 9.1. A construction and demolition landfill is not a Special Waste landfill.

storage - The accumulation of solid waste for the purpose of processing or disposal.

5.0 Precautions and Limitations

Failure to implement the requirements contained in this LIR could cause the Laboratory or the organization to incur penalties and fines.

- RRES-SWRC shall be contacted for special situations not covered in this document.
- The requirements contained in LIR 301-00-02, "Exceptions or Variances to Laboratory Operations Requirements" shall be implemented for exceptions and variances to these requirements.

6.0 General Implementation Requirements

6.1 Division Leader, Program Directors, and Office Directors

Division leaders, program directors, and office directors shall be responsible for ensuring that federal, state and Laboratory requirements specified in this document are implemented. LIR 404-00-02 shall be referred to for implementation requirements for all waste types.

6.2 Solid Waste Generators

Individual solid waste generators shall

- Implement the general waste management requirements contained in LIR 404-00-02.
- Dispose of office trash and other commercial solid waste (as defined above) in an office trash can or solid waste dumpster, which may be done without any waste documentation.
- Manage generated solid waste in accordance with the requirements contained in this LIR.

6.3 Waste Management Coordinators

Waste management coordinators (WMCs) shall assist waste generators to ensure solid waste is managed in accordance with the requirements contained in this document

6.4 RRES-SWRC

The Solid Waste Regulatory Compliance Group (RRES-SWRC) shall act as the point-of-contact for Laboratory personnel regarding solid waste regulatory issues.

6.5 FWO-SWO

The Facility and Waste Operations, Solid Waste Operations Group (FWO-SWO) shall

- prepare manifests for New Mexico Special Waste.
- contract off-site disposal facilities for NM Special Waste and other types of industrial solid waste.

6.6 RRES-WQH

The approval of the Water Quality and Hydrology Group (RRES-WQH), in conjunction with the SWSC WAC Committee, shall be required for ***all*** discharges of solid waste into the Sanitary Wastewater Systems Consolidation (SWSC) plant.

6.7 Commercial Haulers

Only commercial haulers registered with the New Mexico Environment Department (NMED), Solid Waste Bureau shall transport solid waste intra-site and off-site for disposal.

6.8 Prohibited Acts

Laboratory personnel shall **not**

- dispose of solid waste in a manner that will harm the environment or endanger the public health, welfare, or safety.
- dispose of solid wastes in a place other than an office trash can, a solid waste dumpster, or a solid waste facility.
- dispose of sludge (that does not meet the analytical criteria of 20 NMAC 9.1, Section 704), domestic sewage, treated domestic sewage, or septage at a solid waste facility.
- dispose of the following materials in a solid waste dumpster or at a solid waste facility:
    - hazardous waste
    - radioactive waste
    - liquid waste
    - lead-acid batteries
    - infectious waste, asbestos waste, and other types of NM Special Waste
    - administratively controlled waste
    - classified waste
    - pharmaceuticals and controlled substances
    - materials regulated under the federal Toxic Substances Control Act (TSCA), including PCBs as defined in that Act (contact RRES-SWRC for assistance with TSCA issues)
    - aerosol cans and pressurized containers

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7.0 Commercial Solid Waste Requirements

Commercial solid waste shall include office trash, broken glass, food debris, metals, maintenance and janitorial supplies, and other nonhazardous items.

Recycling options shall be considered prior to disposing of any material as a commercial solid waste.

GUIDANCE NOTE: The following are examples of commercial solid wastes that can be recycled:

- office paper products
  - white paper
  - colored paper
  - envelopes
  - catalogs
  - binders
  - folders
  - brochures
  - flyers
  - magazines
  - books]
  - phone books
  - newsprint
  - junk mail
- scrap wood and pallets
- cardboard
- transparencies
- batteries
- light bulbs
- toner cartridges
- circuit boards
- computer manuals
- non-hazardous scrap metal
- aluminum cans
- various plastic materials
- non-hazardous oils and lubricants.

GUIDANCE NOTE: Descriptions of the recycle requirements and the material forms that are acceptable for recycling may be found by clicking on the recycling logo on the LANL home page.

The above referenced website shall be consulted to determine the disposition of the materials.

8.0 Construction and Demolition (C&D) Debris Waste Requirements

- C&D debris ***shall not*** include asbestos; roofing materials (other than asphalt roofing materials); liquids such as waste paints, solvents, sealers; adhesives; or potentially hazardous materials.
- C&D debris waste generators hauling waste in government-plated vehicles or associated with LANL D&D activities shall:
  - Segregate dirt, asphalt, concrete, metal, brush, and other recyclable materials from construction debris stream.
  - Recycle, reuse, or resell recyclable materials either at the construction site or within the Laboratory recycling program.
  - ***Not*** mix C&D debris with other types of solid waste.
  - Have C&D debris destined for the Los Alamos County landfill inspected at the Material Recycling Facility (MRF), TA 60, Bldg. 85 to assure compliance with these requirements unless exempted by contract.

  GUIDANCE NOTE: Additional information on the MRF waste inspection program may be found by clicking on the recycling logo on left side near the bottom of the LANL home page.

  - Arrange pick-up of non-recyclable debris with a solid waste commercial hauler for disposal at the LAC landfill or other C&D landfill.
- Major demolition/construction subcontractors shall include C&D debris recycling specifications in the construction/demolition contract to the maximum extent possible.
- C&D debris mixed with other types of waste shall lose its classification as C&D debris.

9.0 New Mexico Special Waste Requirements

9.1 NM Special Waste Generators

Generators of New Mexico (NM) Special Waste shall:

- Document NM Special Waste characterization through acceptable knowledge or analytical results.
- Clearly mark containers holding NM Special Waste with the contents, the starting accumulation date, and the words "New Mexico Special Waste

Example: Petroleum Contaminated Soil
New Mexico Special Waste
11/17/97

GUIDANCE NOTE: Asbestos and infectious wastes have specific marking/labeling requirements, which are described in the LANL WAC.

- Store NM Special Waste in a storage area that is registered with RRES-SWRC and identified by a prominently posted sign.

GUIDANCE NOTE: RRES-SWRC or a WMC should be contacted for NM Special Waste storage area signs.

- Store NM Special Waste (other than asbestos) for a maximum of 90 days. RRES-SWRC shall be contacted if there is a possibility of exceeding this deadline.
- *Not* dispose of NM Special Waste in the solid waste dumpsters located throughout the Laboratory.

9.2 RRES-SWRC

RRES-SWRC shall register NM Special Waste storage areas and shall serve as the point-of-contact for NM Special Waste issues.

9.3 FWO-SWO

FWO-SWO shall dispose of the NM Special Waste that it manages at a NM Special Waste landfill (or the equivalent for out-of-state disposal).

9.4 Treated Formerly Characteristic Hazardous Waste

GUIDANCE NOTE: An example of treated formerly characteristic hazardous (TFCH) waste is waste from generator treatment and treatability studies.

- TFCH waste generators shall:
  - Contact RRES-SWRC for generator treatment requirements prior to conducting generator treatment or a generator treatability study.
  - Identify underlying hazardous constituents of TFCH waste.

GUIDANCE NOTE: Refer to the Land Disposal Restriction form on the WMC forms web page for more details. The WMC web page can be accessed through the FWO-SWO web page.

9.5 Asbestos Waste

The Laboratory shall manage friable and nonfriable asbestos as New Mexico Special Waste.

9.5.1 Asbestos Waste Generators

Asbestos waste generators shall:

- Contact RRES-MAQ and the WMC prior to conducting asbestos abatement work.
- Coordinate with RRES-MAQ to track asbestos waste from generation to disposal
- Submit a WPF and CWDR to FWO-SWO, even if the waste will be shipped directly off-site instead of through the FMU-64 asbestos transfer station.
- Analyze potential asbestos containing material (ACM), to determine the asbestos content, at a laboratory that is a successful participant in the National Voluntary Laboratory Accreditation Program of the National Institute of Standards and Technology asbestos laboratory program.
- Package, label, and store asbestos waste in accordance with the LANL Waste Acceptance Criteria (LANL WAC) PLAN-WASTEMGMT-002.
- Coordinate with FWO-SWO or NM Special Waste shipper to ensure that asbestos waste is disposed of off-site within 90 days of generation.

9.5.2 Asbestos Waste Transporters

Asbestos waste transporters shall:

- Transport containerized asbestos waste in Laboratory vehicles with an enclosed carrying compartment.
- Keep surfaces of vehicles and other asbestos handling equipment and facilities free from the accumulation of dusts and waste containing asbestos.

- Inspect vacuum trucks containing asbestos liquid waste to ensure that liquid is not leaking from the truck. Vehicles equipped with a compactor ***shall not*** be used to transport asbestos waste.

9.5.3 RRES-MAQ

The Meteorology and Air Quality Group (RRES-MAQ) shall

- Track asbestos waste from removal to final disposal.
- Serve as the point-of-contact for State and Federal regulations governing visible airborne asbestos, asbestos emissions, and asbestos reporting requirements.

9.5.4 FWO-SWO

FWO-SWO shall ship off-site within 90 days of generation the asbestos waste it manages at the Material Recycling Facility (MRF) at TA-60.

9.6 Sludge

GUIDANCE NOTE: Sludge is mainly generated at the SWSC plant, but also could come from septic tanks and other sources. Grit and screenings from the SWSC plant and sediment from cooling towers are not considered sludge and are regulated as solid waste if they pass the paint filter test (i.e., contain no free liquids) and are not hazardous or TSCA-regulated waste.

Sediments from cooling towers shall not be dewatered by discharging liquid into the soil.

9.7 Spill of a Chemical Substance or Commercial Product

This waste category shall include only those spilled chemical substances or commercial products that have the potential to be environmentally threatening, and therefore require special handling, transportation, or disposal. Spills of benign chemical substances or commercial products shall **not** fall into this regulated waste category. RRES-SWRC shall be contacted for assistance in determining what is environmentally threatening.

Laboratory employees ***shall not*** discharge spilled chemical substances or commercial products that require special administrative controls due to human health or environmental concerns:

- To the Laboratory's sanitary sewer system,
- To the LAC landfill by placing them in a solid waste dumpster, or
- To an on-site surface impoundment.

9.8 Dry Chemicals that Become Character-istically Hazardous When Wet

Generators of this NM Special Waste shall:

- Manage dry chemicals that have become wet and, therefore, characteristically hazardous as a RCRA hazardous waste (refer to LIR 404-00-03).
- *Not* dispose of dry chemicals that become characteristically hazardous when wet in a solid waste dumpster that will be disposed of at the LAC Landfill.

9.9 Petroleum Contamin-ated Soils

Generators of petroleum contaminated soil (PCS) shall

- Manage newly generated PCS that is excavated and removed from the site for subsequent storage, treatment, and/or disposal as NM Special Waste.
- Ensure immediate clean up of current spills and releases of petroleum substances to the soil .
- Determine if PCS meets the analytical requirements of 20 NMAC 9.1.704. NOTE: These requirements are available on the RRES-SWRC web page under "Solid Waste."
- Retain copies of analytical data on specific spills or releases of petroleum substances to the soil.
- Coordinate documentation of proposed PCS remediation with RRES-SWRC, if PCS will be landfarmed.

- *Not* dispose of any remediated PCS as solid waste if it contains greater than the following constituent concentrations:
  - Sum of benzene, toluene, ethylbenzene, and xylene isomers at 500 mg/kg
  - Benzene at 10 mg/kg
  - Total petroleum hydrocarbon concentration at 1000 mg/kg

9.10 Infectious Waste

GUIDANCE NOTE: Rodent carcasses, nesting materials and droppings found during pest control operations are not considered infectious waste by the NMED. However, rodent carcasses trapped for counting operations or laboratory rodents used in experiments at the Laboratory are considered infectious waste and should be managed as such.

9.10.1 Infectious Waste Generators

Regulatory requirements that shall be implemented for packaging, labeling, and marking infectious waste are contained in the LANL WAC, Chapter 13

Every person who generates, transports, stores, treats, or disposes of infectious and regulated medical waste *as a part of normal operations* shall prepare a management plan for the waste identifying:

- The type of waste generated or handled
- The segregation, packaging, labeling, collection, storage, and transportation procedures to be implemented
- The treatment or disposal methods to be used
- The transporter and disposal facility to be used
- The person responsible for managing the infectious waste

Generators that store infectious and regulated medical waste shall:

- Segregate containers of infectious and regulated medical waste from other types of waste containers (such as hazardous waste, radioactive waste, or other solid waste) using separate secondary containment.
- Provide containment for infectious and regulated medical waste in a manner and location that:
  - o Affords protection from animal intrusion
  - o Does not provide a breeding place or a food source for insects and rodents
  - o Minimizes exposure to the public
- Store and contain infectious waste in areas that:

- Protect infectious and regulated medical waste from the weather (i.e., the sun, precipitation, wind, etc.)
- Are ventilated to the outdoors
- Are only accessible to authorized personnel

- Keep infectious and regulated medical waste in a nonputrescent state by refrigeration or freezing, if necessary to avoid decay.
- Label refrigerators and freezers used for storage of infectious wastes with the word "BIOHAZARD" and the universal biohazard symbol.
- Mark storage areas with prominent warning signs on or adjacent to the exterior doors or gates.
- Provide warning signs, with the word "BIOHAZARD" and the universal biohazard symbol, that are easily read from a distance of 25 feet.
- Provide signs with a background that is orange or orange-red. In addition, signs shall state:
  - The name of infectious agents, if known, stored in the area
  - The type of biohazard presumed to be present in waste stored in the area,
  - Special requirements for entering the storage area
  - The name and telephone number of the person responsible for the waste stored in the area
- Contact RRES-SWRC if rigid outside containers that have held infectious waste are going to be reused.

9.10.2 Generators Who Disinfect Waste

GUIDANCE NOTE: Chemical disinfection is not allowed by the requirements contained in 20 NMAC 9.1 for treatment of infectious waste without prior approval by the NMED Secretary. Contact RRES-SWRC to submit chemical disinfection methods for approval.

- Chemical disinfection shall be an acceptable practice for disinfection of other contaminated, noninfectious waste. (See LIR 402-530-00, "Biological Safety" or contact HSR-5 for these requirements.)
- Organizations that disinfect infectious waste shall have an infectious waste management plan containing
  - Waste collection and storage procedures,
  - Transportation procedures to be implemented,
  - Treatment or disposal methods to be used,
  - Transporter and disposal facility to be used, and

  - o The person responsible for management of the infectious and regulated medical waste.
- Personnel responsible for disinfecting infectious and regulated medical waste shall be trained with respect to the contents of the infectious waste management plan.
- Generators shall follow a written schedule of cleaning and decontamination of equipment in accordance with the Laboratory's Bloodborne Pathogen Program described in LIR 402-530-00, "Biological Safety."
- Generators shall implement the following requirements for on-site steam sterilization:
  - o The unit shall only sterilize waste generated at the Laboratory.
  - o The unit shall have a design capacity of 200 pounds per hour or less.
  - o Documentation shall be kept on file certifying that the operator of the steam sterilizer understands the written operating procedure for each individual unit used (e.g., time, temperature, pressure, type of waste, type of container, closure of the container, pattern of loading, water content, and maximum load quantity).
  - o The unit shall be operated and the records and logs shall be maintained as required by the 20 NMAC 9.1.706 and LIR 402-530-00, "Biological Safety."
  - o Units with a design capacity of 10 pounds per hour or greater shall be certified and registered with NMED. The user of steam sterilizers that exceed this design capacity shall fill out the Registration Form for Steam Sterilizers. Contact RRES-SWRC for assistance with steam sterilization requirements and submission of the registration form to NMED.
- The operator of the treatment process who has sterilized infectious and regulated medical waste in an autoclave or disinfected it in a manner approved by the NMED shall
  - o Certify in writing that the solid waste remaining after treatment has been rendered noninfectious.
  - o Arrange disposal with the LAC landfill before transporting the disinfected waste to the landfill.
  - o **Not** compact, grind, or use similar devices to reduce the volume of infectious and regulated medical waste until it is rendered noninfectious.

9.10.3 Occupational Medicine (HSR-2)

HSR-2 shall:

- Manage and store infectious and regulated medical waste, bloods and body fluids (B/BF), and clean-up materials in quantities of less than or equal to 5 kilograms.

- Accept small quantities of infectious waste from any Laboratory generator who double-bags the waste and transports it to HSR-2 within three hours of generation.

9.10.4 Industrial Hygiene and Safety (HSR-5)

HSR-5 shall:

- Assist with the Bloodborne Pathogens Exposure Control Plan and associated Occupational Safety and Health Administration (OSHA) regulations.
- In conjunction with RRES-SWRC, assist with chemical disinfection requirements for infectious waste.
- In conjunction with RRES-SWRC, assist with steam sterilizer requirements.
- In conjunction with RRES-SWRC, assist with information on managing spills and releases of B/BF.

9.10.5 Emergency Management and Response (S-8)

S-8 shall:

- Serve as the point-of-contact in the event of a spill or release of infectious waste, and B/BF.
- Contact the Support Services Contractor to respond and clean up spills and releases of infectious waste and B/BF.

9.10.6 Solid Waste Regulatory Compliance (RRES-SWRC)

RRES-SWRC shall assist with the registration of steam sterilizers in conjunction with the Industrial Hygiene and Safety Group.

9.10.7 Solid Waste Operations (FWO-SWO)

FWO-SWO shall not store infectious and regulated medical waste at TA-54, because the Laboratory has a contract that provides turnkey services for this type of waste.

10.0 Administratively Controlled Waste Requirements

GUIDANCE NOTE: Examples of administratively controlled wastes include chemical reagents or reactants that are not hazardous waste, solvents that are not hazardous waste, empty gas cylinders or containers not fit for ~~recycling, and any wastes that require Department of Transportation~~ special handling.

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10.1 Administratively Controlled Waste Generators

Administratively controlled waste generators shall

- Refer to LIR 404-00-02, General Waste Management Requirements, for disposal.
- *Not* place these wastes in a solid waste dumpster.

10.2 FWO-SWO

FWO-SWO shall dispose of administratively controlled waste that it manages at approved facilities and ***shall not*** dispose of it at the LAC landfill or at other nonspecial waste landfills.

11.0 Classified Solid Waste Requirements

11.1 Classified Waste Generators

Laboratory personnel shall sanitize classified waste in accordance with waste-specific Laboratory requirements approved by the Department of Energy.

11.2 FWO-SWO

FWO-SWO ***shall not*** dispose of classified solid waste that it manages at an off-site solid waste landfill before the waste is sanitized.

12.0 Pharmaceutical and Controlled Substance Waste Requirements

Generators of unused and expired pharmaceuticals shall implement the New Mexico Board of Pharmacy requirements for disposal, as authorized by the New Mexico Pharmacy Act, New Mexico Statutes Annotated 61-11-1 to –28. Generators of unused and expired controlled substances shall implement the disposal requirements of the New Mexico Controlled Substances Act, New Mexico Statutes Annotated 30-31-1 to -42.

13.0. Documentation

GUIDANCE NOTE: Many solid waste records are described in LIR 404-00-02. This section describes records that are unique to commercial solid waste or New Mexico Special Waste.

13.1 Solid Waste Generators

Commercial solid waste disposed of in a solid waste dumpster shall require no documentation.

13.2 C&D Debris Waste Generators

Generators of concrete and asphalt debris that is recycled shall complete acceptable knowledge documentation.

13.3 NM Special Waste Generators

NM Special Waste generators shall complete a WPF for NM Special Waste. A CWDR shall be completed to document the NM Special Waste disposal.

13.4 Infectious Waste Generators

Infectious waste generators with an infectious waste management plan shall maintain that plan indefinitely. Infectious waste generators that disinfect waste shall maintain the sterilization records and waste certifications indefinitely.

13.5 Pharmaceutical and Controlled Substance Waste Generators

Generators of pharmaceutical and controlled-substance wastes shall maintain the records required by the New Mexico Board of Pharmacy and the Controlled Substance Act.

14.0. References

14.1 Document Ownership

The Office of Institutional Coordination for this document shall be the WMPPC. (wmppc@lanl.gov).

14.2 Referrals

Meteorology and Air Quality Group (RRES-MAQ), 5-8855

Biosafety Committee, 7-8229

Dynamic Experimentation (DX) Division, 7-5653

Emergency Management and Response (EM&R), S-8, 7-6211

Engineering Sciences and Applications (ESA) Division, 7-4136

Environmental Restoration Group (RRES-ER), 7-4109

ES&H Training Group (HSR-13), 5-5605

Fire Protection Group (FWO-FIRE), 7-9045

Gas Processing Facility (BUS-4), 7-4406

Hazardous Materials Transfer Approvals (BUS-4), 7-4127

Integrated Risk Analysis, Management, and Communication Group (HSR-3), 7-8348

Health Physics Operations Group (HSR-1), 7-7171

Industrial Hygiene and Safety Group (HSR-5), 7-5231

Johnson Controls Northern New Mexico, Redistribution and Marketing, 7-2109

Material Management Group (BUS-4), 7-4127

Office of Legal Counsel, General Law, 7-3766

Operational Safety Section of the Industrial Hygiene and Safety Group (HSR-5), 7-4644

Pollution Prevent Group (RRES-PP), 7-4348

Recycling Program (RRES-PP), 7-4348

Solid Waste Operations (FWO-SWO), 5-6158

Solid Waste Regulatory Compliance (RRES-SWRC), 7-0666

SPCC Plan (RRES-WQH), 5-4752

Water Quality and Hydrology Group (RRES-WQH), 5-0453

14.3 Documents

New Mexico Hazardous Waste Act, New Mexico Statutes Annotated 74-4-1 to 74-4-13.

New Mexico Solid Waste Act, New Mexico Statutes Annotated 74-9-1 to 74-9-42.

New Mexico Administrative Code (20 NMAC 2.78) as amended

New Mexico Administrative Code (20 NMAC 4.1) as amended

New Mexico Administrative Code (20 NMAC 9.1) as amended

42 U.S.C. Sec. 6901 et.seq., Resource Conservation and Recovery Act, as amended

EPA SW-846, "Test Methods for Evaluating Solid Waste, Chemical/Physical Methods."

29 CFR Section 1910.1030, "Bloodborne Pathogens."

40 CFR 61 Subpart M, "National Emission Standards for Asbestos"

40 CFR 261, "Identification and Listing of Hazardous Waste"

40 CFR 261.24, "Toxicity Characteristic"

40 CFR 268, "Land Disposal Restrictions"

40 CFR 503, "Standards for the Use or Disposal of Sewage Sludge"

40 CFR Section 761, "Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce and Use Prohibitions"

40 CFR Section 763, "Asbestos"

42 CFR Section 72, "Interstate Shipment of Etiological Agents"

49 CFR Section 171-178, Department of Transportation Regulations for the Transportation of Infectious Substances and Regulated Medical Waste

20 NMAC 9.1, Section 105.BZ, "Special Wastes"

20 NMAC 9.1, Section 107, "Prohibited Acts"

20 NMAC 9.1, Subpart VII, "Special Waste Requirements"

"Biological Safety," Los Alamos National Laboratory LIR 402-530-00

"General Waste Management Requirements," Los Alamos National Laboratory Implementation Requirement, LIR 404-00-02.

"Hazardous and Mixed Waste Requirements," Los Alamos National Laboratory Implementation Requirement, LIR 404-00-03.

"Los Alamos National Laboratory, Incident Reporting Process," Los Alamos

National Laboratory Implementation Requirement LIR 201-00.04.

"Los Alamos National Laboratory Waste Acceptance Criteria," Los Alamos National Laboratory, PLAN-WASTEMGMT-002.

"Managing Polychlorinated Biphenyls," Los Alamos National Laboratory Implementation Requirement, LIR 404-00-06.

"Managing Radioactive Waste," Los Alamos National Laboratory Implementation Requirement, LIR 404-00-05.

"Waste Profile Form Guidance," Los Alamos National Laboratory Implementation Guidance, LIG 404-00.03.

"Chemical Waste Disposal Request Guidance," Los Alamos National Laboratory Implementation Guidance, LIG 404-00-04

"RCRA Land Disposal Restrictions: A Guide to Compliance," *ISBN 0-444-10022-9*, Elsevier Science Inc., New York, New York.

Managing Radioactive Waste

Los Alamos National Laboratory
Laboratory Implementation Requirement LIR 404-00-05.3
Issue Date: January 5, 1999 (Revised Date: September 13, 2004)

Mandatory Document

1.0 Introduction

Lessons Learned

NOTE: Click here for Lessons Learned *that may apply* to the requirements contained in this LIR.

1.1 Overview

Not a standalone document, this Laboratory Implementation Requirement (LIR) is part of a series of waste management documents. This document only contains requirements that are unique to radioactive waste. Radioactive waste is regulated under DOE Order 435.1, *Radioactive Waste Management*. The primary waste management document that contains the general non-waste-specific requirements that apply to all waste types is LIR 404-00-02, "General Waste Management Requirements."

This LIR states the implementation requirements that support LPR 404-00-00, "Environmental Protection."

This document supercedes the requirements contained in Notice 92.

1.2 In this Document

2.0 Purpose

This document specifies the requirements that shall be implemented for managing radioactive waste; that is, low-level waste (LLW), transuranic (TRU) waste, radioactive liquid waste (RLW), and the radioactive components of mixed waste.

3.0 Scope & Applicability

This document addresses the institutional requirements for managing radioactive waste. The requirements of this LIR shall apply to individual waste generators, their safety and environment responsible line management chain, and all organizations that handle, treat, store, dispose of, or transport radioactive waste.

Radioactive waste produced as the result of accelerator operations shall be managed as LLW.

4.0 Precautions & Limitations

GUIDANCE NOTE: See LIR 404-00-03, "Hazardous and Mixed Waste Requirements," for requirements related to the hazardous constituents of mixed waste.

Radioactive waste that contains hazardous waste is also regulated under the Resource Conservation and Recovery Act (RCRA) and by the New Mexico Hazardous Waste Act; therefore, adherence to these federal and state requirements shall be mandatory for waste operations at the Laboratory.

Radioactive waste that contains a substance regulated under the Toxic Substances Control Act (TSCA) shall also be managed in accordance with federal regulations governing the waste.

Waste leaving a radiological control area shall be characterized as radioactive or meet the release criteria of LIR 402-704-01, "Contamination Control."

GUIDANCE NOTE: This document does not contain requirements for managing high level waste as defined by the Department of Energy (DOE)

Consistent with the ISM Description Document (LAUR-98-2837) Section 5.3.2, this LIR includes those requirements in DOE Order 435.1, *Radioactive Waste Management*, that require a consistent implementation by all elements of the Laboratory to which those requirements apply.

GUIDANCE NOTE: The users of this LIR should be aware that DOE O 435.1 includes other requirements, such as design requirements for storage facilities for radioactive waste, in addition to those listed in this LIR.

5.0 Acronyms

CWDR	Chemical Waste Disposal Request
HLW	high-level waste
LLW	low-level waste
MLLW	mixed low-level waste
RCRA	Resource Conservation and Recovery Act
RLW	radioactive liquid waste
RLWTF	Radioactive Liquid Waste Treatment Facility
RWMB	radioactive waste management basis
TRAMPAC	TRUPACT-II Authorized Methods for Payload Control
TRU	transuranic
TSDF	treatment, storage, and disposal facility
TWID	TRU Waste Interface Document
TWSR	Transuranic Waste Storage Record
WAC	waste acceptance criteria
WIPP	Waste Isolation Pilot Plant
WPF	Waste Profile Form
WSS	Work Smart Standards

6.0 Definitions

High-level waste (HLW) – the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation {DOE O 435.1}.

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Low-level waste (LLW) – radioactive waste that is not high-level waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in Section 11e.(2) of the *Atomic Energy Act of 1954*, as amended), or naturally occurring radioactive material {DOE O 435.1}.

Mixed waste – Any waste containing hazardous waste and source, special nuclear, or by-product materials subject to the Atomic Energy Act of 1954. The use of the generic term "mixed waste" shall refer to both mixed LLW waste and mixed TRU waste.

Radioactive Waste Management Basis – Identifies physical and administrative controls for radioactive waste facilities, operations, and activities to ensure the protection of workers, the public, and the environment. The RWMB shall reference or define the conditions under which the facility may operate.

Staging – The accumulation of LLW to facilitate transportation, treatment, and/or disposal. Staging begins immediately after the waste has been determined to meet the requirements set forth in the LANL Waste Acceptance Criteria (WAC). Staging shall not exceed 90 days.

Storage – For the purpose of this document, the holding of radioactive waste for a temporary period, at the end of which the waste is treated, disposed of, or stored elsewhere {DOE O 435.1}. Storage shall not exceed one year.

Transuranic (TRU) waste – radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for: (1) high-level radioactive waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61 {DOE O 435.1}.

7.0 Implementation Requirements

7.1 Division Leader, Program Director, Program Manager

The safety and environmentally responsible line management chain shall ensure the implementation of the responsibilities and requirements for managing radioactive waste in accordance with LIR 404-00-02, "General Waste Management Requirements.

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7.2 Waste Generator

7.2.1 General Requirements

The waste generator's responsibilities and requirements for managing radioactive waste shall be implemented in accordance with the requirements contained in LIR 404-00-02, "General Waste Management Requirements."

7.2.2 Waste Generation Planning

- Prior to generating radioactive waste, planning shall be performed to address the entire life cycle of the waste stream. Guidance on life-cycle planning can be found in DOE G 435.1, Chapter 1.
- Waste without an identified disposal path shall meet the requirements of LIR 404-00-02, "General Waste Management Requirements," prior to generation.

7.2.3 Waste Minimization

Individual waste generators and waste-generating organizations shall minimize the volume of routine radioactive waste generated. At a minimum, the following methods shall be used to minimize waste:

- Controlling the movement of materials into and through radiological control areas.
- Reducing, reusing, or recycling radioactive and mixed waste at the source whenever technically and economically feasible.
- Decontaminating radioactive material, where appropriate.
- Segregating waste at the point of generation (for example, radioactive, non-radioactive and hazardous wastes shall not be commingled). The following segregation techniques should be considered as part of a waste minimization program
- Segregating LLW as either *compactible* or *noncompactible.*
- Segregating beryllium, polychlorinated biphenyls (PCBs), asbestos, and infectious materials from radioactive wastes.

7.2.4 Radioactive Waste Management Basis

Radioactive waste generators shall have a radioactive waste management basis (RWMB) that is consistent with Appendix A.

7.2.5 Marking and Labeling Radioactive Waste

Packages of radioactive waste shall be marked such that their contents can be identified.

Packages of radioactive waste in staging shall also be labeled and marked as "Radioactive" as required by the following documents:

- PLAN-WASTEMGMT-002, "LANL Waste Acceptance Criteria," Solid Waste ~~Operations.~~
- LIR 402-700-01, "Occupational Radiation Protection Requirements," Los Alamos National Laboratory.

- LIR 404-00-03, "Hazardous and Mixed Waste Requirements for Generators," Los Alamos National Laboratory. (The requirements of this document shall be applicable if the waste contains hazardous constituents).

7.2.6 Characterization

In addition to the characterization requirements contained in LIR 404-00-02, "General Waste Management Requirements," radioactive waste generators shall provide the following characterization data to the receiving facility:

- Physical and chemical characteristics
- Volume, including the waste and any stabilization or absorbent material
- The identities, activities, and concentrations of radionuclides
- Weight of the container and contents
- Characterization date
- Generating source
- Packaging date
- Any additional data specified in the receiving facility's acceptance requirements

GUIDANCE NOTE: The Waste Profile Form (WPF) and Chemical Waste Disposal Request (CWDR) or Transuranic Waste Storage Record (TWSR) contain the characterization requirements listed above.

If not using acceptable knowledge, the data quality objectives process (EPA, 2000. Guidance for the Data Quality Objectives Process, EPA QA/G-4, EPA/600/R-96/055, U.S. Environmental Protection Agency, Washington, D.C., August 2000.), shall be used for identifying characterization parameters and acceptable uncertainty in characterization data.

Waste characterization data, container information, and generation, storage, and transportation information shall be transferred with or be traceable to the waste.

7.2.7 Packaging

Radioactive waste shall be packaged to ensure containment and protection for the duration of the anticipated staging/storage period and until disposal is achieved or until the waste is removed from the container.

Details on specific packaging requirements shall be provided in the receiving facility-specific waste acceptance requirements.

7.2.8 Transportation Requirements

Wastes shall be transported pursuant to the requirements contained in LIR 404-00-02, "General Waste Management Requirements."

The requirements contained in LIR 405-10-01, "Packaging and Transportation," shall be implemented for the specific packaging, labeling, shipping and transportation documentation requirements that are additional to those listed in the receiving facility's acceptance requirements.

Waste generators shall not cause radioactive waste to be transported to a receiving facility without prior approval from the receiving facility. Before transportation to a treatment, storage, and disposal facility (TSDF), shipments of radioactive waste shall have approved documentation as described in LIR 404-00-02, "General Waste Management Requirements."

Shipments of radioactive waste shall be scheduled in accordance with the receiving facility's waste acceptance criteria.

7.2.9 Specific Requirements for LLW and MLLW

7.2.9.1 Solid LLW

LLW generated at the Laboratory shall be disposed of at TA-54, Area G.

Organizations that wish to dispose of LLW at a facility other than TA-54, Area G shall follow the instruction in Section 7.2.9.4 of this LIR.

7.2.9.2 Documentation

A WPF (see LIG 404-00-03, "Instructions for Completing the Waste Profile Form") and a CWDR shall be completed for LLW and MLLW to be disposed of or stored at TA-54.

A WPF shall be completed for liquid waste destined for the Radioactive Liquid Waste Treatment Facility (RLWTF).

CWDRs are **not** required for liquid LLW transferred to the RLWTF through the **radioactive liquid waste collection system.**

A CWDR (in addition to the WPF) shall be completed for liquid LLW transported to the RLWTF by highway.

7.2.9.3 Staging and Storage at Generator Sites

The staging of LLW for the purpose of accumulating quantities of waste to facilitate transportation, treatment, and disposal shall not exceed 90 days.

If the LLW is not transferred to a treatment or disposal facility within 90 days, it shall be stored in accordance with the requirements of Section 7.3 of this document.

LLW that has an identified path to disposal shall not be stored longer than one year prior to disposal.

Radioactive waste being held prior to staging/storage must be labeled and managed in accordance with LIR 402-700-01, "Occupational Radiation Protection Requirements."

In addition to meeting the above requirements, MLLW must be stored in accordance with LIR 404-00-03, "Hazardous and Mixed Waste Requirements."

7.2.9.4 Requesting Off-site Disposal of LLW

Organizations that wish to dispose of LLW at a facility other than TA-54, Area G shall prepare a variance form (Form 1661a) in accordance with LIR 301-00-02, "Variances and Exceptions to Laboratory Operations Requirements." The variance request shall:

- Include the name of the facility to be used
- Document that this alternative is cost-effect and in the best interest of DOE.
- Consider of the life-cycle cost, the potential liability to DOE, and the protection of public health and the environment.

The requester shall also provide detailed characterization of the LLW for which the variance is requested.

The requester shall submit that request to the Group Leader of Facility & Waste Operations - Solid Waste Operations (FWO-SWO) at Mail Stop J595.

The FWO-SWO Group Leader shall:

- Evaluate the variance request for completeness and accuracy.
- Review the waste characterization data provided to ensure that the waste is characterized and certified to meet the identified facility's waste acceptance criteria.
- Forward the documentation provide by the requester, any supporting information developed as part of the review process, and the variance request, along with the FWO-SWO Group Leader's recommendation, to the FWO Division Leader for approval or disapproval.
- Submit a formal request to Los Alamos Site Office (LASO) of NNSA, as described in DOE M 435.1, to dispose of LLW at non-DOE disposal facilities, for variances approved by the FWO Division Leader.

The facility to be used shall be evaluated by the SWO Group Leader to determine that it has the required permit(s), license(s) and approvals for the specific LLW and that it complies with applicable Federal, state and local requirements. The acceptability of a facility shall be determined based on an audit of the facility conducted within the last year by the DOE, UC, or other acceptable agency as determined by the FWO-SWO Group Leader. The Host State and State Compacts where non-DOE facilities are located shall be consulted by the FWO-SWO Group Leader.

GUIDANCE NOTE: Prior to approval LASO will notify DOE Headquarters and consult with the Office of the Assistant Secretary for Environmental, Safety and Health (EH-1). Requesters should factor in this approval when determining when the original variance request should be submitted to support the disposal schedule.

7.2.10 Specific Requirements for TRU and Mixed TRU Waste

7.2.10.1 General

Transuranic waste shall be identified as defense or non-defense waste based on funding source.

TRU waste generated at the Laboratory and destined for the Waste Isolation Pilot Plant (WIPP) shall be characterized by the Transuranic Waste Characterization (RRES-CH) and certified by the Transuranic Waste Certification (RRES-CE) group at the Laboratory.

GUIDANCE NOTE: RRES is responsible for characterizing and certifying TRU and mixed TRU waste in accordance with the WIPP WAC. See Appendix B for information on the WIPP TRU waste certification program.

A WPF and a TWSR (see LIG 404-00-01, "Waste Generator Instructions for Completing a Transuranic Waste Storage Record") shall be completed for TRU and mixed TRU waste to be stored at TA-54.

7.2.10.2 Storage

TRU waste shall be stored in accordance with the requirements of Section 7.3 of this document.

7.3 Waste Storage Area Operators

7.3.1 General

Waste Storage Area Operators shall:

- Develop a RWMB (See Appendix A).
- Submit the waste acceptance requirements to DOE for approval.
- Evaluate waste received for acceptance.
- Implement a process for inspecting and maintaining containers.
- Store waste in a manner and location that protects the integrity of the waste for the time of storage and minimizes worker exposure.
- Establish storage areas for radioactive waste in a weather-protected area.

- Ensure the waste storage area is posted with the appropriate warning signs in accordance with the requirements contained in LIR 402-700-01, "Occupational Radiation Protection Requirements."
- NOT store LLW that has an identified path to disposal for longer than one year prior to disposal.
- Store MLLW in accordance with the requirements contained in LIR 404-00-03, "Hazardous and Mixed Waste Requirements."
- Maintain pipelines and auxiliary facilities necessary for the transfer of RLW in an operational condition.

7.3.2 Storage to Facilitate Treatment

This section addresses specific Laboratory radioactive waste management requirements that are included within the DOE/UC contract. *WSS Controlled*

Radioactive waste that is capable of detonation, explosive decomposition, reaction at anticipated pressures and temperatures, explosive reaction with water, or is pyrophoric shall not be stored longer than 1 year.

- This storage shall be solely for the purpose of the accumulation of such quantities necessary to facilitate proper treatment. Each container shall be clearly marked to identify its contents and the date each period of accumulation begins.
- The details on how this waste is stored safely shall be addressed in the RWMB.
- If the waste is also hazardous, the storage must be at a RCRA storage area.
- Storage of such waste beyond 1 year shall require the approval of the Department of Energy.
- Additionally, if the waste is also hazardous and greater 1 year since the date of generation, the waste shall be added to the LANL Site Treatment Plan and approval shall be obtained from the New Mexico Environment Department.
- The storage facility shall bear the burden of proving that such storage is solely for the purpose of accumulation to facilitate treatment.

7.3.3 Contingency Storage for RLW

For off-normal or emergency situations involving RLW storage or treatment, spare capacity shall be maintained to receive the largest volume of liquid contained in any one storage tank or treatment facility.

7.4 Waste Treatment Operators

Waste Treatment Operators shall:

- Develop a RWMB (See Appendix 1).
- Submit the waste acceptance requirements to DOE for approval.
- Evaluate waste received for acceptance.
- Have contingency storage that meets the requirements of Section 7.3.3 of this document.
- Maintain pipelines and auxiliary facilities necessary for the transfer of RLW in an operational condition.

7.5 Solid Waste Operations Group (FWO-SWO)

FWO-SWO shall:

- Receive and store MLLW and TRU waste in TA-54's storage facilities.
- Receive and dispose of solid LLW at the TA-54 disposal facility.
- Coordinate and track off-site shipments of LLW and MLLW.
- Transport MLLW within LANL boundaries.

GUIDANCE NOTE: Other organizations are not precluded from transporting MLLW within LANL boundaries.

- Review and approve documentation for LLW, MLLW, and TRU waste before shipment.
- Approve and schedule LLW, MLLW, and TRU waste shipments to TA-54.
- Coordinate and track off-site TRU waste shipments, excluding shipments destined for WIPP.

7.6 Waste Management Coordinator

The Waste Management Coordinator's responsibilities for managing radioactive waste shall be implemented in accordance with the requirements contained in LIR 404-00-02, "General Waste Management Requirements."

7.7 Radioactive Liquid Waste Group (FWO-WFM)

FWO-WFM shall:

- Receive and process radioactive liquid waste.
- Maintain the pipelines used for transferring liquid waste to TA-50 as required by LIR 404-00-02, "General Waste Management Requirements."
- Transport radioactive liquid waste from the generators' sites to TA-50.

7.8 Transuranic Waste Certification (RRES-CE)

RRES-CE shall:

- Manage the WIPP waste certification program for the Laboratory.
- Certify TRU waste for shipment to WIPP.
- Review and approve certification documentation of TRU waste destined for WIPP.
- Process certification data before TRU waste shipments are released to WIPP.

7.9 Transuranic Waste Certification (RRES-CH)

RRES-CH shall:

- Characterize TRU waste for shipment to WIPP
- Review and approve Characterization documentation of TRU waste destined for WIPP.
- Process TRU waste characterization data before submitting to RRES-CE

7.10 Waste and Decon Services (RRES-WDS)

RRES-WDS shall:

- Support waste characterization activities of TRU waste for shipment to WIPP.
- Receive, process, and transport TRU waste for WIPP characterization.
- Load and ship TRU waste to WIPP.
- Coordinate and track off-site TRU waste shipments to WIPP.

8.0 Records

The requirements contained in LIR 404-00-02, "General Waste Management Requirements," shall be implemented for general waste record keeping and documentation requirements that apply to all waste types.

Original WPFs, CWDRs, and TWSRs shall be forwarded to FWO-SWO for approval.

Original WPFs, CWDRs, and TWSRs shall be maintained as permanent records by FWO.

9.0 References

9.1 Document Ownership

The Waste Management Policy and Procedure Council (WMPPC) shall be the Office of Institutional Control (OIC) for this document.

9.2 Referrals

Facility and Waste Operations - Radioactive Liquid Waste Treatment Facility (FWO-RLWTF), 7-4301

Facility and Waste Operations - Solid Waste Operations (FWO-SWO), 5-6158

WIPP Certification (RRES-CE), 7-8532

WIPP Characterization (RRES-CH), 5-0548

Waste Decon Services (RRES-WDS), 7-7800

Hazardous Materials Packaging and Transportation (SUP-5), 7-4127

Hazardous and Solid Waste (RRES-SWRC), 5-0677

9.3 References

"Acceptable Knowledge," LIG 404-00-02.

"Atomic Energy Act," Public Law 703 (1954).

"Contamination Control," LIR 402-704-01.

Department of Energy Order 460.1A, "Packaging and Transportation Safety."

Department of Energy Order 460.2, "Departmental Material Transportation and Packaging Management."

Department of Energy Order 435.1, "Radioactive Waste Management."

"General Waste Management Requirements," LIR 404-00-02.

"Hazardous and Mixed Waste Requirements," LIR 404-00-03.

"Instructions for Completing the TRU Waste Storage Record," LIG 404-00-01.

"Instructions for Completing the Waste Profile Form," LIG 404-00-03.

"LANL Waste Acceptance Criteria," PLAN-WASTEMGMT-002.

"Occupational Radiation Protection Requirements," LIR 402-700-01

"Packaging and Transportation," LIR 405-10-01.

Title 40, Code of Federal Regulations Part 264, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.*

Title 40, Code of Federal Regulations Part 270, *Administered Permit Programs: The Hazardous Waste Permit Program.*

"Transuranic Waste Certification Plan," TWCP-PLAN-0.2.4-001.

10. Appendices

Appendix A. Radioactive Waste Management Basis

Appendix B. Los Alamos WIPP-Waste Certification Plan

Appendix A

Radioactive Waste Management Basis

General

Radioactive waste facilities, operations, and activities shall have an RWMB consisting of physical and administrative controls to ensure the protection of workers, the public, and the environment. The RWMB shall reference or define the conditions under which the facility may operate. The following specific controls shall be part of the RWMB:

- Generators. The waste certification program
- Treatment Facilities. The waste acceptance requirement and the waste certification program
- Storage Facilities. The waste acceptance requirement and the waste certification program

The RWMB shall be submitted to and approved by DOE before a new operation begins.

Operations shall be curtailed or facilities shut down for failure to establish, maintain, or operate consistently with an approved RWMB.

Waste Certification Program

A waste certification program shall be developed, documented, and implemented to ensure that the waste acceptance requirements of facilities receiving radioactive waste are met. The certification program shall:

- Designate the officials who have authority to certify and release waste for shipment;
- Specify what documentation is required for waste generation, characterization, shipment, and certification
- Provide requirements for auditability, retrievability, and storage of required documentation and specify the records retention time

Radioactive waste shall be certified as meeting the waste acceptance requirements before it is transferred to the receiving facility.

Radioactive waste that has been certified shall be managed to ensure that it maintains its certification status.

Waste Acceptance Requirements

The waste acceptance requirements shall establish the facility's requirements for the receipt, evaluation, and acceptance of waste.

Waste acceptance requirements for radioactive waste storage areas and treatment facilities shall specify the following:

- Allowable activities and/or concentrations of radionuclides
- Acceptable waste form and/or container requirements to ensure the chemical and physical stability of the waste under conditions that might be encountered during transportation, storage, treatment, or disposal
- Restrictions or prohibitions on waste, materials, or containers that may adversely affect waste handlers or compromise facility or waste container performance

The basis, procedures, and levels of authority required for granting exceptions to the waste acceptance requirements shall be contained in the waste acceptance requirements.

Monitoring Program

Facilities that generate, treat, or store radioactive waste shall establish and maintain a monitoring program as part of the RWMB. In developing the monitoring program, facilities shall consider the need for monitoring of the following parameters:

- Temperature
- Pressure for closed systems
- Radioactivity in ventilation exhaust
- Radioactivity in liquid effluent stream
- Flammable and explosive mixtures of gases

If a facility stores RLW, the need for monitoring the following additional parameters shall be considered:

- Liquid level
- Waste volume
- Waste chemistry

Facility monitoring programs shall include verification that passive and active control systems have not failed.

Appendix B

Los Alamos WIPP-Waste Certification Plan

The Los Alamos National Laboratory (LANL) Transuranic-Waste Certification Plan incorporates the certification and transportation requirements of the WIPP Waste Acceptance Criteria (WAC) for both newly generated and retrievably stored waste. The transportation requirements are detailed in Section 4.0, "LANL Compliance for TRUPACT-II Authorized Methods for Payload Control (TRAMPAC)," of the TRU-Waste Certification Plan. The TRU-Waste Certification Plan is currently applicable to waste certification activities for contact-handled (CH) TRU waste only. When the Carlsbad Field Office (CBFO) develops and publishes requirements for remote-handled (RH) TRU waste and RH-TRU-related TRAMPAC, the TRU-Waste Certification Plan will be revised to reflect the incorporation of these requirements.

The TRU-Waste Certification Plan establishes the programmatic framework and criteria within which waste generators must operate to ensure their wastes can be certified as meeting the requirements of the WIPP WAC. The Plan includes the following sections:

- Section 2.0 – Certification Program Organization
- Section 3.0 – LANL Compliance for WIPP WAC
- Section 4.0 – LANL Compliance for TRAMPAC
- Section 5.0 – Quality Assurance Program Plan
- Section 6.0 – Preparation of TRU-Waste Interface Documents

Section 6.0 is most important to TRU waste generators, as it describes the requirements for Laboratory waste-generator-specific plans and procedures to demonstrate compliance with the TRU-Waste Certification Plan. The generator is required to prepare TRU Waste Interface Documents (TWIDs). These TWIDs serve to document the process by which waste stream analytical data and other acceptable knowledge is evaluated to ensure each waste stream is characterized, packaged, and certified in compliance with the WIPP WAC. If the requirements for sampling, characterization, and packaging are met, the waste will ultimately be certified and transported to WIPP.

Once a TWID has been prepared, it is subject to a Laboratory assessment regarding other the document meets the requirements in the TRU-Waste Certification Plan. The assessment consists of a review by certification program personnel (in the form of an audit) of all facility-specific, certification-related documents referenced in the TWID.

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 87502-6110
Telephone (505) 827-2918
Fax (505) 827-2965

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

December 2, 2005

Edwin Wilmott, Manager
Office of Los Alamos Site Operations
National Nuclear Security Administration
U.S. Department of Energy
528 35th Street
Los Alamos, New Mexico 87544

Robert W. Kuckuck
University of California
P.O. Box 1663
Mail Stop A100
Los Alamos, NM 87545

RE: Request for Additional Information, DP-1132, Los Alamos National Laboratory

Dear Mr. Wilmott and Mr. Kuckuck:

The New Mexico Environment Department (NMED) has reviewed Los Alamos National Laboratory (LANL) Discharge Permit application (DP-1132) dated August 16, 1996. NMED requests the following additional information, pursuant to Section 20.6.2.3109 NMAC, to evaluate the Discharge Permit application:

1. All information, including any reports and all analytical data, from studies that have evaluated impacts on soils, surface water and ground water from operations and discharge at and from TA-50.

2. Please submit the following reports:

    a. All audit reports about TA-50 operations and discharges;
    b. All Department of Energy Inspector General reports about TA-50; and
    c. Emility, L.A., *A History of Radioactive Liquid Waste Management at Los Alamos*, LA-UR-96-1283.

3. Please specify and describe the treatment process at TA-53 for evaporate distillate and RO permeate that does not meet the criteria for discharge to Mortandad Canyon.
    a. Are wastes subjected to further treatment if they are not able to meet the criteria for discharge at TA-50?
    b. How are the wastes that do not meet criteria for discharge at TA-50 treated and disposed?

c. Where are the wastes that do not meet criteria for discharge at TA-50 treated and disposed?

4. Please specify how the solids generated by treatment at TA-50 and proposed to be disposed at TA-54 are managed.

   a. How will the wastes be contained and disposed of?
   b. Is there a contingency plan for disposal of these wastes?
   c. Where are the evaporator bottoms sent for off-site treatment?

5. Please provide copies of waste management plans for all treatment of sludges, scale and other solids.

6. LANL provided NMED a document entitled, *Operational Plan, Ground Water Discharge Plan (DP-1132) for Los Alamos National Laboratory's Radioactive Liquid Treatment Waste Treatment Facility at TA-50,* on November 24, 1998.

   a. Has LANL made any changes or additions to the plan?
   b. Does the plan include maintaining the piping system, leak detection system, and secondary containment systems, such as the "leak collection vaults?"
   c. Does LANL require regularly scheduled mandatory inspections?
   d. Is the plan still in effect or has it been revised?
   e. If the plan has been revised, please submit the most recent version.

7. Please submit a proposed detailed closure plan for TA-50 wastewater treatment, conveyance and disposal system.

Please submit the requested information by January 15, 2006. If you have any comments, questions, or concerns, please contact me at (505) 827-2900 or Christopher Vick at (505) 827-0078. Thank you for your cooperation during the review process.

Sincerely,

George Schuman
Program Manager
Ground Water Quality Bureau

cc: James Bearzi, NMED Hazardous Waste Bureau, P.O. Box 26110, Santa Fe, NM 87502

Bret Lucas, NMED Surface Water Quality Bureau

Tim Michael, Staff Manager, NMED DOE Oversight Bureau, 2905 Rodeo Park Drive East, Bldg. 1,Santa Fe, NM 87505

Steve Yanicak, Point of Contact, NMED DOE Oversight Bureau, 134 SR 4, Suite A, Bldg. 001313, White Rock, NM 87544

Beverly Ramsey, Director, Risk Reduction and Environmental Stewardship Division, Los Alamos National Laboratory, P.O. Box 1663, MS-J591, Los Alamos, NM 87545

Steven Rae, Group Leader, Water Quality & Hydrology Group, Risk Reduction & Environmental Stewardship Division, Los Alamos National Laboratory, MS K497 Los Alamos, NM 87545

Bob Beers, Water Quality and Hydrology Group, Risk Reduction & Environmental Stewardship Division, Los Alamos National Laboratory, MS K497, Los Alamos, NM 87545

Dennis McLain, Facility Manager/Group Leader, Waste Facility Management Group, Facility & Waste Operations Division, Los Alamos National Laboratory, MS J593, Los Alamos, NM 87545

Joni Arends, Concerned Citizens for Nuclear Safety, 107 Cienega, Santa Fe, NM 87501

Kathleen Sanchez, Tewa Women United, Rt. 5, Box 298, Santa Fe, NM, 87506

Peggy Prince, Peace Action New Mexico, 226 Fiesta Street, Santa Fe, NM 87501

George Rice, Concerned Citizens for Nuclear Safety, 414 East French Place, San Antonio, TX, 78212

Brian Shields, Amigos Bravos, P.O. Box 238, Taos, NM 87571

: 03233

Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Stewardship Division
Water Quality & Hydrology Group (ENV-WQH)
P.O. Box 1663, Mail Stop K497
Los Alamos, New Mexico 87545
(505) 667-7969/FAX: (505) 665-9344

Date: January 12, 2006
Refer To: ENV-WQH: 06-002
LA-UR: 06-0102

Mr. George Schuman, Program Manager
Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132)

Dear Mr. Schuman:

Los Alamos National Laboratory (Laboratory) is in receipt of your December 2, 2005, letter requesting additional information for the TA-50 Radioactive Liquid Waste Treatment Facility's Ground Water Discharge Plan Application (DP-1132). At our request, on December 13, 2005, personnel from the Laboratory (Mr. Mike Saladen, Mr. Chris Del Signore, and Mr. Bob Beers) and the National Nuclear Safety Administration's Los Alamos Site Office (Mr. Gene Turner) met with your staff (Mr. Chris Vick and Mr. Robert George) to review the request for information in greater detail. I would like to thank your staff for committing their time and effort at this meeting. I believe our discussions have helped produce a response that more closely matches to your agency's specific concerns.

On the following pages the Laboratory has endeavored to comprehensively answer each of your questions. Each of your questions have been presented along with the Laboratory's response. Attachments are contained within the cardboard file box accompanying this letter.

Please contact me at (505) 667-7969 if you have any questions regarding this matter.

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/tml

Attachments: a/s

Cy: M. Leavitt, NMED/SWQB, w/o att., Santa Fe, NM
R. Ford-Schmid, NMED/DOE/OB, w/o att., Santa Fe, NM
S. Yanicek, NMED/DOE/OB, w/o att., MS J993
M. Johansen, NNSA/LASO, w/o att., MS A316
G. Turner, NNSA/LASO, w/o att., MS A316
K. Hargis, ENV-DO, w/o att., MS J591
D. Stavert, ENV-DO, w/o att., MS J591
T. George, ENV-DO, w/o att., MS J591
J. Dewart, ENV-ERS, w/o att., MS M992
T. Grieggs, ENV-SWRC, w/o att., MS K490
S. Rae, ENV-WQH, w/o att., MS K497
M. Saladen, ENV-WQH, w/o att., MS K497
J. Ball, NWIS-DO, w/o att., MS J910
D. Liechty, NWIS-DO, w/o att., MS C936
C. Douglass, NWIS-RLW, w/o att., MS E518
D. Moss, NWIS-RLW, w/o att., MS E518
P. Worland, NWIS-RLW, w/o att., MS E518
C. Del Signore, NWIS-RLW, w/o att., MS E518
B. McClenahan, NWIS-RLW, w/o att., MS E518
S. Hanson, NWIS-RLW, w/o att., MS E518
P. Wardwell, LC-ESH, w/o att., MS A187
ENV-WQH File, w/att., MS K497
IM-9, w/att., MS A150

NMED Question #1. *All information, including any reports and all analytical data, from studies that have evaluated impacts on soils, surface water and ground water from operations and discharge at and from TA-50.*

LANL Response #1. A list of reports was presented by the Laboratory to the Ground Water Quality Bureau (Bureau) on December 13, 2005. Discussions at the meeting resulted in decisions by the Bureau as to which reports they would like to receive, as shown in Tables 1, 2, and 3:

- Table 1 lists reports enclosed in Attachment 1 of this submittal. Three of those reports (#10, #16, and #29 in Table 1) were previously submitted to the Bureau by the Laboratory, but are being submitted again at the Bureau's request.
- Table 2 lists reports not enclosed because they were previously supplied by the Laboratory to the Bureau.
- Table 3 lists reports in which the Bureau had no interest, and are therefore not enclosed.

Analytical data, consisting of summaries of NPDES Discharge Monitoring Reports (DMRs) for the years 1994-2005, is also enclosed (#27, #28, and #29). Summaries include effluent flows, concentrations, and loadings. The enclosed data expands upon DMR summary data previously provided to the Ground Water Bureau for the years 1998-2003, which accompanied the Laboratory's 2004 re-application for NPDES Permit No. NM0028355.

Table 1
Reports Enclosed With This Submittal

No.	Report Title	Date	LANL Document No.
1	Characterization Well R-13 Completion Report	Mar-03	LA-UR-03-1373
2	Hydrologic Tests at Characterization Well R-14	Aug-04	LA-14107-MS
3	Characterization Well R-15 Geochemistry Report	Mar-03	LA-13896-MS
4	Logs and Completion Data for Water and Mass Balance Wells in Mortandad Canyon	Oct-97	LA-13297-MS
5	Aquifer Test Analysis for Well R-15	May-04	LA-14074-MS
6	Assessment of Potential Contaminant Pathways in the Vicinity of Mortandad Canyon	Jul-04	LA-UR-04-4875
7	Status of Mortandad Canyon Sediment Investigations	Aug-03	LA-UR-03-5997
8	Extent of Saturation in Mortandad Canyon	May-91	LA-UR-91-1660
9	Mortandad Canyon: Elemental Concentrations in Vegetation, Streambank Soils, and Stream Sediments	Jun-97	LA-13325-MS
10	Chemical Quality of Effluents and Their Influence on Water Quality in a Shallow Aquifer	Mar-77	None
11	A Survey of Some LA County Canyons for Radioactive Contamination Spring 1953 to Spring 1955	Jun-55	LA-MS-2038
12	Quality of Storm Water Runoff at LANL in 2000 with Emphasis on the Impacts of the Cerro Grande Fire	May-02	LA-13926
13	Impact of Strontium-90 on Surface Water and Groundwater at LANL through 2000	Dec-01	LA-13855-MS
14	Impact of Tritium Disposal on Surface Water and Groundwater at LANL through 1997	Jul-98	LA-13465-SR
15	Uranium in Waters near LANL: Concentrations, Trends, and Isotopic Composition through 1999	Mar-04	LA-14046
16	Work Plan for Mortandad Canyon	Sep-97	LA-UR-3291
17	Mortandad Canyon Groundwater Work Plan	Aug-03	LA-UR-03-6221
18	RFI Work Plan for Operable Unit 1147	May-92	LA-UR-92-969
19	Radioactive Liquid Wastewater Treatment Facility Influent Minimization Study	2001	LA-UR-01-5353
20	A History of Radioactive Liquid Waste Management at Los Alamos	1996	LA-UR-96-1283
21	Surface Water Data at Los Alamos National Laboratory 2004 Water Year	Apr-05	LA-14211-PR
22	Surface Water Data at Los Alamos National Laboratory 2003 Water Year	Mar-04	LA-14131-PR
23	Surface Water Data at Los Alamos National Laboratory 2002 Water Year	Mar-03	LA-14019-PR
24	Surface Water Data at Los Alamos National Laboratory 2001 Water Year	Apr-02	LA-13905-PR
25	Surface Water Data at Los Alamos National Laboratory 2000 Water Year	Jun-01	LA-13814-PR
26	Pilot Scale Membrane Filtration Testing at the Radioactive Liquid Waste Treatment Facility	Nov-02	LA-UR-02-7108
27	LANL, NPDES Permit Re-Application Project, DMR Outfall Data Summary (Aug , 1994-Dec 31, 1997)	1998	None
28	LANL, NPDES Permit Re-Application Project, DMR Outfall Data Summary (1/1/98-12/31/03)	2004	None
29	LANL, DMR Outfall Data Summary (1/1/2004-10/31/2005)	2005	None
30	Well R-28 Completion Report	Feb-05	None

Table 2
Reports Previously Provided to the NMED

No.	Title	Date	Document No.
1	Elimination of Liquid Discharge to the Environment from the TA-50 RLWTF	Jun-98	LA-13452-MS
2	Characterization Well R-15 Completion Report	May-01	LA-13749-MS
3	Characterization Well MCOBT-4.4 and Borehole MCOBT-8.5 Completion Report	Dec-02	LA-13993-MS
4	Groundwater Annual Status Report for Fiscal Year 2002	Mar-03	LA-UR-03-011
5	Characterization Well R-14 Completion Report	Jun-03	LA-UR-03-1664
6	Environmental Surveillance at Los Alamos during 2004	Sep-05	LA-14239-MS

Table 3
Reports of No Interest

No.	Title	Date	Document No.
1	Background Radioactivity in River and Reservoir Sediments near Los Alamos, New Mexico	May-02	LA-13603-MS
2	Predicting Floodplain Boundary Changes Following the Cerro Grande Wildfire	2001	LA-UR-01-1819
3	Site-Wide Environmental Impact Statement (SWEIS) Yearbook--2004	Aug-05	LA-UR-05-6627
4	Los Alamos National Laboratory Perchlorate Issues Update	Dec-04	LA-CP-03-0441
5	Background Radioactivity in River and Reservoir Sediments near Los Alamos, New Mexico	2004	LA-UR-02-4821
6	Los Alamos National Laboratory 2002 Pollution Prevention Roadmap	Dec-02	LA-UR-02-7430

Q#2 *Please submit the following reports:*

a. *Audit reports about TA-50 operations and discharges*
b. *Department of Energy Inspector General reports about TA-50*
c. *Emility, L.A. A History of Radioactive Liquid Waste Management at Los Alamos, LA-UR-96-1283.*

R#2 (a.1.) The NMED Surface Water Quality Bureau conducts routine Compliance Evaluation Inspections on behalf of the EPA-Region VI to evaluate the Laboratory's compliance with NPDES Industrial Point Source Outfall Permit No. NM0028355. Two inspections have been conducted of the TA-50 RLWTF's NPDES Outfall 051 since 2000 on the following dates:

- May 21, 22, 27 and 28, 2003
- May 24-26, 2005

Copies of the inspection reports are available from the Surface Water Quality Bureau.

(a.2.) The NMED Hazardous Waste Bureau conducts routine RCRA Compliance Inspections at the Laboratory. Four inspections of the TA-50 RLWTF have been conducted since 2000 on the following dates:

- April 23 to August 31, 2001
- March 31 to April 28, 2003
- March 22 to April 13, 2004
- February 28 to April 7, 2005

Copies of the inspection reports are available from the Hazardous Waste Bureau.

(a.3.) Internal audit and assessment records have been catalogued and entered into a database since 2000. Audit and assessments prior to 2000 have been archived. These records can be physically searched upon the Bureau's request. The Audits and Assessments Division conducts Laboratory-wide assessments at LANL of ten functional areas on the topics of environment, safety, health, and security, and TA-50 activities have been assessed, during the course of and as part of these lab-wide assessments, on three occasions since 2000:

- An assessment of the safety basis program for 12 nuclear facilities was conducted from April 25 through May 19, 2005.
- An assessment of the emergency management and fire protection programs was conducted from June 21 through July 9, 2004.
- An assessment of environmental data quality was conducted from August 27 through November 20, 2001.

(b) The Laboratory's *I-TRACK* database is the repository for all findings generated from external audits and inspections. A search of this database for findings from 2000-2005 turned up no records from audits by the Inspector General's Office.

(c) A copy *A History of Radioactive Liquid Waste Management at Los Alamos* has been attached, as indicated in Table 1.

Q#3 *Please specify and describe the treatment process at TA-53 for evaporate distillate and RO permeate that does not meet the criteria for discharge to Mortandad Canyon.*

a. *Are wastes subject to further treatment if they are not able to meet the criteria for discharge at TA-50?*
b. *How are the wastes that do not meet the criteria for discharge at TA-50 treated and disposed?*
c. *Where are the wastes that do not meet criteria for discharge at TA-50 treated and disposed?*

R#3 All evaporator distillate from the TA-50 RLWTF is reprocessed through the final three treatment steps of the main treatment process – tubular ultrafiltration (TUF), ion exchange (IX), and reverse osmosis (RO). Therefore, the following discussion of RO permeate also applies to evaporator distillate.

The response to the preceding question on RO permeate is presented in multiple parts. First is a brief discussion of the treatment process used at TA-50. The management of treated waters prior to discharge is next discussed, including the management of treated waters that fail to meet discharge standards (i.e., NPDES effluent limits, DOE standards for radionuclides, and groundwater standards of the New Mexico Water Quality Commission). This is followed by a discussion of the treatment process at TA-53, and the management of waters trucked from TA-50 to the evaporation basins at TA-53. The response is closed by presenting volume information to provide perspective to the discussion.

(1) Management of Waters at TA-50: Figure 1 (Page 13) depicts the process steps used to treat radioactive liquid wastes at TA-50. Wastewater is collected in influent tanks, then passed through a clarifier where chemicals are added to form a precipitate. Clarified supernatant is treated by tubular ultrafiltration (TUF), ion exchange (IX), and reverse osmosis (RO). Effluent from the TA-50 treatment facility consists of permeate from the final treatment step, reverse osmosis.

(2) Management of Treated Waters at TA-50: Two tanks (not shown in Figure 1) are used to collect reverse osmosis permeate in batches of ~20,000 gallons. Prior to discharge, each batch of RO permeate is screened (i.e., sampled and analyzed) for selected radioactive, groundwater, and NPDES parameters, typically: total dissolved solids (TDS), nitrate-as-nitrogen, fluoride, perchlorate, alpha radioactivity, and tritium. If screening criteria are met then the effluent is discharged into Mortandad Canyon via NPDES Outfall 051.

If, on the other hand, a batch of RO permeate fails to meet a screening criterion, then one of two actions are taken. If the batch failed the screening criterion for tritium[A], the batch is transferred via tanker truck to the TA-53 basins for evaporation. If the batch failed any other screening criterion (metals, fluoride, etc.), the batch is re-treated through all or part of the TA-50 process treatment steps. In this situation, the batch will most commonly either be sent back to the influent tanks to go through all treatment steps again, or it will be sent back to the tubular ultrafilter (TUF) to be processed through the final three treatment steps (TUF, IX, RO).

(3) Management of Radioactive Liquid Wastes at TA-53: The evaporation basins at TA-53 are used to treat radioactive water from accelerator research activities. Most water results from the cooling of accelerator components such as magnets, and from the cooling of beam targets and experimental stations.

Radioactive liquid waste (RLW) is pumped from two lift stations at TA-53 through double-walled piping to one of three 30,000-gallon horizontal fiberglass tanks located in Bldg. 53-945 at the east end of TA-53. The tanks are sized to allow decay of radioisotopes generated by the LANSCE accelerator beam, most of which have short half-lives (e.g., Co-58 = 71 days, Hf-173 = 24 hours, Lu-171 = 8.25 days, and P-32 = 14 days). After aging, the RLW is pumped to the west evaporative basin, one of two basins. Each basin is above-ground, 75 ft. x 75 ft. x 3 ft. deep, with a capacity to hold 125,000 gallons of water. The basins are constructed of concrete with an 80-mil HDPE (high-density polyethylene) primary liner and an 8-inch thick concrete slab for secondary containment. Leaks in the HDPE primary liner will drain to a sump that is instrumented with leak detection alarms. The basins are sized such that the east basin is not likely to ever be used. In the event of extremely high RLW generation rates, the west basin would overflow to the east basin.

(4) Management of Waters Trucked to TA-53: A small (capacity of ~2500 gallons) tanker truck is used to transport reverse osmosis (RO) permeate that exceeds the EPA drinking water standard for tritium from TA-50 to TA-53. The RO permeate is pumped into one of the three tanks within Bldg. 53-945. The RO permeate is then pumped into the west evaporation basin.

(5) Effluent data for 2004 and 2005: During 2004, a total of 2.2 million gallons of reverse osmosis permeate (RO) were discharged to Mortandad Canyon as effluent from the TA-50 facility. Just 4,500 gallons of permeate (0.2%) were transported to TA-53 for evaporation. Through the first eleven months of 2005, a total of 1.7 million gallons of RO permeate were discharged to Mortandad Canyon, and no waters were trucked from TA-50 to TA-53 for evaporation.

[A] The screening criterion for tritium is 20,000 picocuries per liter. This concentration (a) is 1% of the discharge standard that appears in DOE Order 5400.5 and (b) is equal to the EPA drinking water standard for tritium that appears at 40 CFR 141.16.

Q#4 *Please specify how the solids generated by treatment at TA-50 and proposed to be disposed at TA-54 are managed.*

a. *How will the wastes be contained and disposed of?*
b. *Is there a contingency plan for disposal of these wastes?*
c. *Where are the evaporator bottoms sent for off-site treatment?*

R#4 The response to this question comes in four parts. First is a discussion of the five types of solid wastes that are generated at TA-50. Second is a general discussion of the management of solid wastes at TA-50 prior to shipment to TA-54. Third is a specific discussion of the treatment and disposal of the evaporator bottoms. And fourth is a discussion of the management of solid wastes once they reach TA-54.

(1) *Types of Solid Wastes Generated at TA-50*: Five different types of solid waste are generated by activities at the TA-50 RLWTF:

- Commercial solid wastes[B]
- Chemical wastes
- Mixed low-level radioactive wastes (MLLW)
- Low-level radioactive wastes (LLW)
- Transuranic (TRU) wastes

In general, the volumes of solid LLW are greater than the other three types of non-commercial solid waste combined. For example, volumes generated during 2004 were 0.3 cubic meters of chemical wastes, 0.1 cubic meters of MLLW, 69 cubic meters of LLW, and no transuranic waste.

(2) *Management of Solid Wastes at TA-50*: General waste management requirements are set forth in LIR 404-00-02.3, "General Waste Management Requirements". General requirements include the following:

- Completion of a Waste Profile Form (WPF) prior to generation of a new waste type or waste stream. The WPF includes waste characterization data, assures that the waste will have a disposal path, and assures compliance with Waste Acceptance Criteria. The WPF is approved by TA-54 personnel.
- Wastes must be placed in approved packaging, as defined in the Waste Acceptance Criteria (WAC).
- While at TA-50, wastes can only be stored in approved locations, such as a <90-day storage location for RCRA wastes or MLLW. All <90 day storage areas are required under RCRA to have contingency plans. These plans are available upon request.
- Prior to transfer of wastes from TA-50 to TA-54, a Waste Disposal Request form is prepared, then submitted to and approved by TA-54 personnel.

[B] Commercial solid waste includes office trash, broken glass, food debris, plastics, metals, scrap wood and pallets, and other nonhazardous items. These are either recycled or disposed at a commercial waste landfill, and are not further discussed.

(3) Management of TA-50 Evaporator Bottoms: Evaporator bottoms (see Figure 1) are trucked to an off-site commercial facility, GTS Duratek's Bear Creek Operations Facility (www.duratekinc.com) in Oakridge, Tennessee, where they are dried and compacted into pucks. The dried solids are returned to LANL, and sent to TA-54 for management and disposal as low-level radioactive solid wastes.

(4) Management of Solid Wastes at TA-54:

- Chemical and mixed low-level radioactive wastes are staged at TA-54, then shipped to commercial facilities for treatment and/or disposal. LANL has contracts with multiple commercial TSD facilities. Disposal does not occur at LANL.

- Transuranic wastes are stored at TA-54, characterized in accordance with requirements set forth by the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico, and then shipped to Carlsbad for disposal at WIPP. Transuranic wastes are not disposed at LANL.

- Low-level radioactive wastes are disposed at TA-54. As of September 2004, disposal may now also take place at the Nevada Test Site. Some information:

  ◊ DOE Order 435.1 and Manual 435.1: The Order and Manual establish requirements for LLW management control systems, including waste acceptance criteria, a waste certification program, disposal authorization, storage limitations (12 months), and closure and monitoring requirements.

  ◊ Performance Assessment (PA) and Composite Analyses (CA): The PA and CA assess environmental and human impacts for 1,000 years after a LLW disposal site is closed. The PA/CA are reviewed by DOE Low-Level Waste Disposal Facility Federal Review Group and, if acceptable, form the basis for an authorization to dispose. This regulatory framework is set forth in DOE Manual 435.1, which empowers the Federal Review Group as the disposal authorization authority.

  ◊ Nevada Test Site (NTS) certification was achieved in September 2005, and eleven shipments of contaminated soils were made to NTS that month. There are thus two disposal paths now available for LLW – Area G (low-level waste landfill at TA-54) and the NTS.

Q#5 *Please provide copies of waste management plans for all treatment of sludges, scale, and other solids.*

R#5 TA-50 operations adhere to institutional documents for waste management, referred to as LANL Implementation Requirements, or LIRs. Four LIRs, enclosed in Attachment 2 for your information, apply to the solid waste types generated at TA-50:

- LIR404-00-02.3, General Waste Management Requirements
- LIR404-00-03.1, Hazardous and Mixed Waste Requirements
- LIR404-00-04.2, Managing Solid Wastes
- LIR404-00-05.3, Managing Radioactive Wastes

Generalized requirements for waste generators are to ensure that wastes have a disposal path, to practice waste minimization, and to characterize wastes (acceptable knowledge, or sampling and analysis). Prior to generation, new waste types must have a Waste Profile Form approved by TA-54 personnel. While at the generating facility, wastes must be packaged, labeled, and stored in accordance with Waste Acceptance Criteria and/or regulations. Waste transportation must be coordinated with TA-54, via preparation and approval of a Waste Disposal Request form.

Generalized requirements for storage and disposal Facilities at LANL (e.g., TA-54) are to operate in compliance with regulations, to develop Waste Acceptance Criteria, and to authorize waste transfers to the facility. Treatment, Storage, and Disposal (TSD) Facilities are also authorized to reject any wastes that are not properly characterized.

Q#6 *LANL provided NMED a document entitled Operational Plan, Ground Water Discharge Plan (DP-1132) for Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility at TA-50, on November 24, 1998.*

a. Has LANL made any changes or additions to the plan?
b. Does the plan include maintaining the piping system, leak detection system, and secondary containment systems, such as "leak collection vaults"?
c. Does LANL require regularly scheduled mandatory inspections?
d. Is the plan still in effect or has it been revised?
e. If the plan has been revised, please submit the most recent version.

R#6 (a) Yes, the Operational Plan has changed in the last seven years. The initial operational plan, submitted 11/20/98, outlined the Laboratory's plans for achieving compliance with groundwater standards of the New Mexico Water Quality Control Commission by March 1999. Including the original submittal, twelve transmittals have been made; they are summarized in Table 4 below. Submittals were frequent during 1999 and early 2000, primarily to provide progress reports on the installation of new equipment for both the main treatment process and for the treatment of secondary liquid wastes. A revision to the plan is also enclosed with this submittal to the Bureau, in response to part (e) of this question.

: 03244

Table 4
LANL Submittals of TA-50 RLWTF Operational Plan

	Date	Main Topic
1	11/20/98	Plan to achieve compliance with NM WQCC regulations
2	12/23/98	Change: Treatment of RO concentrate via mechanical evaporation, not denitrification
3	03/12/99	Status report
4	03/23/99	Status report
5	04/14/99	Status report: Evaporator installation seven months sooner than previously committed
6	10/04/99	Change: Clarifier/gravity filter placed back into service
7	10/29/99	Status report
8	01/25/00	Change: Effluent tanks removed from service; four new tanks installed.
9	02/18/00	Status report: All treatment units, including evaporator, now operating.
10	02/04/02	Change: Ion exchange added to main treatment process
11	12/10/02	Change: New influent tanks planned.
12	12/02/04	Change: Process flow diagrams updated.
13	01/13/06	Change: Process flow diagrams updated.

(b,c) The operational plan discusses only the treatment processes and the management of radioactive liquid wastes. Regularly scheduled maintenance inspections are, however, conducted in accordance with the facility's maintenance program.

(d,e) Figure 1 (Page 13) is a process flow diagram that depicts the current treatment of radioactive liquid wastes at the TA-50 RLWTF. The following text augments the diagram.

Main Treatment Process (MTP):

Radioactive liquid wastewaters are transferred to the TA-50 facility either by an underground collection system or, for small volumes, by truck. The collection system connects generators in six technical areas using approximately four miles of double-walled, underground, high-density polyethylene piping. The pipeline system contains a series of 65 underground vaults equipped with leak detection sensors.

At the TA-50 facility, wastewater is collected in influent tanks, and then passed through a clarifier where chemicals are added to form a precipitate. Clarified supernatant is treated by tubular ultrafiltration (TUF), ion exchange (IX), and reverse osmosis (RO). Effluent from the TA-50 treatment facility consists of permeate from the final treatment step, reverse osmosis.

Main Treatment Process (con't):

Two tanks (not shown in Figure 1) are used to collect reverse osmosis permeate in batches of ~20,000 gallons. Prior to discharge, each batch of permeate is screened (i.e., sampled and analyzed) for selected radioactive, groundwater, and NPDES parameters. If screening criteria are met, the effluent is discharged into Mortandad Canyon via NPDES Outfall 051.

If, on the other hand, a batch of permeate fails to meet a screening criterion, then one of two actions are taken. If the batch failed the screen for tritium, a rare event as shown in the above response to Q#3, the batch is transferred to TA-53 for evaporation. If the batch failed any other screening criterion (metals, nitrate, etc.), the batch is re-treated through all or part of the TA-50 process treatment steps. In this situation, the batch will most commonly either be sent back to the influent tanks to go through all treatment steps again, or it will be sent back to the tubular ultrafilter (TUF) to be processed through the final three treatment steps (TUF, IX, RO).

Secondary Treatment Process:

Clarifier sludge is dewatered through a vacuum filter. Waters separated from the sludge are sent to the TA-50 influent tanks, and then re-processed through the main treatment process (MTP). De-watered sludge is packaged in 55-gallon drums and shipped to TA-54 for management and disposal as a low-level radioactive solid waste.

Reverse osmosis concentrate is treated in two or three steps. The first is pretreatment, which is an optional step. Pretreatment may include precipitation, concentration via electrodialysis reversal (EDR), processing through a sea-water RO unit, or combinations of these. If the EDR is used, EDR treated waters are sent to the TA-50 influent tanks, and then re-processed through the MTP. The EDR concentrate stream is sent on to the evaporator. Similarly, if a seawater RO unit used, treated waters are reprocessed through some or all treatment steps in the MTP, and the concentrate stream is sent on to the evaporator.

The evaporator is another concentration step. Distillate from the evaporator is reprocessed through the final three treatment steps of the MTP. Bottoms from the evaporator are sent on to the third treatment step.

The third and final treatment of the RO concentrate stream takes place off-site. Evaporator bottoms are trucked to a commercial facility, GTS Duratek in Oakridge, Tennessee, where they are dried and compacted into pucks. The dried solids are returned to LANL, and sent to TA-54 for management and disposal as low-level radioactive solid wastes.

Treatment of Transuranic RLW:

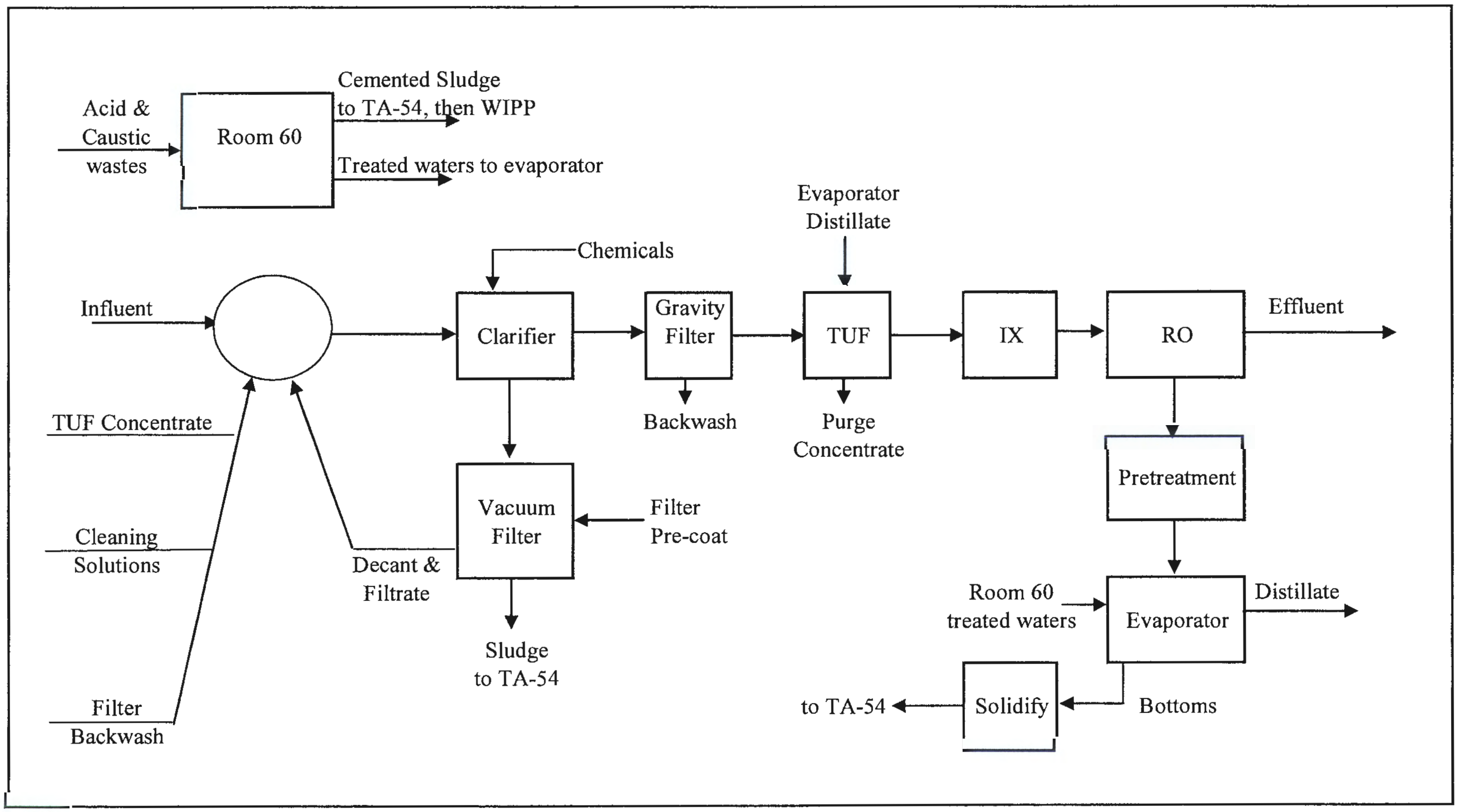
Transuranic radioactive liquid waste (RLW), acid and caustic waste streams from TA-55, are transferred to the TA-50 facility by an underground collection system. As with the collection system for the main treatment process (MTP), the collection system for transuranic RLW consists of double-walled, underground, high-density polyethylene piping.

At the TA-50 facility, wastewater is collected in two influent tanks, passed through a clarifier where chemicals are added to form a precipitate, and then filtered to separate treated water from the precipitate. Treated water, no longer transuranic waste, is sent to the Secondary Treatment Process evaporator. Precipitate is solidified using cement, and then shipped to TA-54 for management as a transuranic solid waste and eventual disposal at WIPP.

Q#7 *Please submit a proposed detailed closure plan for TA-50 wastewater treatment, conveyance, and disposal system.*

R#7 On August 30, 2004, at the NMED's request, the Laboratory submitted a closure plan for DP-1132. As discussed at the meeting of December 13, 2005, LANL awaits review comments from the NMED Ground Water Quality Bureau on the submitted plan.

Figure 1
Radioactive Liquid Waste Treatment at TA-50



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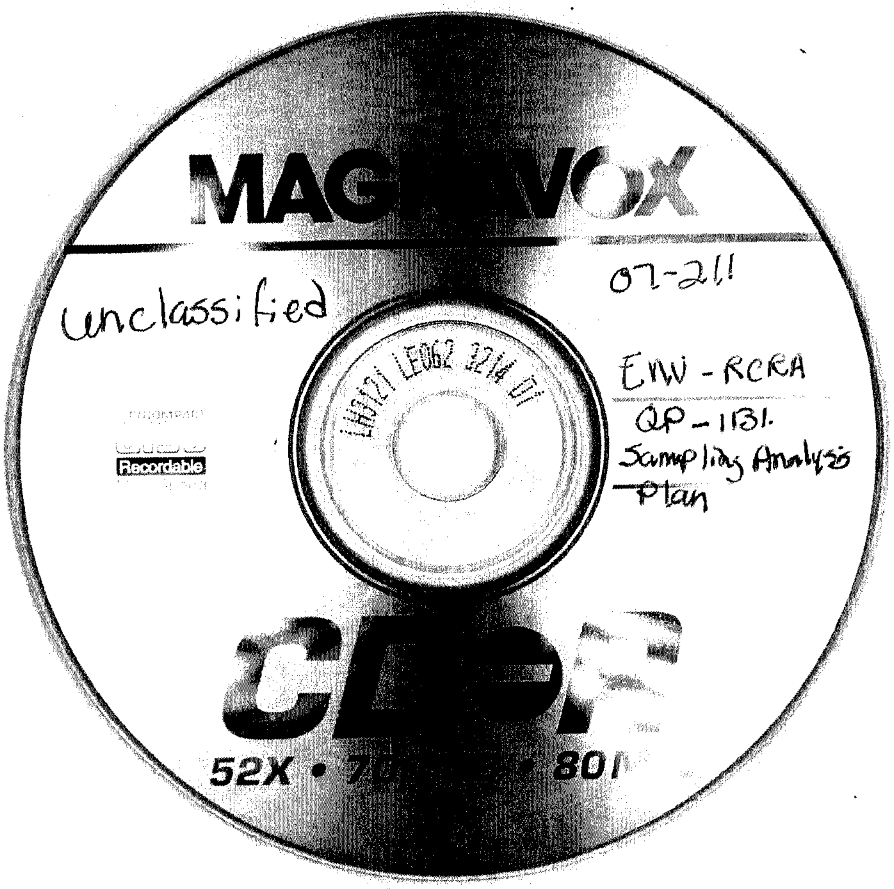
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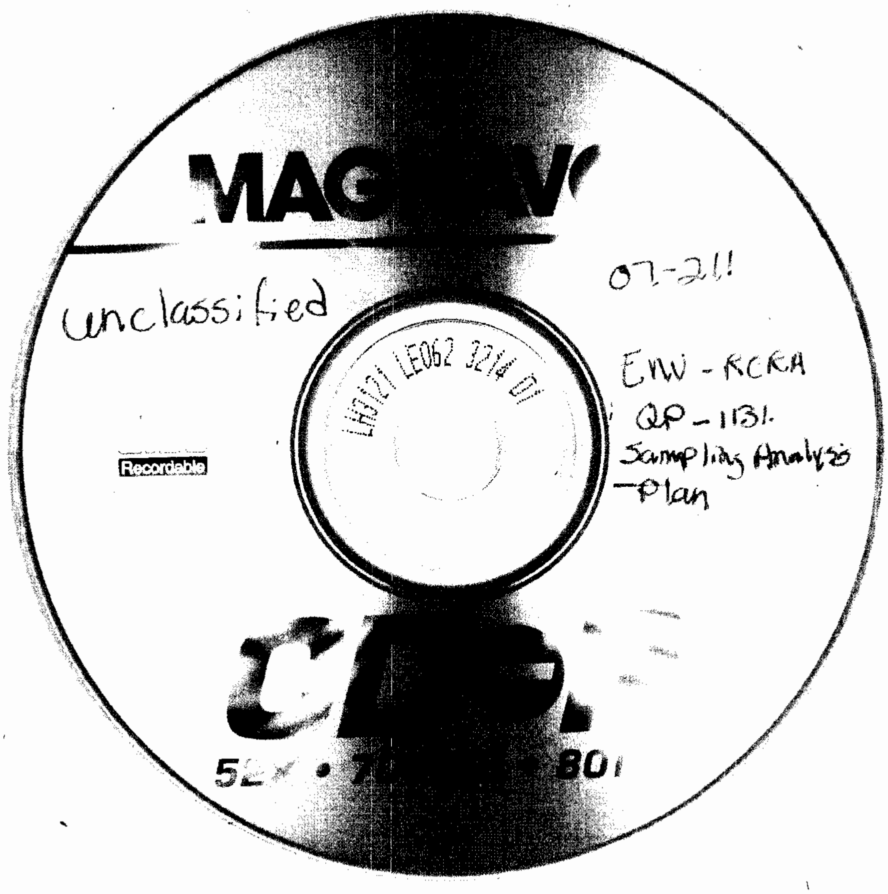

"ENV-RCRA-QP-113-R1" file

DEVELOPING DATA QUALITY OBJECTIVES

Purpose

This Environmental Protection – Water Quality & RCRA Group (ENV-RCRA) procedure describes the process for developing data quality objectives (DQOs) to establish criteria for defensible decision making for individual RCRA compliance sampling events.

Scope

This procedure applies to the process of determining the type, quantity, and quality of data needed for sampling events performed by ENV-RCRA RCRA Compliance Sampling personnel.

In this procedure

This procedure addresses the following major topics:

Signatures

Prepared by: Signature on file Dustie Rich, ENV-RCRA	Date: 5/23/07
Approved by: Signature on file Jack Ellvinger, ENV-RCRA Team Leader	Date: 5/29/07
Approved by: Signature on file Anthony R. Grieggs, ENV-RCRA Group Leader	Date: 6/6/07

06/21/07

General information about this procedure

Attachments

This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Data Quality Objective Guidance Questions	1

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	02/01/2004	New document
1	6/2007	Incorporated changes due to reorganization

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- ENV-RCRA RCRA Compliance Sampling Coordinator

Training method

The training method for this procedure is **self-study** (reading) and is documented in accordance with ENV-RCRA-QP-024, *Personnel Training*.

Definitions specific to this procedure

Data Quality Objective (DQO): Statements of the uncertainty level a decision-maker is willing to accept in results derived from environmental data.

Hazardous waste: Wastes that are listed or exhibit characteristics as defined in 40 CFR 261.3. The term generally refers to waste that EPA believes could pose a threat to human health and the environment if managed improperly.

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Data Quality Objective process

Background

The Data Quality Objective (DQO) process, as described in EPA QA/G-4, *Guidance on Systematic Planning Using the Data Quality Objectives Process*, is used for all RCRA Compliance Sampling Program environmental sampling events to determine the type, quantity, and quality of data needed.

Specifications

All RCRA environmental sampling data collection programs, as documented in the ENV-RCRA Sampling and Analysis Plan, will include specifications for the following:

- accuracy, precision, completeness, representativeness, and comparability
- sample identification number, location, location name, and coordinates
- sample date and time
- sampled media
- type of sample (routine, duplicate, etc.)
- analytical method/instrumentation
- detection limit
- sample result
- sample qualifier (accept, reject, qualified)
- field and laboratory comments
- QA/QC samples/processes
- chain-of-custody
- data verification and validation procedures
- data management process

Individual programs may have additional parameters to record, depending on the type of sample or analytical technique employed.

DQO development process

The following steps are integral to developing DQOs for each RCRA Compliance Sampling Program environmental sampling event.

Use specific questions found in Attachment 1, DQO Development Guidance Questions, as guidance in preparing the DQOs.

Step 1 – State the problem

Purpose

The purpose of this step is to summarize the problem that requires sampling and identify the resources available to resolve the problem.

Reviewing the request for analysis

When a Laboratory operating group (the waste generator) needs a process or other waste material sampled or requests that samples be picked up for RCRA characterization, they fill out a Request for Analysis (RFA) (on-line at www.drambuie.lanl.gov/~esh-19/), which is automatically emailed to the ENV-RCRA RCRA Compliance Sampling team.

The **RCRA Compliance Sampling Coordinator (CSC)** reviews the request for analysis and contacts the operating group's Facility Operations Director (FOD) or Waste Management Coordinator (WMC) if more details are needed on the purpose of the sampling, the waste or types of waste possible at the site, and unique site conditions.

Tasks

The **CSC** will complete the following tasks:

- describe the waste to be sampled by reviewing records and historical data
- determine the site conditions where the waste will be sampled
- establish the sampling team, including representatives from the operating group and facility, as well as RCRA Compliance Sampling personnel and WMCs
  - Will RCTs or IHs be needed during the sampling?
- specify available resources and constraints to the sampling event
  - What safety documents need to be written and approved prior to sampling?
  - What regulatory requirements apply to the sampling event and/or analysis?
  - What budget is available for the sampling?
  - When does the client need the results?

Step 1 – State the problem, continued

Products

DQOs for each sampling event will include:

- a title that clearly states the nature of the sampling event
- regulatory, programmatic, and facility context of the sampling event
- a complete list of the team members and safety controls (from which the IWD can be written)
- an estimate of budget and schedule

Step 2 – Identify the decision

Purpose

The purpose of Step 2 is to identify the decision that requires new environmental data to address the problem. Identify the key questions and alternative actions concerning this sampling event.

- Is the waste RCRA-listed?
- What radioactive constituents are in the waste?
- Does the waste meet the RCRA or DX RCRA waste acceptance criteria requirements?
- Does this closure meet clean closure standards?
- What chemicals are in the used oil?
- Do the contents of the spill come under the requirements of the NM Special Waste requirements?
- Is there a health risk involved with this waste?

Tasks

The **CSC** will complete the following tasks:

- identify the principal study question
- identify the alternatives that could result from the resolution of the principal study question, i.e., no further study is needed or further sampling/analysis is needed
- combine the principal study question and alternative into a decision statement
- organize multiple decisions, if necessary

Products

DQOs for each sampling event will include a clear statement of the decision needed from the sampling; i,e, determine if the waste contains constituents that are RCRA-regulated and if so, determine if they exceed regulatory limits.

Step 3 – Identify inputs

Purpose

The purpose of Step 3 is to identify the information required to support the decision and specify which inputs require new sampling.

Tasks

The **CSC** will complete the following tasks:

- identify the information required to resolve the decision statement
    - What type of sampling is required?
    - What are the contaminants of concern?
    - What analytical methods are appropriate for this sampling/contaminant?
    - Are there obvious signs of contamination at the site? What is the extent of the contamination?
    - Is the site stable?
- determine sources for each type of information required to resolve the decision statement
    - historical records
    - regulations
    - previous site investigations
- identify what information is needed to establish an action/threshold level
    - regulatory standards
    - documented background levels
- confirm that appropriate analytical methods exist to provide necessary data
    - measurement methods
    - accredited laboratories

Products

DQOs for each sampling event will include:

- detailed listing of each type of sampling and analytical information needed
- location/availability of that information
- standards by which the data are measured
- confirmation that appropriate analytical methods exist to measure the variables needed to resolve the decision statement

Step 4 – Define the boundaries

Purpose

The purpose of Step 4 is to clarify site conditions by defining the spatial and temporal boundaries that the data must represent to support the decision.

Tasks

The **CSC** will complete the following tasks:

- specific characteristics that define the sampling universe; i.e., to focus the sampling event by type of contamination and media
- define the geographic area of concern; i.e., size, volume, TA boundaries
- divide the sampling universe into homogeneous strata, if necessary
- determine the time frame to which the decision applies
- determine when to collect the samples
- define the scale of the decision making, based on factors such as risk, exposures, permit requirements, NOVs/COs, technological considerations, financial considerations, identification of "hot spots"
- identify practical constraints on data collection, including
  - — weather conditions
  - — access limitation
  - — lack of personnel
  - — jurisdictional disputes

Products

DQOs for each sampling event will include a detailed description of the following:

- waste/contamination characteristics
- geographic limits
- times for sampling
- scale of decision making
- practical constraints

Step 5 – Develop a decision rule

Purpose

The purpose of Step 5 is to develop a logical "if . . . then . . . " statement that defines conditions that would cause the decision maker to choose among the alternative actions.

Tasks

The **CSC** will complete the following tasks:

- specify the statistical parameters (mean, median, percentage, concentration) to characterize the waste/contaminant -- the parameter should always be consistent with regulatory requirements and may be chemical-specific, action-specific, or location-specific
- specify the regulatory action levels
- confirm that the detection limits (from Step 3) will allow reliable comparisons with the action levels
- combine the products from the previous steps to development a decision rule

Products

DQOs for each sampling event will include a decision rule, such as "If this waste contains constituents that are RCRA regulated, then further characterization will be required; otherwise no further evaluation is required."

Step 6 – Specify tolerable limits on decision errors

Purpose

The purpose of Step 6 is to specify the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. The limits become the qualitative performance criteria for the sampling event. Each sampling event must determine an appropriate action level. The tolerable limit must be sufficiently low to ensure operation within regulatory limits (the probability of a false negative or a failure to detect an exceedance is near zero) but must be sufficiently high to minimize unnecessary responses and investigations (false positive responses are minimized).

Tasks

The **CSC** will complete the following tasks:

- determine the possible range of parameters of interest
- define types of decision errors, such as sampling design error and measurement error and their potential consequences
- select the baseline condition (null hypothesis) and alternative conditions to be studied
- specify a range of possible parameter values, including action levels, where the consequences of a false negative decision error are relatively minor
- assign probability values to points above and below the action level that reflect the tolerable probability for the occurrence of decision errors

Products

DQOs for each sampling event will include sampling design boundaries that balance the consequences of a decision error against the cost of limiting the error.

Step 7 – Optimize the design for obtaining data

Purpose

The purpose of Step 7 is to identify a resource-effective sampling and analysis design for generating data that are expected to satisfy the DQOs. This is an iterative process in which the planning team revisits earlier steps to achieve the correct balance.

Tasks

The **CSC** will complete the following tasks:

- review the DQO products and existing environmental data
- develop general data collection design alternatives
- formulate the mathematical expressions necessary for each design alternative
- select the sample size that satisfies the DQOs for each design alternative
- select the most resource-effective design that satisfies all DQOs
- document the operational details and theoretical assumptions of the selected design

Products

The product of this step is a resource-effective sampling and analysis design, based on the 6 previous steps, that includes:

- sample size
- sample type
- general collection techniques
- sample support
- sample location and how locations were selected
- timing for sample collection, handling, and analysis
- analytical methods
- QA/QC protocols

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be maintained in accordance with ENV-DO-110, *Records Management Program*:

- Data Quality Objectives

Click here to record self-study training to this document.

DQO DEVELOPMENT GUIDANCE QUESTIONS

Step 1: State the problem

1. Is this a solid waste?
2. What regulatory requirements apply to the sampling event and/or analysis?
3. Is there a conceptual model of the waste generation process, material spill?
4. Is there a history of the unknown material?
5. Is the waste hazardous or nonhazardous?
6. What was the release mechanism if this is sampling a spill?
7. What were the weather conditions at and following the point of contamination?
8. Who should be on the sampling planning team? Representatives from the operating group and facility, as well as ENV-RCRA RCRA Compliance Sampling personnel and WMCs?
9. Will a memorandum of agreement be needed?
10. What permits need to be obtained prior to sampling? Will the sampling require special documentation, rad work permit, Industrial Hygienist review?
11. What safety documents need to be written and approved prior to sampling? What budget is available for the sampling?
12. Will any financial issues need to be addressed such as a quote for the analysis or who is liable for analytical costs?
13. When does the client need the results?
14. Will the normal analytical time (15 working days) be sufficient or will a quicker, more expensive analysis be required?

Step 2: Identify the decision statement

1. Will the waste need to meet the specifications of the LDR?
2. Does this waste require RCRA characterization?
3. Where will the waste be disposed of?
4. What radioactive constituents are in the waste?
5. Will the waste need to meet the specifications of a WAC? If so, which WAC?
6. Does the waste meet the RCRA or DX RCRA WAC requirements?
7. Does this closure meet clean closure standards?
8. What chemicals are in the used oil?
9. Do the contents of the spill come under the requirements of the NM Special Waste requirements?
10. Is there a health risk involved with this waste?

Step 3: Identify inputs

1. Will the characterization be based on a single sampling event because the waste consists of a 5-gallon bucket of material?
2. If a process is involved, what would be the best approach to make the sample representative, i.e., several sampling events, a single sampling event taken at 5 minute intervals, a random sample of 1 of 15 drums?
3. How will sampling and analysis be designed to follow the ENV-RCRA Sampling and Analysis Plan and SW-846 methods?
4. What is the containment fate and transport pathways (including weather conditions) for continuous flowing materials i.e., RCRA waste lines?
5. What is the condition of the waste at the time of sampling?
6. What site conditions exist at the time of sampling?
7. Which analytical methods should be used?
8. Will any deviation be necessary to attain viable, defensible results?
9. Will any parameters of the RCRA sampling or analysis be breached?
10. Sampling materials for non-RCRA characterization or using sampling equipment not specified in the ENV-RCRA Sampling Plan?

Step 4: Define boundaries

1. What type of contamination is in the waste?
2. Is the waste stream considered a batch?
3. Is the waste a one-time event?
4. Is management of the waste potentially subject to RCRA regulations?
5. What media is the waste in?
6. Where is the sampling going to take place? What TA? Specific location
7. How big is the sampling area? What are the spatial boundaries of the waste – width of flow, discharge rate of flow, temporal boundaries, volume, length, width, height?
8. Is it necessary to divide the sampling universe into homogeneous strata?
9. How long ago was the waste put in this location?
10. When should the samples be collected? Is there a specific time of year or time of day best suited to collection?
11. Are there any factors such as risk, exposures, or permit requirements; NOVs/Cos; technological considerations; financial considerations; or identification of "hot spots" that need to be considered?
12. Are there any practical constraints on data collection that need to be considered, including the following:
    - weather conditions
    - access limitation
    - worker health and/or safety issues
    - lack of personnel
    - amount of waste available for sampling
    - jurisdictional disputes

Step 5: Develop decision rule

1. What is the parameter of interest: VOA, SVOA?
2. How will the data be used to make a decision (hazardous or nonhazardous waste)?
3. Does any other sampling need to occur to address other requirements: LDR, clean closure permit requirements, treatment standards?
4. What level of measurement needs to be achieved: ppm, ppb?
5. What sampling equipment will be used?
6. What quality assurance samples need to be taken, if any?
7. What criteria will be used to access the usefulness of the data: Level I, II, Analytical Laboratory qualifications?
8. What information does the analytical laboratory need: amount of material to be sampled, acceptable radiation levels, health concerns associated with giving the sample to the laboratory?
9. Will background samples be required?

Step 6: Specify tolerable limits of decision error

1. What variability in the sampling is acceptable?
2. How could errors be reduced: more samples, different sampling methods or using different field techniques?
3. What is the acceptable probability of making a decision error and what are the consequences: incorrect data, increased risk to human health and the environment, potential enforcement action, financial burden?
4. What uncertainty is acceptable: +/- certain %? What should be done if uncertainty is breached?
5. Does the waste need a confidence level attainment for the waste handler?

Step 7: Optimize the design for obtaining data

1. Do the DQO products from the previous steps conform to the existing environmental data?
2. Have general data collection design alternatives been developed?
3. Have mathematical expressions necessary for each design alternative been formulated?
4. Has a sample size that satisfies the DQOs for each design alternative been selected?
5. Has the most resource-effective design that satisfies all DQOs been selected?
6. Have the operational details and theoretical assumptions of the selected design been documented?
7. What factors need to be adjusted to meet health issues, disposal time frames, etc?

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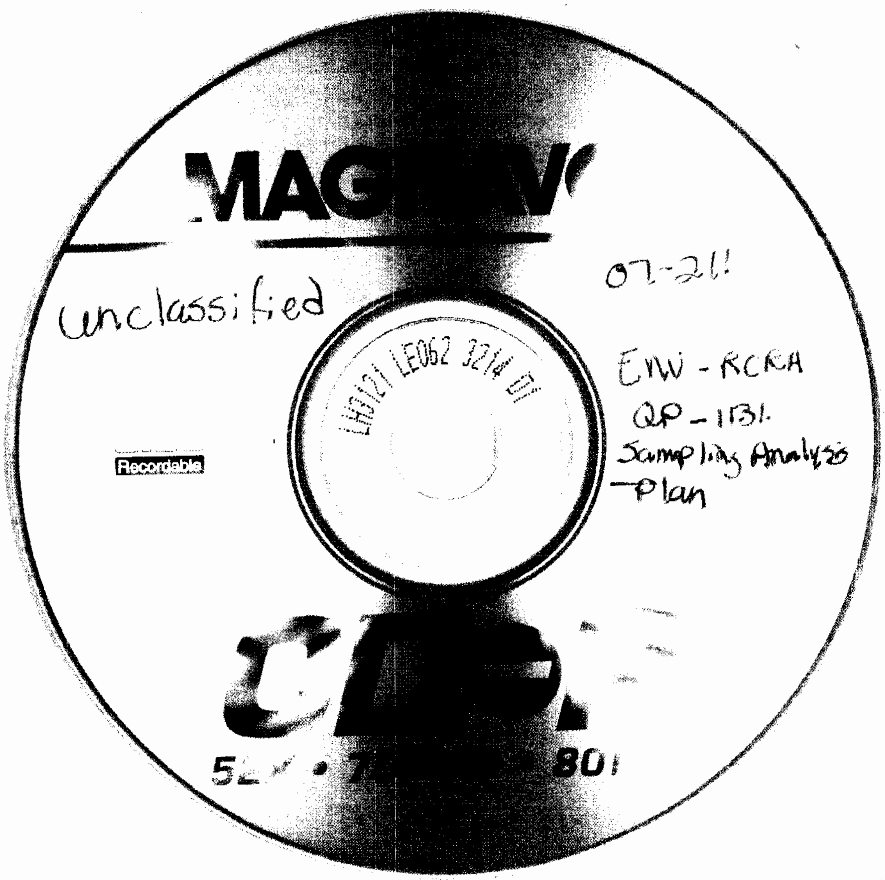

"ENV-SWRC-QAPP-Sampling-R3" file

ENVIRONMENTAL STEWARDSHIP DIVISION
SOLID WASTE REGUATORY COMPLIANCE
(ENV-SWRC)

ENV-SWRC SAMPLING AND ANALYSIS PLAN

Third Revision:
January 2006

Revised by:

Dustie Rich
ENV-SWRC Compliance Sampling Coordinator

Prepared for:

Los Alamos National Laboratory
P.O. Box 1663
Los Alamos, New Mexico 87545

ENV-SWRC SAMPLING & ANALYSIS PLAN

Originally Adopted in December 2000

Under Project No. 5016.06.1501.A07

Controlled Distribution Date: July 1, 2005
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Approved by: Signature on File Date: 2/21/2006
Anthony Grieggs, ENV-SWRC, Solid Waste Regulatory Compliance Group

Approved by: Signature on File Date: 2/21/2006
Dustie Rich, ENV-SWRC Compliance Sampling Coordinator

Approved by: Signature on File Date: 2/21/2006
Joanna Foster, ENV-SWRC Quality Assurance Officer

ENV-SWRC SAMPLING & ANALYSIS PLAN

Third Revision, January 2006

I acknowledge that I have read the ENV-SWRC *Sampling & Analysis Plan* and understand the contents. User acknowledgement of the ENV-SWRC *Sampling & Analysis Plan* must be renewed bi-annually.

Acknowledgement of the ENV-SWRC *Sampling & Analysis Plan* does <u>not</u> authorize the user to perform sampling. Sampling authorization shall be granted as part of the worker authorizations in ENV-SWRC-QP-103, Compliance Sampling and ENV-SWRC-QP-115, Sampling Analysis.

Printed Name and Title	Signature	Date

Printed Name and Title	Signature	Date

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LIST OF ACRONYMS AND SYMBOLS

ALARA	as low as reasonably achievable
C	Chemistry (Division)
°C	degrees Celsius
CDL	commercial driver's license
CFR	Code of Federal Regulations
Ci	curie
CLP	contract laboratory program
cm	centimeter
CPR	cardiopulmonary resuscitation
COLIWASA	composite liquid waste sampler
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDTA	ethylenediaminetetraacetic acid
ENV	Environmental Stewardship Division
EPA	U.S. Environmental Protection Agency
g	gram
HAZWOPER	Hazardous Waste Operations and Emergency Response
HCl	hydrochloric acid
HMT	Hazardous Materials Table, 49 CFR § 172.101
HMTF	Hazardous Materials Transfer Form
HNO_3	nitric acid
H_2SO_4	sulfuric acid
HSR	Health, Safety, and Radiation Protection Division
IDLH	immediately dangerous to life or health
IH	industrial hygienist
IWD	individual work documents
L	liter
LIR	Laboratory Implementation Requirement
LP	Laboratory Policy
LSA	low specific activity
µCi/g	microcurie per gram
µCi/L	microcurie per liter
µrem/hr	microroentgen equivalent man per hour
mCi/g	millicurie per gram

mg	milligram
mL	milliliter
mrem	milliroentgen equivalent man
MSDS	material safety data sheet
NaOH	sodium hydroxide
$NaHSO_4$	sodium hydrogen sulfate
nCi/g	nanocurie per gram
nCi/L	nanocurie per liter
OSHA	Occupational Safety and Health Administration (or Act)
pH	a measurement of acidity (pH < 7) or alkalinity (pH > 7)
pCi/g	picocurie per gram
pCi/L	picocurie per liter
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCA	radiological control area
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RMTF	Radioactive Materials Transfer Form
RWP	Radiological Work Permit
SCBA	self-contained breathing apparatus
SSSP	site specific safety plan
SW-846	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA 1992b)
SWP	special work permit
SWS	Sanitary Wastewater System
TA	Technical Area or tracking analysis
TCLP	toxicity characteristic leaching procedure
TLD	thermoluminescent dosimeter
UV	ultraviolet
WPF	Waste Profile Form
VOA	volatile organic analyte
VOC	volatile organic compound

DEFINITIONS

Accuracy: The closeness of agreement between an observed value and an accepted reference value.

ALARA: As low as reasonably achievable. A radiation protection guideline for keeping individual and collective radiation exposures (in the work force and general public) as low as social, technical, economic, practical, and public policy considerations permit.

Blanks: Samples of deionized or distilled water, rinses of collection devices or containers, sampling media (e.g., sorbent), etc., that are handled and subsequently analyzed in the same manner as the sample to identify possible sources of contamination during collection, preservation, handling, or transport (see Section 5.0 for details).

Composite Sample: A combination of individual samples collected from different locations within a source. The samples are combined into a single sample that is analyzed for the chemical constituents of concern. Composite sampling techniques are often used for environmental samples or in the initial phases of assessment to identify areas requiring further investigation. Compositing can mask problems by diluting hazardous compounds below limits of detection or concern. It is essential for personnel safety that compatibility tests be performed before compositing hazardous wastes.

Count Sample: A 500 mL sample, which ***C*** personnel analyze to determine volume contamination levels.

Duplicates: Samples collected at the same time, contained, preserved, and transported in the same manner. They are separate samples taken from the same source, stored in separate containers, and analyzed independently. These samples are often used to verify the reproducibility of the analytical technique and to document the precision of the sampling and analytical process.

Grab Sample: A single sample taken from a specific source at a given point in time. The sample is collected all at once at one particular location in the source. If the source is heterogeneous, a single grab sample may not be representative and it may be necessary to take additional grab samples from appropriate locations to adequately characterize the source. Grab sampling techniques are generally preferred over composite sampling because grab sampling minimizes the amount of time sampling personnel are in contact with hazardous materials, reduces risks associated with compositing unknowns, and eliminates chemical changes that might occur because of compositing.

Precision: The agreement among a set of replicate measurements without assumption of knowledge of the true value. Precision is estimated by means of duplicate/replicate analyses.

Random sampling: Random sampling uses a table of random numbers and is employed when little information exists concerning the material to be sampled. The number of sampling locations should be large enough to lend statistical validity to the random selection process.

Reagent Grade: Reagents that conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society (ACS). Synonymous terms for such reagents are analytical reagent grade and ACS reagent grade.

Replicates: See *Duplicates*.

Sampling event: One or more sampling operations at one site on the same day.

Sampling operation: Each time a unique drum or other waste container is sampled.

Sediments: Deposited material underlying a body of water.

Sludges: Semidry materials ranging from dewatered solids to high viscosity liquids.

Soil: A dynamic, natural body composed of mineral and organic materials and living forms in which plants can grow.

Vermiculite: A silica clay that has a high net negative charge.

LOS ALAMOS NATIONAL LABORATORY
ENV-SWRC SAMPLING & ANALYSIS PLAN

1.0 INTRODUCTION

Researchers at the Los Alamos National Laboratory (the Laboratory) request chemical analysis of waste using the Solid Waste Regulatory Compliance Group (ENV-SWRC) *Request for Analysis* Form (RFA). Using their knowledge of the waste generating process, researchers provide as much information as possible about the waste to be sampled and analyzed. In response to an RFA, ENV-SWRC sampling personnel collect representative samples and deliver them to a certified analytical laboratory for analysis. If the waste is a regulated waste, analytical results are used to characterize and certify the waste before it is accepted by the Laboratory's waste management facilities for treatment, storage, or disposal. Liquid waste is sent to the Sanitary Wastewater System (SWS) Plant, or the TA-50 Radiological Waste (RLW) facility. This ENV-SWRC Sampling & Analysis Plan (hereafter referred to as the plan) is based on the ENV-DO Integrated Management Plan (IMP) and the ENV-SWRC Quality Management Plan (QMP) and functions as the Quality Assurance Project Plan (QAPP) for sampling program. The plan provides sampling personnel with guidelines and procedures that enhance personnel safety and ensure that the samples collected produce analytical results that are scientifically valid and legally defensible. Analytical personnel perform sample analyses according to established procedures, developed to ensure scientifically valid and legally defensible sample data for waste characterization and/or certification purposes.

The purpose of the sampling procedures in this plan is to identify if the sampled waste stream is a U.S. Environmental Protection Agency (EPA) hazardous waste or a mixed waste. Definitions for these waste categories are in the Laboratory Implementation Requirement, "Hazardous and Mixed Waste Requirements" (LIR 404-00-03.1).

Sampling materials or waste streams require carefully collecting adequately sized, representative samples. The sampling method, container type, preservation method, and equipment selected must ensure chemical and physical properties of the sample are preserved. The appropriate number of duplicate samples and the appropriate number and type of quality control blanks must be collected to ensure valid data. Because no universal sampling procedure can be recommended because sampling situations vary, this plan relies on the Data Quality Objectives Process (DQOs), as described in, or similar to, EPA QA/G-4, "Guidance for the Data Quality Objectives Process."

Although this plan is written to include extreme exposure scenarios, they are not commonplace at the

Laboratory. Sampling personnel must approach each sampling event with caution, especially when sampling unknown or orphan materials. Using the *Presampling Questionnaire and Site-Specific Safety Plan (SSSP)*, ENV-SWRC sampling personnel obtain information about a waste from the waste generator or waste management coordinator (WMC) before sampling the waste. All SSSPs must be reviewed and approved by an HSR-5 Industrial Hygienist (IH).

Sampling personnel must be properly trained and cognizant of sampling methods and container and preservation requirements. They should also be familiar with the methods and requirements described in this plan in the sections listed below.

- Sampling and preservation methods (Sections 5.0 and 6.0) for environmental and effluent sampling, control of samples, and analytical data management
- Health and safety issues (Section 3.0)
- Personal protective equipment (PPE) requirements (Section 3.4)
- Packaging and transportation requirements (Section 8.0)
- Quality assurance requirements, including records management and chain of custody (COC) (Section 2.0)

Sampling personnel may contact other Laboratory groups for technical guidance appropriate to a sampling event in order to draft the DQOs for each event, as described in detail in ENV-SWRC-QP-113, "Developing Data Quality Objectives." The guidance or assistance these groups provide is described below.

- Analytical personnel provide guidance related to sampling containers, volumes, preservatives, and holding times.
- HSR-1 Health Physics Operations Group personnel perform radiological surveys on mixed waste containers before each sampling operation and provide guidance for working with radioactive and mixed waste. HSR-1 will also recommend PPE for radiological purposes and will perform radiological air sampling if determined to be necessary.
- HSR-5 Industrial Hygiene and Safety Group personnel recommend appropriate PPE to be worn by sampling personnel and perform air monitoring as needed.
- SUP-3 Packaging and Transportation Group personnel provide Driver III training and guidance on U.S. Department of Transportation (DOT) shipping requirements.

  Job Hazard Analysis (JHA) computer input to determine the level of risk of the sampling event.

In addition to the procedures described in this plan, sampling program personnel should be familiar with the guidance and reference documents listed in the bibliography. Many of these documents were used to develop this plan.

2.0 QUALITY ASSURANCE

Quality assurance (QA) and quality control (QC) ensure precision and accuracy and are essential components of sampling operations. Data obtained from analyzing the samples collected by ENV-SWRC sampling personnel will be used for waste characterization and certification. ENV-SWRC personnel described below must follow the guidelines and procedures in the ENV-SWRC Sampling & Analysis Plan, ENV-SWRC-QP-103, "Compliance Sampling," ENV-SWRC-QP-115, "Sample Analysis," the ENV-SWRC-QMP, and must document any deviation from these procedures. The QA principles, practices, and procedures described throughout this plan ensure the analytical data is scientifically valid and legally defensible and allow the plan to function as the ENV-SWRC compliance sampling Quality Assurance Project Plan (QAPP).

2.1 Responsibilities

The quality of the ENV-SWRC sampling operations and the safety of ENV-SWRC sampling personnel depend on group personnel fulfilling specific responsibilities. These personnel and their responsibilities are described below:

2.1.1 ENV-SWRC Group Leader

- Approves this plan and any subsequent revisions
- Provides written authorization for any deviation from this plan
- Ensures that adequate resources are available for staffing and maintaining the ENV-SWRC sampling operations
- Ensures that ENV-SWRC sampling operations do not pose a threat to humans or the environment
- Designates the ENV-SWRC Compliance Sampling Coordinator to oversee the operation
- Establishes, in conjunction with the ENV-SWRC training coordinator, minimum qualifications required for the ENV-SWRC sampling personnel

2.1.2 ENV-SWRC Compliance Sampling Coordinator

- Reviews this plan to ensure that it meets ENV-SWRC waste characterization and certification requirements
- In conjunction with the ENV-SWRC training coordinator and the ENV-SWRC Group Leader, identifies the training requirements for the ENV-SWRC sampling personnel, and ensures that the sampling personnel receive identified training
- Ensures that sampling personnel follow the procedures established by this plan
- Ensures that sampling personnel follow DOT regulations when transporting samples to analytical facilities
- Ensures that QA records generated by sampling operations are maintained as described in Section 2.11 of this plan
- Notifies the ENV-SWRC Group Leader of any nonconformance identified by audits and assessments of the ENV-SWRC sampling program

- Coordinates sample analysis with analytical laboratory personnel

2.1.3 ENV-SWRC Compliance Sampling Personnel

- Be authorized to and comply with all Laboratory requirements established in appropriate LIR's as specified in the hazard reviews included in RRES-ES-Field, ENV-SWRC-QP-103, "Compliance Sampling," ENV-SWRC-QP-115, "Sample Analysis," the LANL Radiological Control Manual, individual work documents (IWDs), special work permits (SWPs), radiological work permits (RWPs), and confined space entry permits
- Read, understand, and correctly execute the sampling procedures established by this plan
- Attend the required training identified by the Compliance Sampling Coordinator and the ENV-SWRC training coordinator
- Consult with appropriate personnel to evaluate orphan waste sampling
- Provide accurate and legible QA records described in Section 2.11 to the Compliance Sampling Coordinator
- Resolve all safety concerns with the HSR-5 IH and/or an HSR-1 health physicist before initiating sampling activities, as appropriate
- When necessary, observe the Laboratory Policy "Stop Work and Restart" (LIR 401-10-02)
- Report all spills that occur during sampling operations and document the spill, as required by the Laboratory's Spill Prevention Control and Countermeasures Plan or by site-specific plans
- Collect representative samples
- Collect and prepare samples to comply with the analytical laboratory's requirements
- Collect the appropriate number of duplicate and QC samples, if appropriate, for each sampling event
- Preserve the samples according to EPA-SW-846 guidance to ensure that the samples retain the properties of the original waste except in circumstances where preservation might cause safety problems
- Properly label samples and complete chain-of-custody forms to ensure that the sample can be tracked through the entire sampling process
- Complete field logbooks
- Promptly submit samples to the analytical laboratory to avoid exceeding sample holding times

2.1.4 ENV-SWRC Sampling Plan Quality Assurance Officer

- Reviews this plan and any revisions for QA and QC issues

- Periodically assesses the sampling operations to ensure that QA and QC principles and practices established by this plan are implemented
- Assists the Compliance Sampling Coordinator in determining the root cause of nonconformance, initiating corrective actions, and verifying that corrective actions have been completed
- Ensures that records are maintained as described in Section 2.11 of this plan

2.1.5 ENV-SWRC Training Coordinator

- Establishes, in conjunction with the ENV-SWRC Compliance Sampling Coordinator and ENV-SWRC Group Leader, minimum qualifications for ENV-SWRC sampling personnel
- Ensures that qualifications and training of sampling personnel are documented and periodically reviewed for adequacy

2.1.6 HSR-5 Industrial Hygienist

- Determines the level of PPE that sampling personnel must wear, using the information provided on the Presampling Questionnaire and SSSP
- Reviews and approves the completed Presampling Questionnaire and SSSP before sampling personnel begin sampling operations
- Performs periodic safety assessments of sampling operations to ensure that sampling personnel are adhering to SSSP guidelines
- Documents any nonconformance and corrective actions to the Compliance Sampling Coordinator
- Provides personnel safety guidance to sampling personnel as requested

2.2 Representative Samples

Sampling personnel must attend appropriate training courses (see Section 9.0 of this plan) that include sampling methods to learn sampling strategies that allow for accurate and precise results. Sampling personnel must obtain representative samples to ensure high confidence in analytical data. Representative samples may be obtained by following the guidance provided in EPA 530, Sections 5 and 6 (EPA, 2002). The methods used to collect representative samples (data collection design options) include, but are not limited to, simple random sampling, stratified random sampling, systematic sampling, ranked set sampling, sequential sampling, authorative sampling and composite sampling.

A single sample (or grab sample) may be representative of a homogeneous material because the material has a uniform composition throughout; however, heterogeneous materials vary in composition throughout the matrix. When possible, representative sampling is ensured by collecting waste material from three distinct locations for each sample to be analyzed. This may not always be possible for orphan or unknown wastes. Sampling accuracy is typically achieved by random sampling. Sampling precision is usually achieved by taking an appropriate number of samples from the source. The number of samples to be collected is based on the type of statistical information required and the type of material collected. The strategy to randomly select the sampling locations is described in Chapter Nine, "Sampling Plan" of *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846).

2.3 Sample Types

The appropriate type, size and number of samples taken should comply with the laboratory's analytical and QA/QC requirements. In addition to the waste sample collected for waste characterization and certification purposes, sampling personnel must prepare blank samples (Section 2.3.1) and when possible, collect duplicate samples (Section 2.3.2) as described below to ensure that minimum precision and accuracy are obtained for each sampling event.

2.3.1 Blank Samples

To verify the quality of sampling activities, sampling personnel must prepare, containerize, preserve and handle blank samples in the same manner as the waste sample. These blanks are described in the following paragraphs. The analytical laboratory also prepares blank samples, but this activity is not addressed in this sampling plan. ENV-SWRC personnel use the data obtained from blank samples to identify contamination introduced during the sampling and transportation processes.

- *Trip Blank* - A trip blank contains laboratory-grade distilled or deionized water or some other analyte-free media (obtained from the analytical laboratory) that is measured into a sample container in the analytical laboratory. The trip blank containers should be of the same lot and type as those in which the waste samples will be placed. Sampling personnel carry the trip blank through the entire sampling event and sample transportation. The trip blank is used to document any contamination attributable to field handling and shipping procedures. Sampling personnel label the trip blank with a sequential number similar to waste samples and designate it as a trip blank in the field logbook (see Section 2.11 of this plan).

- *Field Blank* - Sampling personnel prepare the field blank during the sampling event with laboratory-grade distilled or deionized water or analyte-free media. In preparing the field blank, sampling personnel must open the container, introduce media (and preservative if added to the samples), and close the container using the same sequence followed for each waste sample. Sampling personnel must label the field blank with a sequential number similar to waste samples and designate it as a field blank in the field logbook. Sampling personnel seal, label, package and transport the field blank the same as waste samples. Analysis of the field blank provides data on potential container, preservative, or media contamination.

- *Field Soil Blank* - When there is extensive soil sampling, sampling personnel prepare soil blanks in the field during the sampling event. Field soil blanks can be prepared from washed silica sand. In preparing the field soil blank, sampling personnel must open the container, introduce media (and preservative, if added to the samples), and close the container using the same sequence used for each waste sample. Sampling personnel label the field soil blank with a sequential number similar to waste samples and designate it as a field soil blank in the field logbook. Sampling personnel seal, label, package, and transport the field soil blank the same as waste samples. Analysis of the field soil blank provides data on potential container, preservative, or distilled or deionized water contamination to evaluate potential contamination as a result of field handling procedures or shipping.

- *Equipment Rinsate Blank* - LANL does not typically have a need to collect rinsate blanks. However, in the unlikely event that LANL collects a rinsate blank, these will be collected using organic/analyte-free water placed in contact with the decontaminated sampling equipment under field conditions to evaluate the effectiveness of equipment decontamination or to detect sample cross contamination.

2.3.2 Duplicate Samples

Sampling personnel collect duplicate samples at the same time, from the same location in the container, with the same apparatus, and place the duplicate samples into identical containers prepared in the same way and filled to the same volume. It may not be possible to obtain duplicate samples of orphan or unknown wastes. Sampling personnel preserve and handle all duplicate samples identically. Sampling personnel label duplicate samples with a sequential number similar to other waste samples, and designate them as duplicate samples in the field logbook. The analysis of duplicate samples using the same procedure and instrument verifies the reproducibility of the analytical data.

2.3.3 Split Samples

When the Laboratory wants to validate data obtained from different analytical methods or analytical laboratories, sampling personnel may prepare a split sample. A split sample is a sample that is divided into equal portions that are analyzed by different accepted analytical techniques or by separate laboratories that participate in the EPA Contract Laboratory Program (CLP). Because obtaining accurate split samples from heterogeneous or multilayered samples is often very difficult, sampling personnel must collect these samples with great care to ensure that each portion has the same composition.

2.4 Sample Management

It is imperative to the success of this plan that the sample be carefully collected, handled, and tracked throughout sample collection, transport, and analysis. Sampling personnel must assign each sample a sequential, unique, alphanumeric code and follow proper records management procedures (Section 2.11). Careful sample management allows ENV-SWRC sampling personnel to track the sample from collection, through analysis and interpretation of analytical results, to characterization and certification of the waste by the waste generator. Correct sample management will also enable ENV-SWRC sampling personnel to recreate a sampling event. Details on the ENV-SWRC Sample Management Laboratory are presented in ENV-SWRC-QP-070, "Sample Management Laboratory."

2.5 Decontamination

Sampling personnel minimize contamination of the collected samples by using sampling equipment that is purchased in sealed, uncontaminated, sterile packages. When necessary, sampling personnel decontaminate sampling equipment used for collecting solids, soils, sludges, or sediments according to equipment decontamination methods described in Section 5.7 of this plan. Sampling personnel collect samples carefully and change gloves between each sample to avoid contaminating clean equipment or cross-contaminating samples.

2.6 Holding Times

Sampling personnel must deliver samples to the analytical laboratory as soon as possible after collection to ensure that established sample holding times are not exceeded. The holding time is the maximum amount of time the sample can be held before analysis, and begins the date and time the sample is collected. If sample holding times are exceeded, the analytical data may be considered invalid because an important QA element has not been met. Sampling personnel must ensure proper completion of the COC form (see Section 2.11 of this plan) upon collecting the sample and relinquishing it to analytical personnel. This ensures that sample holding times can be determined.

2.7 Sample Preservation

Sampling personnel must follow guidance for sample preservation procedures, using premeasured ampules of recommended preservatives as appropriate. The sample must retain the properties of the original waste from the time of sampling to analysis. Degradation or alteration of the sample through exposure to air, excessive heat or cold, microorganisms, or contaminants from the container must be avoided. Volatilization, loss of acidic gases, and biodegradation can be reduced by storing and transporting the samples at a reduced temperature, approximately 4°C. Sampling personnel must avoid freezing aqueous samples because the sample could fracture, resulting in separation of slightly immiscible phases and the release of volatile compounds. Sample fracture can also result in the precipitation of some salts that might not redissolve, resulting in inaccurate analytical results. Further, glass containers may break at freezing temperatures. Appendix A of this plan summarizes methods of sample preservation.

2.8 Quality Assessments and Nonconformances

Sampling personnel are responsible for continual self-assessment to ensure compliance with this plan. The ENV-SWRC Sampling & Analysis Plan QA officer assesses the quality of the sampling process and analytical data and reports results to the ENV-SWRC Compliance Sampling Coordinator. The QA officer periodically assesses on-site sampling events to ensure that sampling personnel follow the QA principles and sample collection procedures established in this plan. The QA officer must document each assessment, including the date of the assessment, location, the sample operations observed, any nonconformances or problems identified, the names of sampling personnel, and corrective actions recommended and taken to resolve any nonconformances. The QA officer immediately informs the ENV-SWRC Compliance Sampling Coordinator of any problems identified that are likely to affect sample data validity.

A deficiency is any event that does not comply with state, federal and LANL laws, regulations and requirements. A deficiency may also occur when any of the Group's quality document requirements for sampling are not met. When deficient conditions are noted, a deficiency form should be filled out by the person noting the deficiency, per the instructions and forms included in ENV-SWRC-QP-050, "Deficiency Reporting and Correcting." The form is then signed by the ENV-SWRC Compliance Sampling Coordinator and the ENV-SWRC Group Leader or a designee of the Group Leader.

2.9 Preservative and Reagent Quality

Sampling personnel consult with analytical personnel to ensure preservatives and reagents they use when collecting samples are of adequate purity. Sampling personnel also ensure expiration dates, if any, of preservatives and reagents are not exceeded.

2.10 pH Meter Calibration and Maintenance

Sampling personnel calibrate the pH meter before each use according to the manufacturer's specifications. Sampling personnel use the pH meter and electrode with care to avoid equipment damage, decontaminate the pH electrode between samples, ensure that periodic maintenance is performed according to the manufacturer's specifications, and document calibration and maintenance in the field logbook for each sampling event in which it is used.

2.11 Records Management

ENV-SWRC compliance sampling personnel complete and maintain records that document the sampling and analysis of waste streams to assure quality. These records also ensure this plan is properly implemented and the analytical results can be traced back to the waste that was sampled. Records pertinent to the waste sampling program include all field and laboratory records generated by the activities performed in accordance with this plan and are listed below.

- Request for Analysis Form (RFA)
- Presampling Questionnaire and SSSP
- Data Quality Objectives (DQOs)
- Deficiency reports
- Audits and assessments
- Field logbook
- Chain-of-Custody Record (COC)
- Sampling equipment maintenance and calibration forms

- Written requests and approvals for any temporary modifications to sample collection procedures

ENV-SWRC personnel must make all entries on all records with indelible, blue or black ink. All entries should be legible, consistent, direct, and succinct. ENV-SWRC personnel must ensure the records are identifiable, retrievable, and protected against damage, deterioration, and loss. Access to records must be controlled. Personnel making changes to any record do so by drawing a single line through the original information so it remains legible, writing the correct information adjacent to the original information, and initialing and dating the change.

2.11.1 Request for Analysis Form (RFA)

ENV-SWRC personnel use this form to track individual sampling events and to maintain completed log sheets that are kept on file at TA-59. The information provided on RFA form (Figure 2-1), is listed below. Filling out an RFA can be done on ENV-SWRC's webpage located at http://www.esh.lanl.gov/~esh19/online_data_idx.html.

- Requestor (generator) name and group
- Date sample requested
- Date ENV-SWRC sampling personnel contact the requestor to complete the *Presampling Questionnaire and SSSP*
- Location of Material
- Radiological data
- Chemical and Physical Characteristics
- Waste status

2.11.2 *Presampling Questionnaire and SSSP*

Sampling personnel preparing for a sampling operation must complete a *Presampling Questionnaire and SSSP* after initially contacting the requestor. If necessary, sampling personnel may complete some of the information on the form during a site assessment. Information required on this form includes a description of the waste generating process, material to be sampled, waste container(s), site, and work area; special hazards of concern; PPE to be worn; emergency evacuation routes and safety equipment locations; and important telephone numbers. Before the waste is sampled, all personnel involved with the sampling operation must sign the form, certifying they have reviewed the information. The *Presampling Questionnaire and SSSP* is described in Section 4.0 of this document.

Request For Analysis System Id: 261

REQUEST FOR ANALYSIS FORM							
Account Information: CC: PC: CA: WP:	**Request For Analysis System Id:**				**Request Date:**		
Requestor's Name:	**Z-No:**	**Group:**	**Phone:**	**MS:**	**TA:**	**BLDG:**	**Room:**
Location of Material to be sampled:	**TA:**	**BLDG:**	**ROOM:**	**Other (specify):**			
Purpose Code: ,Other:							
If the waste is radioactive or suspect, name the Radiation Control Technician (RCT) assigned to the area. **RCT: Phone: Pager:**							
Will the analytical be used for a specific purpose ? If yes, explain or check the appropriate box.							
Chemical and Physical Characteristics **Provide as much information as possible for the material being sampled.**							
Matrix of Material:							
Waste Classes:							
Container Size:							
Container Type:							
Status:							
Material Description:							

Please print this page from your web browser and keep a copy for your records. This information was also electronically sent to Dustie Stephens in ESH-19.

Current URL Address: http://eshdb.lanl.gov/~esh19/databasess/rfa_form.html

FIGURE 2-1
Request for Analysis Form

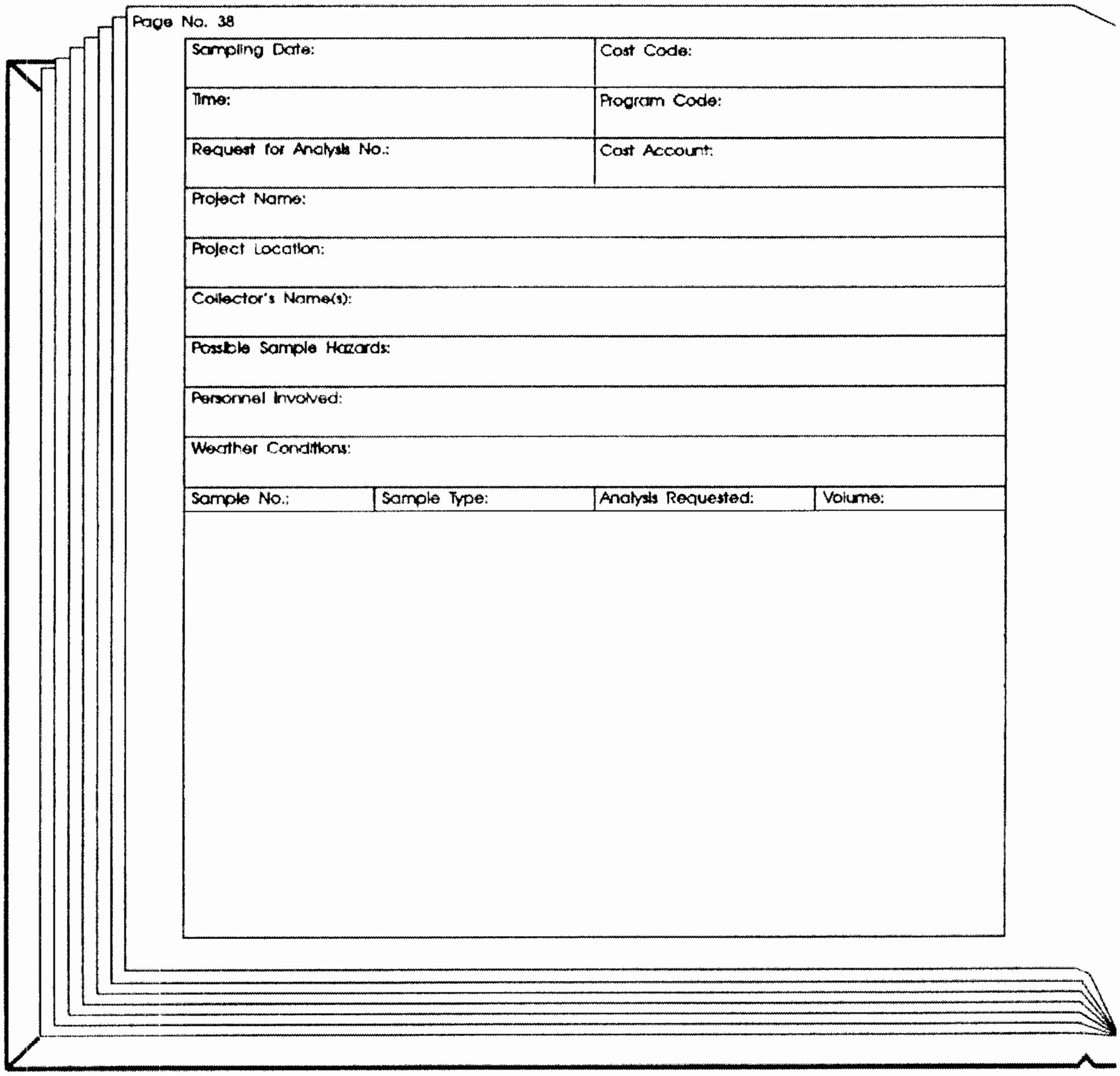
03293

2.11.3 Field Logbook

The field logbook is a spine-bound notebook with prenumbered pages, containing all information pertinent to the sampling operation. The logbook format is illustrated in Figure 2-2. The field logbook remains in the custody of the waste sampling personnel at all times. While sampling waste, personnel document the following information in the field logbook:

- Sampling date and time
- Cost code, program code, and cost account
- Project name and location
- Collector's name(s)
- Possible sample hazards
- Personnel involved
- Weather conditions
- Unique sample number
- Sample type and volume
- Analysis requested
- Remarks (see below)
  - Field observations and measurements
  - Deviations from or anomalies in the sampling procedures
  - Lot number and expiration date of preservatives (if applicable)
  - Preservation method used (if applicable)
  - Waste characteristics (category, matrix, homogenous/heterogeneous, solid/liquid)
  - Sample container and tool types
  - pH of the waste (if applicable)
  - Sample point location
  - Sampling strategy
  - Sample identification (duplicate, field blank, etc.)
  - Physical condition of the original waste container
  - Cooler temperature
  - Uncompleted work
  - Other pertinent information

Sample numbers include the year the sample was taken, the acronym SWRC (Solid Waste Regulatory Compliance), followed by a sequential number that distinguishes individual samples. Two potential sample numbers might be 05SWRC0001 and 05SWRC0002. ENV-SWRC sampling personnel record only a single sampling event per page in the field logbook, and draw a diagonal line through any blank space(s) at the bottom of a page, which is dated and initialed. This technique facilitates easy retrieval of information.



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Sampling Date:		Cost Code:	
Time:		Program Code:	
Request for Analysis No.:		Cost Account:	
Project Name:			
Project Location:			
Collector's Name(s):			
Possible Sample Hazards:			
Personnel Involved:			
Weather Conditions:			
Sample No.:	Sample Type:	Analysis Requested:	Volume:

FIGURE 2-2
Sample Page Field Logbook

2.11.4 *Chain-of-Custody Record*

Each time a sample is transferred from the custody of sampling personnel to analytical personnel, the person relinquishing the sample must complete the required information on a *COC Record*. This record allows the sample to be tracked throughout the analytical process, assuring control over tracking of the sample and its corresponding analytical results.

More than one sample may be included on one record. This tracking is a vital aspect of QA. ENV-SWRC personnel maintain a copy of the signed *COC Record* at TA-59. Figure 2-3 is a sample of this record.

The ENV-SWRC *COC Record* includes the following information:

- Project name
- Names of the sampling personnel
- Date and time of the sample shipment/transfer
- Sample type (composite, grab)
- Sampling site (station) location
- Unique sample number for each sample being transferred
- Number of containers
- Type of analyses to be performed
- Sample label number
- Signature of person relinquishing the sample(s)
- Date and time the sample(s) is relinquished
- Signature of the person receiving the sample(s)
- Any additional remarks (including sample description and quantity)

Los Alamos
National Laboratory
Los Alamos, New Mexico 87545

ESH-19 CHAIN OF CUSTODY RECORD

Hazardous and Solid Waste Group
Mail Stop K498
Phone 667-0666

Project Name:

Sampling Team:

no. of containers

Date	Time	Comp.	Grab	Station Location / Sample ID								Label No.

Relinquished by:	Date / Time:	Received by:	Relinquished by:	Date / Time:	Received by:
Relinquished by:	Date / Time:	Received by:	Remarks		

Original Accompanies Shipment. Copy to Field Files.

FIGURE 2-3
Sample Chain of Custody

2.11.5 Shipping Papers

The transport of some samples may be regulated by the DOT. Section 8.0 of this document provides guidelines for determining which samples are DOT regulated. Additional information on shipping hazardous materials is provided in Section 8.0 of this plan.

2.11.6 Analytical Results Reports

Analytical personnel generate a report of the analytical results for each sample submitted. The following information must be included in each report:

- Analytical request number
- Unique sample number (provided by sample collector)
- Unique sample number assigned by the analytical laboratory (if applicable)
- Date the sample was received by analytical personnel
- Date of analysis
- Name of the analyst (or initials)
- Analytical parameters requested
- Analytical results for each parameter
- Analytical methods used for each parameter
- Data from QC samples (e.g., replicates, matrix spikes, and surrogates) introduced by the analytical laboratory into the sample analysis stream

The analytical reports are submitted to ENV-SWRC sampling personnel, who review the reports and determine that the data package is complete. The data is then mailed to the waste generator or the waste management coordinator.

2.11.7 Discrepancy and Corrective Action Reports

If sampling personnel note significant deficiencies or discrepancies while collecting samples or reviewing the analytical results, they are noted in the logbook. The description of the deficiency or discrepancy should describe how identification was made and corrective action if necessary to ensure that the waste stream is properly characterized. If a deficiency occurs, QP-050 will be followed.

2.11.8 Sample Labels

Sampling personnel attach the sample label (Figure 2-4) to the sample container at the time of sample collection and are required to track samples from collection to analysis and to correlate the analytical results to the original waste stream. The sample label includes the sample number, the preservatives added, the date and time sampled, and the sampler's initials.

ENV-SWRC personnel who sample hazardous materials and PCBs or who sample materials that have been in a radiological controlled area can encounter materials with known or unknown radioactive constituents. A Radiological Control Technician (RCT) must complete a survey tag for this material before ENV-SWRC personnel can accept any radioactive wastes or suspect radioactive material.

2.11.9 Integrity Seal

After attaching the sample label, sampling personnel must attach the integrity seal (Figure 2-6) to the sample container. ENV-SWRC sampling personnel initial and date the integrity seal. The integrity seal indicates if any person tampers with the container or if its integrity is in any way impaired. An analysis of integrity seals is kept on file by the ENV-SWRC Compliance Sampling Specialist. This analysis can be used to determine contamination of materials by integrity seals. If new integrity seals are purchased, a new set of analysis should be performed and the data kept on file by the ENV-SWRC Compliance Sampling Coordinator.

2.11.10 Container Identifier Label

Sampling personnel place a container identifier label (Figure 2-7) on the original waste container (i.e., the container from which the sample was collected). This label is vital to ensuring that analytical results are applied to the correct container of waste. Sampling personnel write the following information on the container identifier label:

- Sample date
- Sampling personnel
- Sampling group and sampling group phone number
- Constituents for which the waste was sampled (i.e., VOA, SVOA, metals)
- Sample reference number

After drawing the samples and properly labeling and sealing the sample bottles, sampling personnel complete the container identifier label and affix it to the container. If more than one waste container is sampled, for each waste container sampling personnel draw the sample(s), label and seal the sample bottle(s), label the container, and record the assigned numbers in the field logbook before moving on to the next container.

Client **Dustie Stephens**	o Grab o Composite
Site Name **01DS118**	Date
Sample #	Preservative
Analysis	Coll. By

FIGURE 2-4
Sample Label

Los Alamos
NATIONAL LABORATORY

LAB SAMPLE

DO NOT TAMPER

Date ______________

Initials ______________

FIGURE 2-5
Integrity Seal

ATTENTION

The material in this container/tank has been sampled and is currently being analyzed.

SAMPLE DATE:
SAMPLED BY:
GROUP:______ PHONE:

Contact the individual listed above or the Environmental Protection Group at 667-5021 before handling, moving, or disposing of this material.

SAMPLED FOR

FIGURE 2-7
Container Identifier Label

3.0 HEALTH AND SAFETY

The ENV-SWRC sampling program requires sampling personnel to make health and safety related decisions in the field. Therefore, sampling personnel must have knowledge of chemical, physical, radiological, and biological hazards present when sampling waste. Section 3.0 describes the potential hazards and risks associated with waste sampling activities and safety control measures implemented by ENV-SWRC to minimize risks to personnel and the environment.

The Laboratory and ENV-SWRC have established administrative and engineering controls to protect the health and safety of Laboratory personnel, the public, and the environment. The Laboratory has also established guidelines for using PPE. Sampling personnel wear level D PPE (see Section 3.4.4 of this plan) unless the HSR-5 IH recommends a higher level of PPE as noted on the Presampling Questionnaire and SSSP. Some of the administrative and engineering controls and guidelines are described in Laboratory manuals (LMs), the Laboratory's JHA program, Hazard Reviews attached to ENV-SWRC QPs, LIRs, RWPs, confined space permits, and the LANL Radiological Control Manual. Personnel involved with sampling operations must comply at all times with the established Laboratory requirements.

To minimize chemical, radiological, physical, and biological hazards, personnel must conduct sampling operations safely. Through documented training, sampling personnel must demonstrate knowledge of the hazards related to sampling activities and knowledge of hazardous waste in general. Sampling personnel must be familiar with information in the LANL Radiological Control Manual. Sampling personnel must be authorized under the safe work practices and authorized through hazard control plans by the group leader or his designee.

3.1 Chemical and Hazardous Material Handling

Personnel who perform sampling operations must prepare a Presampling Questionnaire and SSSP before each sampling event (see Section 4.0 of this plan). Before the sampling operation begins, an HSR-5 IH reviews the prepared Presampling Questionnaire and SSSP and determines the level of PPE that sampling personnel must use.

The completed Presampling Questionnaire and SSSP describes chemical and radiological hazards and the appropriate PPE for the sampling operation(s); lists emergency telephone numbers; and provides a sketch of the location of eyewash stations, safety showers, fire extinguishers, evacuation routes, spill kits, and fire alarms. Before beginning a sampling operation, all sampling personnel must sign the safety plan. At least two Laboratory personnel (e.g., the sampling technician and waste generator or WMC) must be present during any sampling operation. Each person must be prepared to respond to an emergency. The PPE requirements for the sampling operation(s) may change when the personnel are in the field and the sampling situation changes. If PPE changes are deemed necessary, the job will be stopped or delayed until an HSR-5 IH hazard reassessment can take place.

Exposure to chemicals can follow several routes: inhalation, ingestion, absorption, or injection (i.e., exposure through a puncture wound). Sampling operations involve opening drums and containers, which increases the opportunity for exposure to the contained chemical. Also, drums may have a buildup of vapors and pressure, which creates an additional hazard of inhaling a toxin. Finally, the waste being sampled may contain chemicals and materials that are flammable, combustible, corrosive, toxic, or reactive. Sampling personnel must be aware of these hazards and request guidance from the HSR-5 IH, if necessary.

Inhalation is the primary route of exposure to hazardous materials, with the main hazard coming from volatile organic compounds (VOCs). Sampling personnel conduct all sampling operations in well-ventilated areas or in HSR-5-approved fume hoods, diluting airborne materials and minimizing the inhalation risk. HSR-5 personnel may perform air monitoring to detect VOCs during selected sampling events. Because the pressure inside the waste containers increases with ambient temperature, VOC monitoring is more critical during the summer months. HSR-5 personnel may request that sampling personnel wear personal samplers (such as absorption badges or personal air pumps, coupled with adsorption media) to assess exposure to hazardous materials.

Eating, smoking, drinking, chewing gum or tobacco, and applying lip balm and other cosmetics in areas containing hazardous wastes are the most common causes of accidental ingestion of hazardous materials. The ENV-SWRC Group Leader strictly forbids these activities in these areas. A best management policy is to avoid any type of hand-to-mouth contact while working with or around hazardous waste.

If incompatible wastes are mixed, a fire or explosion could occur. Sampling personnel must segregate samples during collection and transport to minimize the risk of fire or explosion. Fire and explosion hazards are also present when personnel open drums containing a waste identified as a flammable, a combustible, or an oxidizer. Therefore, drums should be grounded before opening them to prevent sparks that may serve as ignition sources. As a further precaution, sampling personnel open drums carefully, following the procedures described in Section 3.3. Welding, cutting, spark-producing operations, and similar sources of ignition are not permitted near sampling operations. Sampling personnel do not conduct sampling operations during lightning storms or other inclement weather conditions. If a chemical fire or explosion occurs, personnel must pull the fire alarm, evacuate the area, and notify the appropriate site emergency response personnel. Sampling personnel must be familiar with LIR's Water Pollution Control LIR 404-50-01.0 and Abnormal Events LIR 402-130-01 to properly respond to chemical spills and emergencies.

3.2 Radiation Safety

When sampling personnel sample known or suspect mixed waste, radiation safety is critical. All personnel working with radioactive materials must wear thermoluminescent dosimeters (TLDs) to enable the Laboratory to assess each worker's exposure to ionizing radiation. Before sampling a known or suspect mixed waste, sampling personnel must have a Radiological Work Permit (RWP). Sampling personnel must obtain an RWP before sampling waste known or suspected to contain a radioactive component. Sampling personnel may contact HSR-1 personnel for additional guidance on collecting and handling radioactive samples and for guidance on proper radioactive contamination control.

Radiation safety is also critical when sampling personnel sample suspect mixed waste or unknown waste. During the process of completing the *Presampling Questionnaire and SSSP* with the generator, sampling personnel should be able to determine if an unknown waste could have radioactive contamination. If sampling personnel proceed with the assumption that a waste is radioactive, an RWP must be in place before sampling. The sampling personnel verify radioactive contamination by collecting a sample, which is counted to determine the gross alpha, beta, gamma, and tritium contamination. As is the case for known radioactive samples, sampling personnel should wear TLDs and contact HSR-1 for additional guidance.

ENV-SWRC personnel who sample hazardous materials and PCBs or who sample materials that have been in a RCA can encounter materials with known or unknown radioactive constituents. An RCT must complete a survey tag for this material before ENV-SWRC personnel can accept any radioactive wastes. QP-103 Compliance Sampling must be followed when accepting radioactive or suspect radioactive waste.

The Laboratory has established a program to ensure that radiation exposure to workers are as ALARA and well below regulatory limits established in 10 CFR Part 835. Personnel performing sampling operations must observe the ALARA policy by sampling as quickly and as safely as possible, staying as far away from the radiation source as possible, and using shielding material whenever practical.

When sampling mixed waste, personnel may be exposed to radiation through inhalation of radioactive gases and airborne particulates; ingestion; absorption through the skin, eyes, or an open wound, or by direct exposure to beta or gamma radiation. Through documented training, personnel who sample mixed waste must be familiar with DOE and Laboratory's radiological control manuals. These manuals establish entry and exit requirements; requirements for monitoring for personnel contamination; authority to stop radiological work; response to abnormal situations; and controls for benchtop work, laboratory fume hoods, sample stations, and gloveboxes.

Qualified RCTs must perform external dose rate surveys on each container of mixed waste before the sampling operation begins. This activity provides preliminary knowledge about the external radiation hazards associated with the waste. During and after the sampling operation, RCT's must conduct proper radioactive contamination control, including surface contamination and external dose rate surveys. Normal background levels of gamma and beta radiation at the Laboratory are approximately 20 μrem/hr. Sampling personnel may continue operations when external radiation levels are elevated; however, if external dose rates increase to more than five times background levels (i.e., greater than 100 μrem/hr), sampling personnel must contact an HSR-1 RCT. Sampling personnel must not continue work without the advice of a qualified health physicist when external dose rates exceed 10,000 μrem/hr.

Radioactive materials that strictly emit alpha particles or low-energy beta or gamma radiation are not readily detected with portable monitoring equipment. In most cases, documentation will indicate the potential for these materials to be present (i.e., the material will be suspect radioactive) and sampling personnel must take appropriate precautions. Alpha particles present an internal hazard through inhalation when they become airborne. Beta and/or low energy gamma radiation will render an external dose to the skin if not adequately shielded. Tritium, a common low-energy beta emitter, can easily be absorbed through the skin and cause a dose to the whole body, or it can present an inhalation hazard when airborne.

Level C PPE will provide adequate protection from radiation hazards for most sampling activities involving mixed waste. Level B PPE will provide adequate protection for most sampling activities involving mixed waste that could contain tritium. Section 3.4 of this plan describes PPE selection in more detail.

The Laboratory has established various requirements to control the spread of radioactive contamination. One of these requirements is personnel monitoring (refer to the LANL Radiological Control Manual for specific procedures). After removing PPE and before exiting a radiological area, sampling personnel must use the area's self-monitoring equipment to perform personnel frisking and to monitor sampling equipment, sample containers, and supplies. Sampling personnel receive training in the use of monitoring equipment during the Laboratory's Radiological Worker II training course.

3.3 Physical and Biological Concerns

Sampling personnel could suffer physical injury while moving and handling waste containers during sampling operations. Physical injuries may also result from accidental slips, trips, and falls; thermal stress; and chemical explosion or fire. To reduce physical injuries from slips, trips, or falls, sampling personnel should inspect the area during the site assessment and note hazards and obstacles on the location map of the SSSP. Most accidents result from unsafe working conditions and unsafe practices. The unsafe conditions and practices can be avoided, reducing the likelihood of accidents. To reduce physical injuries from moving and lifting waste containers, sampling personnel should obtain assistance from a forklift operator for moving waste drums. If sampling personnel find it necessary to move a container manually (as with a drum dolly), they should minimize container handling, use proper lifting and moving techniques, and obtain assistance if the container is too heavy or bulky for one person to move safely. To avoid injury to the feet, sampling personnel must wear steel-toed shoes with skid-resistant rubber soles during sampling activities.

The potential for explosive reactions or the release of noxious gases when containers are opened requires considerable safeguards. To reduce physical injuries that may result when opening a waste container, personnel must obtain as much information about the container contents as is readily available. Sampling personnel must open containers slowly to relieve excess pressure, and nonessential personnel should not be in the vicinity of the sampling operation. Sampling personnel must obtain a confined space permit for sampling operations involving entry into large containers, tanks, and trenches. A known or suspect confined space must not be entered under any circumstances until HSR-5 personnel have assessed the space for hazards.

Sampling personnel should exercise extreme caution when handling waste containers of unknown contents, of volatile or flammable materials, or containers that are bulging. If VOCs have been detected in a container by HSR-5 personnel, sampling personnel should request HSR-5 personnel to monitor the area around the container before they open it. Monitoring should continue throughout the sampling operation. If sampling personnel notice crystallization at the neck of any container, they should manage it as an explosive because of the potential presence of peroxides, picric acid, or another explosive chemical. Bulging containers or crystallized containers shall not be handled or opened. Contact EM&R for assistance.

To prevent sparking between the wrench and the bung when opening metal containers, sampling personnel should use brass or bronze-beryllium alloy, nonsparking bung wrenches. These wrenches have fittings made to remove nearly all commonly encountered bungs. If nonsparking bung wrenches are unavailable, sampling personnel can prevent sparking by grounding the wrench to the drum before fitting the wrench to the bung.

There are several techniques for grounding metal containers. One technique is to clip one end of a clip wire to the lip of the drum and attach the other end to the handle of the wrench. A second technique is to ground the drum to a true ground by attaching a bonding strap to the drum and connecting the strap to another grounded item. Then, sampling personnel attach a second bonding strap to the wrench and the grounded item. Both of these techniques require personnel to ensure good connections between the grounded items (drum and wrench) and the grounding element (clip wire or bonding strap attachments). Grounding is not required for polyethylene drums.

Sampling personnel can suffer from heat stress on very hot days or from frostbite or hypothermia during extremely cold weather during outdoor sampling activities. Personnel can minimize the potential for heat and cold stress during sampling operations by wearing the appropriate clothing under their PPE and drinking cold or warm beverages outside the sampling area, as appropriate to the season, to reduce the effects of thermal stress.

Biological hazards that may affect personnel performing sampling operations include stings from venomous insects and arachnids, hantavirus, and rattlesnake bites. Venomous insects and arachnids endemic to the Los Alamos area include bees and wasps, the brown recluse spider, the black widow spider, and the scorpion. To avoid stings by bees and wasps, sampling personnel should not use scented products (deodorants, hair spray, perfume, or cologne) that attract wasps and bees, and they should use insect repellant when appropriate, taking precautions to avoid contaminating the sampling equipment. Sampling personnel should wear heavy work gloves and examine the underside of any item under which a scorpion or spider could be hiding before moving the item. An area with mouse droppings should be assessed by an HSR-5 IH.

3.4 Personal Protective Equipment (PPE)

ENV-SWRC requires all sampling personnel to wear steel-toed shoes with skid-resistant rubber soles and chemical-resistant gloves during sampling activities. In addition, sampling personnel must wear the appropriate PPE as described in the site-specific safety plan. The PPE protects personnel during sampling operations that involve known or suspect atmospheric contamination; could generate vapors, gases, or particulates; or could involve direct contact with skin-affecting substances. Full-face respirators protect the lungs, gastrointestinal tract, and eyes against airborne toxicants. Chemical-resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals.

The Occupational Safety and Health Administration (OSHA) have divided PPE into four levels according to the degree of protection afforded (29 CFR § 1910.120). These levels of protection and the conditions warranting them are described in the following subsections.

3.4.1 Level A Personal Protective Equipment

OSHA recommends using Level A PPE when the highest level of respiratory, skin, and eye protection is needed. Level A PPE includes a pressure-demand, full-face, self-contained breathing apparatus (SCBA) or a pressure-demand supplied-air respirator with an escape SCBA; a fully encapsulating, chemical-resistant suit; inner chemical-resistant gloves; chemical-resistant safety shoes or boots; and two-way radio communication. Optional equipment includes a hard hat, coveralls, a cooling unit, long cotton underwear, and disposable protective suit, gloves, and boot covers. Any one of the following conditions may require the use of Level A PPE:

- The chemical and/or biological constituents of the waste to be sampled are unknown.
- The chemical constituents are known and hazardous substances have been measured at high concentrations, requiring the highest level of protection for skin, eyes, and respiratory system.
- Oxygen concentrations are less than 19.5 percent by volume.
- Site sampling operations present a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to the skin.
- Operations are conducted in confined, poorly ventilated areas, and the existence of hazardous substances in those areas has not been determined.

Occasionally, ENV-SWRC sampling activities at the Laboratory will require Level A PPE.

3.4.2 Level B Personal Protective Equipment

OSHA recommends using Level B PPE when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B PPE includes a pressure-demand, full-face, SCBA or a pressure-demand, supplied-air respirator with an escape SCBA; hooded chemical-resistant clothing; inner and outer chemical-resistant gloves; and chemical-resistant safety shoes or boots. Optional equipment includes coveralls, a face shield, long cotton underwear, and disposable boot covers. Any one of the following conditions require the use of Level B PPE, provided no condition is present requiring Level A PPE:

- Air contaminants have been identified and measured at concentrations immediately dangerous to life and health (IDLH), but do not represent a severe skin hazard.
- The atmosphere is such that more protection is required than that provided by an air-purifying respirator.
- The atmosphere contains less than 19.5 percent oxygen by volume (must use SCBA).
- The sampling event involves mixed waste that could contain tritium.

3.4.3 Level C Personal Protective Equipment

OSHA recommends using Level C PPE when the presence of airborne contaminants of known concentration and type require personnel to wear air-purifying respirators. Level C PPE includes chemical-resistant clothing, such as overalls and long-sleeved jacket; a hooded, one- or two-piece chemical splash suit or a disposable, chemical-resistant, one-piece suit; a full-face, air-purifying respirator; inner and outer chemical-resistant gloves; a hard hat; and chemical-resistant safety shoes or boots. Optional equipment includes coveralls, a face shield, disposable boot covers, and long underwear. Any of the following conditions may require the use of Level C PPE, provided no other condition is present requiring Level A or Level B PPE:

- Oxygen concentrations are greater than or equal to 19.5 percent by volume (i.e., an air-purifying respirator provides adequate protection and the use of an SCBA is not required).
- Measured air concentrations of identified substances will be reduced by the air-purifying respirator below the substance's threshold limit value (TLV) and the concentration is within the service limits of the air purifying canisters.
- Atmospheric contaminant concentrations do not exceed IDLH levels.
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing.

After reviewing the *Presampling Questionnaire and SSSP*, MSDSs, and radiological characterization documentation, the HSR-5 IH may routinely decide Level C PPE provides adequate protection.

3.4.4 Level D Personal Protective Equipment

OSHA recommends using Level D PPE only as a work uniform and not on any site where respiratory or skin hazards exist. It provides no protection against chemical hazards. Level D PPE includes coveralls or uniforms, safety glasses or goggles, and chemical-resistant, steel-toed safety shoes or boots and gloves. Optional equipment includes a hard hat, hearing protection, and a face shield. The existence of both of the following two conditions allows use of Level D PPE:

- No contaminants are present.
- Work activities preclude splashes, immersion, or potential for unexpected inhalation or other contact with hazardous levels of any chemicals.

For sampling operations where the type of chemical(s), concentration(s), and possibilities of contact are unknown, the PPE selected should be the highest level required by the potential hazards of the site, until the hazards are better identified. Personnel should always be conservative when selecting the level of protection.

4.0 PRESAMPLING ACTIVITIES

Sampling personnel complete a *Presampling Questionnaire and SSSP* using information from the RFA, information obtained during a telephone interview with the waste generator, and information noted during the presampling site assessment. This information enables sampling personnel to plan necessary coordination with other Laboratory groups and to identify the sampling and safety equipment needed for the sampling event.

Sampling personnel coordinate each sampling event with a team that could include an analytical chemist, a quality assurance specialist, and a RCRA compliance specialist. Team members evaluate the waste and provide guidance on the sample container type(s), methods of preservation and decontamination, and sizes and number of samples. Team members also evaluate the waste characterization disposal criteria. This information is often found in the disposal Waste Acceptance Criteria (WAC) such as the Envirocare WAC.

Sampling personnel must wear the PPE recommended by the HSR-5 IH and noted on the *Presampling Questionnaire and SSSP*. When sampling known or suspect radioactively contaminated waste, sampling personnel must contact HSR-1 personnel. An HSR-1 representative must survey the waste for radioactivity before the sampling event and recommend any precautions, such as shielding, that sampling personnel should use during the sampling event. If VOCs are suspected in the waste matrix, sampling personnel should request air monitoring from HSR-5 personnel. Sampling personnel should also consult HSR-5 personnel to determine hazards associated with confined spaces.

Immediately preceding the sampling event, sampling personnel, HSR-1 and HSR-5 personnel, and any site personnel involved in sampling operations (e.g., site safety officer, waste generator, WMC) must attend a safety briefing at which they review the *Presampling Questionnaire and SSSP*. All personnel attending the briefing must sign the document to indicate that the information and location map are accurate. If anyone is concerned about any safety issue, the sampling personnel must ensure that the site safety officer and the ENV-SWRC Compliance Sampling Coordinator are consulted before beginning sampling operations.

This section contains a sample *Presampling Questionnaire and SSSP*, and a *Presampling Preparation Checklist*. Sampling personnel should carry the checklist as a reminder of the activities that they must perform before each sampling event.

4.1 *Presampling Questionnaire and SSSP*

The Presampling Questionnaire and SSSP is to be completed by ENV-SWRC sampling personnel and an HSR-5 industrial hygienist (IH) prior to sampling wastes for which an analysis has been requested. The questionnaire will help the sampling personnel and IH determine the possible hazards and risks associated with the waste and at the sampling site. Sampling personnel must not perform sampling if they cannot ensure their personal safety and protection of the environment. If, after completing this questionnaire, sampling personnel are unsure about any aspect of the waste sampling event, they must contact the HSR-5 IH and, if applicable, the HSR-10, Hazardous Materials Response Group. Any "unknown" responses must be resolved by conducting a presampling site assessment. The Presampling Questionnaire and SSSP provide input to the JHA to determine the risk level of the sampling event and whether an IWD is required.

The Presampling Questionnaire and SSSP is provided separately from this plan so that it can be easily updated and modified to meet the needs of the sampling program.

5.0 GENERAL INSTRUCTIONS FOR SAMPLING PERSONNEL

This section describes activities that sampling personnel should perform before, during, and after a sampling event. The general instructions in this section highlight information about equipment and supplies; sample collection, preservation, packaging, and shipping; decontamination procedures; and documentation. By following these instructions and the specific guidelines contained in Section 6.0 of this plan, sampling personnel will ensure that the sample acquired is representative of the waste, thus providing scientifically valid and legally defensible analytical data. Sampling personnel must review the specific sampling guidelines before each sampling event.

All individuals in the sampling area must wear PPE appropriate for their tasks and must follow the approved SSSP requirements. The person(s) collecting samples and filling sample containers must change gloves between samples. Sampling personnel may contact analytical personnel for guidance during the planning process and can refer to Appendix A of this plan for container and preservation guidelines. As a general rule, a minimum of two persons are required (i.e. "the buddy system") for safety during sampling activities. **Sampling personnel must not eat, drink, smoke, apply lip balm, chew tobacco, or gum while sampling or while in the work area.** Sampling personnel must dispose of used, disposable equipment and gloves; used ampules and wipes; contaminated containers; and any other waste generated during sampling operations in the appropriate waste container on site. The waste generator who requested the analysis is responsible for this waste.

5.1 Presampling Activities

Field preparation requires organizing sample container(s), sample label(s), and documentation in an orderly, systematic manner that promotes consistency and traceability of all data. Sampling personnel should perform the following activities before each sampling event.

- Identify the sampling team
- Consult analytical personnel for guidance on sample containers, preservatives, and holding times
- Consult waste management groups
- Consult with other applicable laboratory groups
- Complete a Presampling Questionnaire and SSSP (Section 4.0)
  Prepare DQOs (ENV-SWRC-QP-113)
- Review and discuss specific plans, safety issues and considerations, procedures, and QA/QC concerns applicable to each sampling event
- Assemble sample containers, labels, checklists, COC seals and form
- Prepare equipment and supplies

5.2 Sampling Activities

Once on site, the sampling personnel expeditiously collect, label, preserve (if appropriate), package, store, and transport the samples to ensure that holding times are not exceeded and hence analytical results are viable. Throughout this process, sampling personnel document COC for the samples using a *COC Record* discussed in Section 2.11 of this plan. Sampling personnel record all pertinent information (e.g., date, time, site, sample location) in the field logbook. Sampling personnel follow these guidelines during the sampling event:

5.2.1 Representative Samples

The collected samples must be representative of the entire waste volume; a sufficient number of samples must be taken. This plan does not describe representative sampling strategies in detail. References to specific EPA guidance for collecting representative samples are provided in Section 2.2. The strategy for ensuring representative samples should be determined by sampling personnel and documented in the Date Quality Objective (DQO) or the Systematic Planning Process (SPP). Sampling personnel must follow the sampling strategy described in the DQO and document any necessary information in the sampling logbook.

5.2.2 Sample Container(s)

Sample containers vary according to the matrix and nature of the sample to be collected. Wide-mouth containers are generally used for soils and solid wastes; narrow-mouth containers are used for liquid samples. Sampling personnel consult with analytical personnel and use Appendix A to determine the number and type of containers required for the sampling effort. Sampling personnel determine the number of each type of container required by including duplicates and blanks with the number of collection samples. Sample containers must meet the EPA requirements for Level 1 preserved and unpreserved sample containers.

5.2.3 Sample Labels

Sample labels are necessary to prevent sample misidentification. Preprinted sample labels ensure that sampling personnel do not omit necessary information. Sampling personnel must attach a sample label to each sample they collect. After collecting the sample, sampling personnel secure the cap, apply the integrity seal, and complete the label using indelible blue or black ink. Sample labels may be filled out before collection to minimize handling of the sample containers. Sample labels are described in more detail in Section 2.11 of this plan.

5.2.4 Radioactive Materials Survey Tag

ENV-SWRC personnel who sample hazardous materials and PCBs or who sample materials that have been in a RCA can encounter materials with known or unknown radioactive constituents. A Health Physics RCT must complete a survey tag for this material before ENV-SWRC personnel can accept any radioactive wastes. Sections which must be completed include:

Section 1 Item Description: The RCT must describe the item, including the bar code number and the category of the material.

Section 2 Survey of Bare Materials: Background: Because *bare materials* can be interpreted differently by RCTs at different technical areas, it is necessary for ENV-SWRC sampling personnel to convey to the generating group the ENV-SWRC has a specific definition of *bare materials*.

- Bare Materials: The only acceptable definition of *bare materials* for ENV-SWRC personnel is "the primary container housing the waste".
- Baggies: Baggies are not acceptable as primary containers, and ENV-SWRC sampling personnel cannot accept a material that has only had the baggie smeared for radiation. If the primary container cannot be deemed radiation free, the generating group must either clean the container or recontainerize the material. Baggies can be used as separation material for containers.
- Contamination Survey Results: This portion of the survey tag must show that there is no detectable amount of radiation in each category.

Section 3 External Radiation Survey Results: Not Applicable: This portion of the survey tag does not need to be completed because the information is addressed in Section 6 of the survey tag.

Section 4 Survey of Packaged/Shielded Material: Removable Contamination: This portion of the survey tag contains the results of the removable contamination survey. Each category should be completed by the RCT, as necessary.

Section 5 External Radiation Survey Results: Material Measurement: This portion of the survey tag must be completed before the sample pickup can occur. The material must be measured at contact, at 30 cm (1ft) and a 1 m. If measurements exceed 0.5 mrem/hr, ENV-SWRC sampling personnel cannot accept the material and should contact SUP-3 to have the material transported.

Section 6 Instrument Information: The RCT makes the determination of whether the instrument manufacturer's information is applicable to the material being released and fills in this portion of the survey tag, as necessary.

Section 7 General Comments

- Comments: This portion of the survey tag is available for any comments or controls that the RCT might insert.
- Signature: The survey tag must always be signed and dated by the RCT.

Section 8 Individual Authorizing Release: Signatures: This portion of the tag can either be completed by the line manager who is acting as the material generator or by the ENV-SWRC sampling personnel who accepts and transports the material.

Records None. All radioactive materials survey tags are generated by HSR-5 RCTs and stay with the material continuously. HSR-5 maintains records of the tags.

5.2.5 Sample Volume

Sampling personnel must collect a sufficient volume of sample to ensure all the required analyses can be performed, and to provide for any quality control needs, split samples, or repeat laboratory procedures. The volumes listed in Appendix A are general guidelines. Sampling personnel consult analytical personnel to confirm sample volume limits.

5.2.6 Sample Preservation

CAUTION: When adding preservatives or other solutions (e.g., acids, bases, or water) to wastes, dangerous chemical reactions might occur. For example, adding acid to wastes that contain cyanide or sulfide can produce hydrogen cyanide gas or hydrogen sulfide gas, respectively. Both of these gases are toxic. It is extremely important that sampling personnel consult with analytical personnel before sampling these waste types. Preservatives should not be added to orphan or unknown wastes.

Sampling personnel determine preservation requirements for specific analyses in consultation with analytical personnel. Sampling personnel may use Appendix A as a reference. When recommended by analytical personnel, sampling personnel will add preservatives at the time of sampling. Materials commonly needed for sample preservation are listed below.

- Reagent-grade acids (HNO_3, HCl, and H_2SO_4) in premeasured ampules
- Ascorbic acid crystals
- pH paper
- Lead acetate paper
- Small bottles of pelletized NaOH

Precleaned sample containers, preservatives, equipment, and packaging containers are stored at ENV-SWRC in the secure sample management room.

5.2.7 Field Logbook

Sampling personnel enter all information pertinent to the sampling activity in a bound logbook with consecutively numbered pages. Sampling personnel must follow procedures outlined in Section 2.11 of this plan for completing the logbook.

5.2.8 Sample Collection

Sampling personnel use the specific guidelines provided in Sections 6.0, 7.0, and 8.0 of this plan for handling, collecting, packaging, and transporting samples. Liquid samples present a safety hazard due to the potential for spilling and splashing. Precautions should be taken to protect eyes, hands and body when sampling and handling liquids. This may be accomplished using safety glasses, splash shields, gloves, aprons and other PPE.

5.2.9 Chain of Custody

Sampling personnel must complete a *COC Record,* affix the integrity seal to the sample container, and ensure that they can account for the sample at all times until the sample is relinquished to analytical personnel. (Section 2.11 of this plan provides detailed instructions on COC procedures and forms.)

5.3 Post-Operation Activities

Sampling personnel must verify that all sample bottles have been correctly identified and labels have sample number, preservatives, date, and time. Also, sampling personnel must cross-check label information for filled sample bottles against information recorded in the field logbook. Sampling personnel must confirm that used equipment has been decontaminated as required and that PPE has been disposed of in an approved waste disposal area. Further, sampling personnel maintain custody of filled sample bottles (with integrity seal affixed) by keeping them in their possession, within view, locked or sealed to prevent tampering, or bring them into an area under lock and key with controlled access. Finally, sampling personnel prepare samples for transport to analytical facilities complying with applicable DOT regulations (see Section 8.0 of this plan).

5.4 General Sampling Guidelines for Liquids

This section addresses general sampling guidelines for liquids and groundwater, as well as liguids sampled at the point of generation. Section 6.0 of this plan contains specific sampling procedures. Sampling personnel follow the guidelines outlined below for collecting liquid samples:

5.4.1 Sample Collection

- Before collecting samples for organics or cyanide analysis, determine if residual chlorine and sulfides are present. If chlorine and/or sulfides are present, preserve samples according to analytical personnel's instructions.
- Take extreme care to avoid contaminating the sample containers or caps. Remove the cap just before filling and replace it as soon as possible after filling. Avoid touching the inside of the bottle or cap.
- Decide whether or not to filter the sample based on the objectives of the project. For example, water samples used for human health risk assessment should be analyzed in the form most likely to be ingested by those at risk, i.e., unfiltered. Samples under investigation for geochemical properties could be collected as filtered AND unfiltered samples. The requirement to filter or not filter is established by the needs of the project and is written into the sample collection work plan.
- Slowly fill each container almost full, except volatile organic analyte (VOA) vials. Section 5.6 of this plan provides guidelines for organic analytes in liquid or solid matrices.

5.4.2 Sample Preservation

- If required for a particular type of analysis, add the prescribed preservative. After adding preservative, slowly invert the vial to mix.
- If required by analytical laboratory or ENV-SWRC protocol, place the sample in a cooler. Maintain the samples at a cool temperature with frozen Blue Ice or water ice. Avoid freezing the sample by packing it with vermiculite to prevent contact between the coolant and the sample container.
- Do not expose the sample to extreme hot or cold temperatures and intense sunlight, even if no specific preservation is recommended.
- Deliver the samples to the analytical laboratory as soon as practicable.

5.5 General Sampling Guidelines for Solids

This section addresses general sampling procedures for solids, soils, sludge, sediment, and bulk material. Section 6.0 of this plan contains specific sampling procedures. Sampling personnel follow the guidelines outlined below for collecting samples from solid matrices:

5.5.1 Sample Collection

- Use EPA clean containers to protect the sample from contamination.
- When sampling wet soils, leave enough headspace in the bottle to allow for expansion.
- Take extreme care to avoid contaminating the bottles or caps. Remove the cap just before filling and replace it as soon as possible after filling. Avoid touching the inside of the bottle or cap.

5.5.2 Sample Preservation

- If required by analytical or ENV-SWRC protocol, place the container in a cooler. Maintain the samples at a cool temperature with frozen Blue Ice. Avoid freezing the sample by packing it with vermiculite to prevent contact between the coolant and the sample container.
- Do not expose the sample to extreme hot or cold temperatures and intense sunlight, even if no specific preservation is recommended.
- Deliver the samples to the analytical laboratory as soon as practicable.

5.6 Specific Sampling Guidelines for Organic Analytes in Liquid or Solid Matrices

Special precautions must be taken to maintain sample integrity when analyzing for VOCs or semi-VOCs. In addition to the general sampling guidelines described for liquids and solids in Sections 5.4 and 5.5 of this plan, sampling personnel follow the guidelines outlined below for collecting liquid or solid matrix samples to be analyzed for organic analytes:

5.6.1 VOCs

- To monitor possible contamination, prepare a trip blank before leaving ENV-SWRC for the sampling site from organic-free reagent water. Carry the trip blank throughout sampling, storage, and transportation.

- Do not collect or store samples in the presence of exhaust fumes from vehicles, equipment, or machinery.

- Collect only grab samples. Compositing samples poses an unknown safety risk; do not composite samples of unknown wastes with suspect organic components.

- *Liquids.* Use standard 40-mL glass, screw-cap VOA vials with Teflon-lined silicone septa for liquid samples. Introduce liquids into the vials gently to reduce agitation that might drive off volatile compounds. Pour liquid samples into the VOA vial without introducing any air bubbles within the vial as it is being filled. If bubbling occurs, discard the sample and collect another sample in a new VOA vial. Each VOA vial should be filled until a meniscus is over the lip of the vial. The vials should be completely filled at the time of sampling so that when the septum cap is fitted and sealed (Teflon side toward the sample) and the vial inverted, no headspace is visible. If there are any air bubbles, recollect the sample.

- *Solids.* Use standard 40-mL glass; screw-cap VOA vials with Teflon-lined silicone septa for samples with solid or semi-solid matrices. Introduce the solids into the vials gently to reduce agitation that might drive off VOCs. VOA vials should be completely filled. The VOA vials should be tapped slightly as they are filled to eliminate free air space.

- Seal each VOA vial in a separate plastic bag to prevent cross-contamination between samples, particularly if the sampled waste is suspected of containing high levels of volatile organics. VOA samples may also be contaminated by diffusion of VOCs through the septum during transportation and storage at analytical facilities.

5.6.2 Semi-VOCs (Including Pesticides, PCBs, and Herbicides)

- Do not collect or store samples in the presence of exhaust fumes.

- Collect only grab samples. Compositing of samples poses an unknown safety risk; do not composite samples of unknown, suspect organic analytes.

- Containers used to collect semivolatile organic compounds samples should be specially cleaned or cleaned with a soap and water wash followed by methanol or isopropanol rinsing. The sample containers should be glass or Teflon and have screw-caps with Teflon-lined septa. Plastic containers or lids may NOT be used. To avoid any possible contamination, sample containers should be filled with care to prevent any portion of the collected sample coming in contact with the sampler's glove.

5.7 Equipment Decontamination

Equipment decontamination is the removal or neutralization of contaminants that have accumulated. Sampling personnel use disposable sampling equipment whenever possible to minimize the need for equipment decontamination. However, some types of sampling equipment (e.g., soil auger, bucket bailer, and Bacon Bomb) will require decontamination to prevent cross-contamination of samples collected in the field and thereby assure the accuracy and validity of analytical data. Equipment decontamination also prevents the possible mixing of incompatible chemicals, as well as the uncontrolled spread of potentially hazardous substances from the sampling site to transport vehicles, other sampling equipment, and PPE. To ensure that equipment does not become cross-contaminated, sampling personnel should, whenever possible, place monitoring and nondisposable sampling equipment in plastic bags and make openings for sample ports and sensors that must contact site materials. This section does not address radioactive decontamination of sampling equipment. Sampling personnel should contact HSR-1 for assistance in radioactive decontamination whenever necessary.

All sampling equipment leaving the sampling site (referred to as the exclusion zone) must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to the equipment. Decontamination methods include physical removal, chemical inactivation, or a combination of physical and chemical means. In most cases, gross contamination can be removed by physical means using scrub brushes and water, washing with detergent solution, rinsing several times with tap water, rinsing with distilled water, wiping off excess water, and air drying. For sampling equipment that may have been used to sample organic products, petroleum products, and oil residues, it may be necessary to first wipe the sampling equipment with an absorbent cloth, then rinse with an organic solvent followed by a detergent solution and rinsing with water. Sampling personnel should ensure adequate ventilation when using organic solvents for equipment decontamination. Also, when using the same equipment for multiple samples, sampling personnel should prepare equipment rinsate blanks (Section 2.3.1) after decontaminating equipment. All rinsate, used absorbent cloths, and decontamination solutions should be disposed of properly in an approved waste container appropriate for the waste type.

5.8 General Sampling Equipment and Supplies Checklist

Sampling personnel can use the *General Sampling Equipment and Supplies Checklist* (Checklist 5-1) to prepare for a sampling event. They can also use summary information provided in Flowchart 6-1 and in a quick reference card in Appendix C of this plan.

CHECKLIST 5-1

General Sampling Equipment and Supplies Checklist

Forms and General Equipment

__________ Field Logbook
__________ COC/RFA
__________ First-aid kit

Sample Containers - Based on Specific Procedures

__________ Narrow-mouth amber glass bottles with Teflon-lined caps (0.5, 1.0, and 2.0 L)
__________ Wide-mouth polyethylene bottles (0.5, 1.0, and 2.0 L)
__________ 250-mL sterile bottle
__________ Glass vials with Teflon-lined septa (40 mL)
__________ New or cleaned polyethylene narrow-mouth bottles (1.0 L and 500, 125, and 60 mL)

Sampling Materials

__________ Ballpoint pen (permanent blue or black ink)
__________ Felt-tip marker pen (permanent blue or black ink)
__________ Disposable nitrile gloves
__________ Pipette with disposable tips
__________ NaOH pellets
__________ Kimwipes
__________ Ascorbic acid crystals
__________ Crystalline $Na_2S_2O_3$
__________ Methanol and deionized water in Teflon wash bottles
__________ Concentrated HNO_3, H_2SO_4, and HCl (5 mL "Toss-It" ampules)
__________ Field test kit for sulfides, when required
__________ Field test kit for chlorine, when required
__________ Clipboards (optional)
__________ Deionized water
__________ Paper towels
__________ Stop watch
__________ pH meter

Shipping Material for Analytic Facilities

__________ Thermometer
__________ Insulated coolers
__________ Blue Ice
__________ Sample labels
__________ Vermiculite or bubble-wrap of samples
__________ Ziplock bags
__________ Integrity seals
__________ Heavy-duty poly bags and ties
__________ Plastic trash can liners
__________ Strapping tape
__________ Other equipment specified in specific procedures, Section 6.0 through 6.8

6.0 SAMPLING PROCEDURES

Sections 6.1 through 6.8 describe specific procedures, equipment checklists, and figures for equipment currently used by sampling personnel to obtain liquid, solid, soil, and bulk material samples. The sections are designed to be pulled out separately for use during the sampling event. During presampling activities, sampling personnel should determine the appropriate sampling equipment for the waste matrix sampled and the amount of sample needed. Appendix B lists sampling equipment recommended for various waste types. EPA-530-D-02-002 RCRA Waste Sampling Draft Technical Guidance and SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods are recommended guidance documents for following correct sampling protocol and achieving representativeness in a waste material. Figure 6-1 highlights activities performed before, during, and after a sampling event. All procedures must be performed by a two person team, following the Laboratory's buddy system. One person collects the sample (in the exclusion zone) while the other remains outside the exclusion zone and completes QA records, the field logbook, and sample labels. The person outside the exclusion zone can assist or call for help in an emergency.

Sampling personnel should ensure that they review the health and safety concerns listed below before each sampling event. These concerns should be discussed during the safety briefing at the sampling site immediately preceding the sampling event.

- Sampling personnel must ensure that analytical recommendations are being followed.
- All individuals in the sampling area must wear PPE appropriate for their tasks and follow the SSSP requirements.
- The person collecting samples and filling sample containers must change his or her gloves between samples.
- Sampling personnel must not eat, drink, smoke, apply lip balm, or chew tobacco or gum while sampling.
- Sampling personnel must dispose of all waste generated during sampling operations in the waste container provided by the generator.
- Where radioactivity is known or suspected to be present, sampling personnel must follow instructions for radiological safety on the *Presampling Questionnaire and SSSP* and must ensure that the following safety requirements are observed:
  - An HSR-1 RCT has monitored the waste and is present at the site to monitor the work area for radioactivity throughout the sampling event.
  - Any shielding recommended by the HSR-1 RCT is used.
  - The hood, if used, must be certified by HSR-5 before use.
  - If needed, a RWP has been obtained.

- The sample is packaged according to DOT regulations (see Section 8.0).

- Self-monitoring is performed before leaving the site.

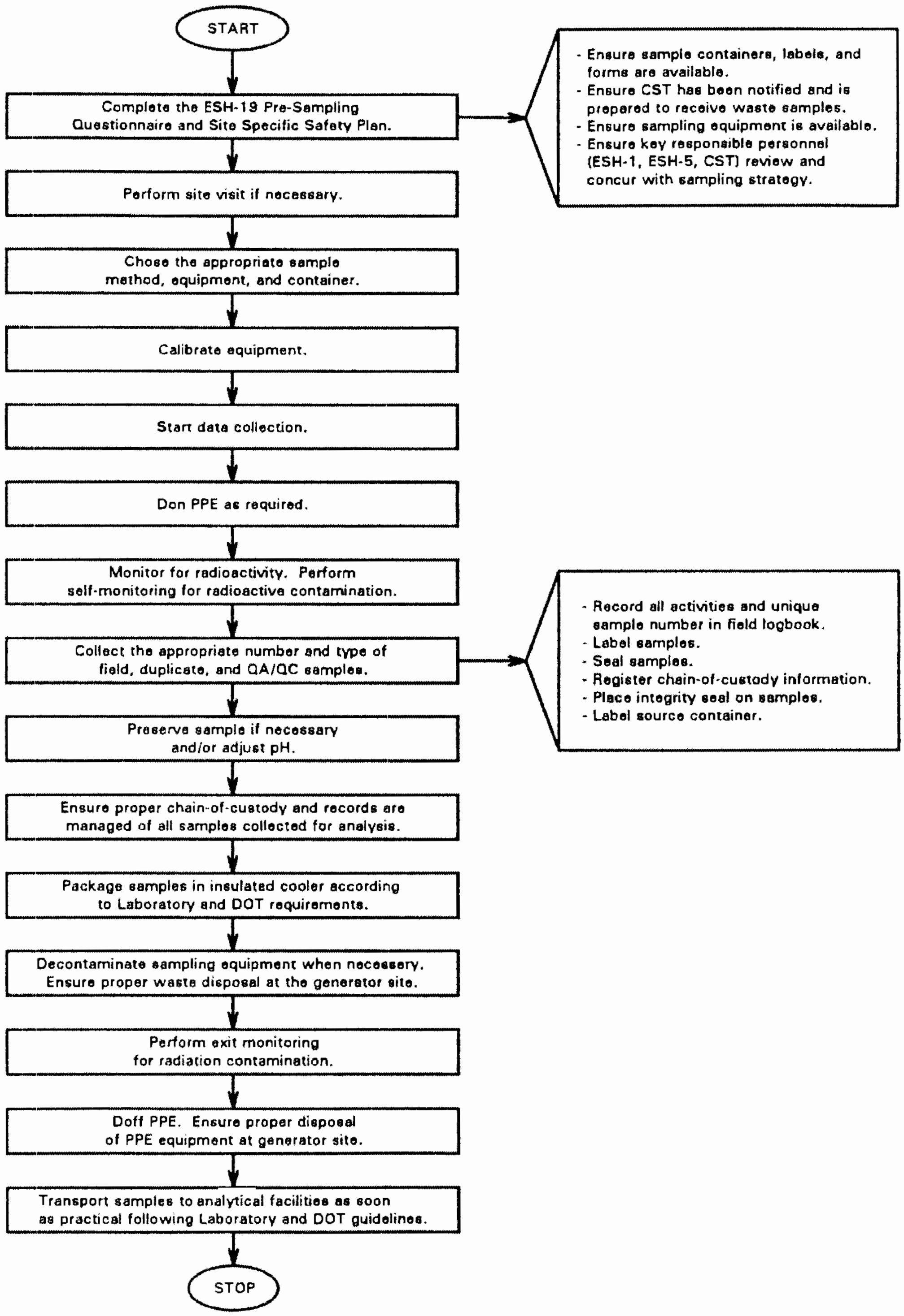

FIGURE 6-1
Sampling Event Flowchart

6.1 Sampling Liquid Containerized Wastes Using Glass or Plastic Tubes

This method is a quick means of collecting concentrated, containerized, liquid wastes or bottom sludges. It requires a two-person sampling team. Tubes are made of glass or rigid plastic. Use plastic tubes when hydrofluoric acid waste is suspected. Use tubes of material similar to the waste container if the container is not corroding or degrading.

NOTE: If a reaction is observed (agitation, smoke, light, etc.) when the glass tube is inserted in the drum or sample container, leave the area immediately, contact the site safety officer, and document the occurrence. While using a glass tube, a smoke reaction indicates the probable presence of hydrofluoric acid; a plastic tube may be substituted after consultation with the site safety officer and the waste generator.

Guidelines - Liquids

1. Review health and safety concerns, Section 6.0 of this plan.

2. Don PPE.

3. Remove the cover or bung from waste container.

4. Insert the glass or plastic tube slowly to almost the bottom of the container. Keep some of the tube above the top of the container.

5. Allow the waste in the drum to reach its natural level in the tube.

6. Cap the top of the tube with a safety-gloved thumb or a rubber stopper.

7. Slowly withdraw the tube from the waste container with one hand while wiping the tube with a disposable cloth or rag with the other hand.

8. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.

9. Insert the uncapped end of the tube in the sample container.

10. Release the thumb or stopper on the tube and allow the sample container to fill to approximately 90 percent of its capacity.

    See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

11. Repeat Steps 4 through 10 if more volume is needed to fill the sample container.

12. Cover the waste container or drum opening when working with the sample and recording information.

13. Add preservative to the sample container, if required.

14. If using an acidic or caustic preservative, check the pH adjustment with the pH meter.

15. If necessary, add more preservative to achieve the desired pH.

16. If an error is made in collection or preservation, discard the entire sample container into the appropriate waste container and start with a new one.

17. Cap the sample container tightly with a Teflon-lined cap.

18. With the cap firmly in place, clean the exterior of the bottle with a wipe moistened with deionized water, followed by a wipe moistened with methanol.

19. Attach the completed integrity seal and self-adhesive sample label.

20. Refrigerate the sample in the insulated cooler, if required by analytical laboratory's protocol.

21. Record information in the field logbook.

22. Complete the sample analysis request sheet and chain-of-custody record.

23. Collect duplicate samples following the steps outlined above.

24. Prepare the QA/QC samples (see Section 2.3 of this plan).

25. At the end of the sampling event, remove the tube from the sample container and dispose of it in the provided waste disposal container. Dispose of used rags/wipes in the appropriate waste container.

26. Replace and secure the bung and/or cover on the drum or waste container.

27. Doff PPE and dispose of it in an approved waste container.

Guidelines - Sampling Bottom Sludge

1. Review health and safety concerns, Section 6.0 of this plan.

2. Don PPE.

3. Remove the cover or bung from the waste container.

4. Insert the glass or plastic tube slowly to almost the bottom of the container. Keep some of the tube above the top of the container.

5. Allow the waste in the drum to reach its natural level in the tube.

6. Gently push the tube towards the bottom of the drum into the sludge layer. Do not force it.

7. Cap the top of the tube with a safety-gloved thumb or a rubber stopper.

8. Slowly withdraw the tube from the waste container with one hand while wiping the tube with a disposable cloth or rag with the other hand.

9. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.

10. Insert the uncapped end of the tube in the sample container.

11. Release the thumb or stopper on the tube and allow the sample container to fill to approximately 90 percent of its capacity. If necessary, the sludge plug in the bottom of the tube should be dislodged with a stainless steel laboratory spatula. Decontaminate or discard the spatula in the provided waste container.

    See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

12. Repeat Steps 4 through 11 if more volume is needed to fill the sample container.

13. Cover the waste container or drum opening when working with the sample and recording information.

14. Add preservative to the sample container, if required.

15. If using an acidic or caustic preservative, check the pH adjustment with the pH meter.

16. If necessary, add more preservative to achieve the desired pH.

17. If an error is made in collection or preservation, discard the entire sample container into the appropriate waste container and start with a new one.

18. Cap the sample container tightly with a Teflon-lined cap.

19. With the cap firmly in place, clean the exterior of the bottle with a wipe moistened with deionized water, followed by a wipe moistened with methanol.

20. Attach the completed integrity seal and self-adhesive sample label.

21. Refrigerate the sample in the insulated cooler, if required by analytical laboratory's protocol.

22. Record information in field logbook.

23. Complete the sample analysis request sheet and COC record.

24. Collect duplicate samples following the steps outlined above.

25. Prepare the QA/QC samples (see Section 2.3 of this plan).

26. At the end of the sampling event, remove the tube from the sample container and discard in the provided waste disposal container. Dispose of rags/wipes in the appropriate waste container.

27. Replace the bung and/or cover on the drum or waste container.

28. Doff PPE and dispose of it in an approved waste container.

CHECKLIST 6-1

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Liquid Containerized Wastes Using Glass or Plastic Tubes

__________ PPE
__________ Glass tubes (rigid plastic tubes when necessary)
__________ Sample containers and preservatives
__________ Spatula
__________ pH meter
__________ Storage containers for waste decontamination rinsate (if needed)
__________ Kimwipes
__________ Parafilm
__________ Insulated coolers
__________ Blue ice
__________ Vermiculite for packaging of samples
__________ Plastic sheet
__________ Filtering apparatus (if needed)
__________ Camera and film (if needed)
__________ Field logbook
__________ Chain-of-Custody/Request for Analysis forms
__________ Integrity seals
__________ Sample labels
__________ Any additional equipment and supplies listed in associated procedures

6.2 Sampling Containerized Waste Using the Composite Liquid Waste Sampler

The composite liquid waste sampler or COLIWASA (Figure 6-2) is designed to permit representative sampling of stratified liquid wastes from drums and other containerized wastes. COLIWASAs are made from plastic or glass. Use glass COLIWASAs to sample all containerized liquid wastes (including those collected for VOAs) and those wastes known or suspected to contain ketones, nitrobenzene, dirnethylformamide, mesityl oxide, and tetrahydrofuran. Use plastic COLIWASAs to sample wastes known or suspected to contain strong alkali or hydrofluoric acid solutions.

Guidelines

1. Review health and safety concerns, Section 6.0 of this plan.
2. Don PPE.
3. Choose either a glass or plastic COLIWASA.
4. Ensure that the COLIWASA is clean.
5. Ensure that the COLIWASA is functioning properly. Adjust the locking mechanism if necessary so that the stopper provides a tight closure.
6. Put the COLIWASA stopper in the open position.
7. Slowly lower the COLIWASA into the liquid waste at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a nonrepresentative sample.
8. When the COLIWASA stopper reaches the bottom of the waste container, slowly close the sampler.
9. Slowly withdraw the COLIWASA from the waste container with one hand while wiping the COLIWASA tube with a disposable cloth or rag with the other hand so any excess is returned to the original container.
10. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.
11. Position the lower end of the COLIWASA in a sample container. Carefully discharge the sample into the sample container by slowly pulling the lower end of the handle away from the locking block.

    See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.
12. Repeat Steps 4 through 11 if more volume is needed to fill the sample container.
13. Cover the waste container or drum opening when working with the sample and recording information.
14. Add preservative to the sample container, if required.
15. If using acidic or caustic preservative, check the pH adjustment with the pH meter.

16. If necessary, add more preservative to achieve the desired pH.

17. If an error is made in collection or preservation, discard the entire sample container into the appropriate waste container and start with a new one.

18. Cap the sample container with a Teflon-lined cap.

19. Attach the completed integrity seal and self-adhesive sample label.

20. Refrigerate the sample in the insulated cooler, if required by analytical protocol.

21. Record information in the field logbook.

22. Complete the chain-of-custody record.

23. Collect duplicate samples following the steps outlined above.

24. Prepare the QA/QC samples (see Section 2.3 of this plan).

25. At the end of the sampling event, clean the COLIWASA on site or dispose of the contaminated disposable sampler in the appropriate waste container. Dispose of rags/wipes in the appropriate waste container.

26. Replace the bung and/or cover on the waste drum or container.

27. Doff PPE and dispose of it in an approved waste container.

CHECKLIST 6-2

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Containerized Waste Using a COLIWASA

__________ PPE
__________ COLIWASA, glass or plastic
__________ Sample containers and preservatives
__________ pH meter
__________ Storage containers for waste decontamination rinsate (if needed)
__________ Kimwipes
__________ Insulated coolers
__________ Blue ice
__________ Vermiculite for packaging of samples
__________ Plastic sheet
__________ Filtering apparatus (if needed)
__________ Camera and film (if needed)
__________ Field logbook
__________ Chain-of-Custody/Request for Analysis forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

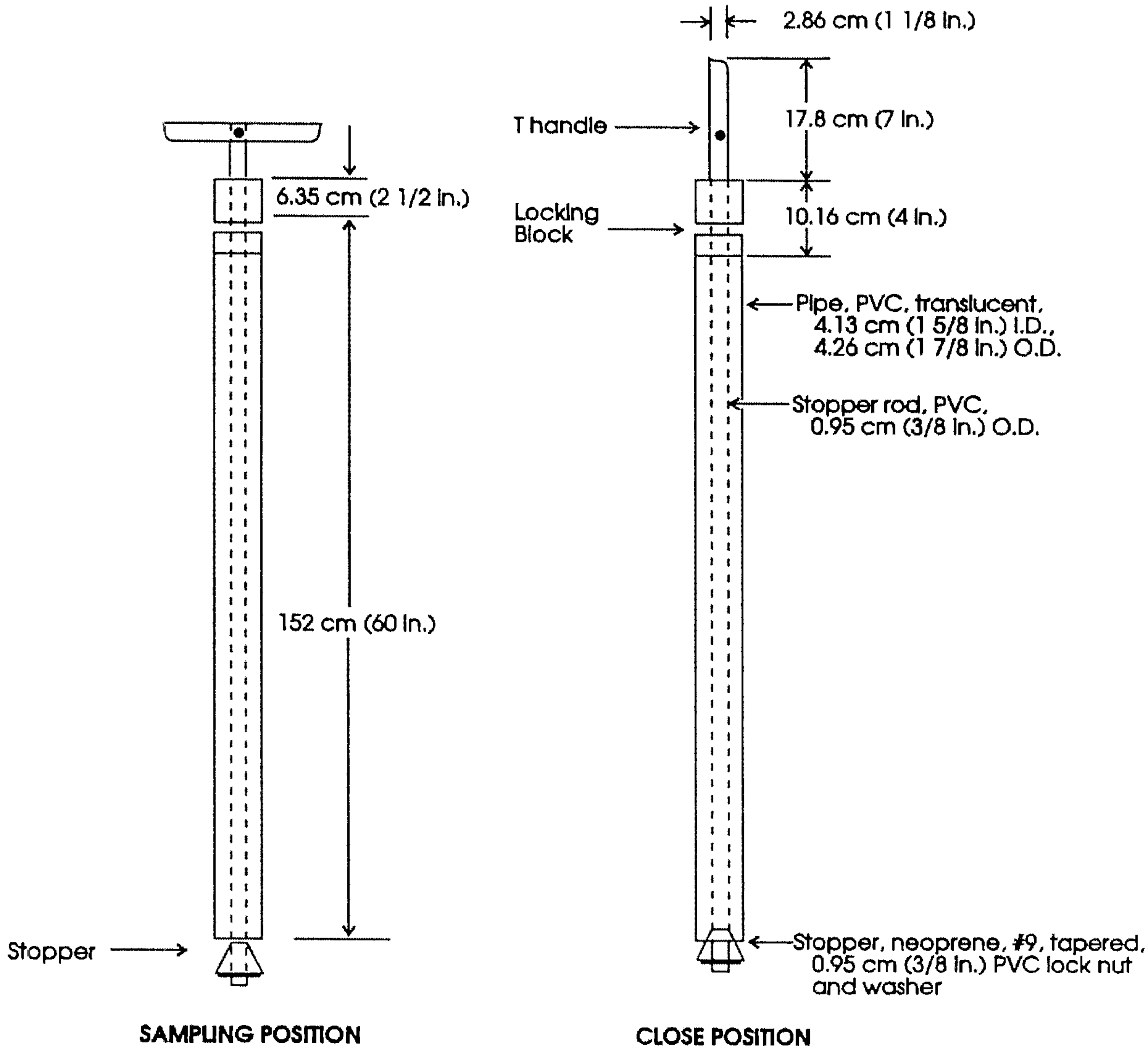

FIGURE 6-2
Composite Liquid Waste Sampler
(COLIWASA)

6.3 Sampling Containerized Wastes Using the Bacon Bomb

The bacon bomb (Figure 6-3) is designed for withdrawing samples of containerized waste from various levels within a storage tank. The bacon bomb is a heavy sampler best suited for viscous materials held in large storage tanks or lagoons.

Guidelines

1. Review health and safety concerns, Section 6.0 of this plan.
2. Don PPE.
3. Attach the sample line and the plunger line to the sampler.
4. Measure and then mark the sample line at the desired length (based on tank depth).
5. Gradually lower the sampler by the sample line until the desired level is reached.
6. When the desired length is reached, pull up on the plunger line and allow the sampler to fill for a sufficient length of time before releasing the plunger line to seal off the sampler.
7. Retrieve the sampler by the sample line being careful not to pull up on the plunger line. This prevents accidental opening of the bottom valve.
8. Rinse or wipe the exterior of the sampler body.
9. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.
10. Position the sampler over the sample container and release the contents by gently pulling on the plunger line.

    See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

11. Repeat Steps 5 through 10 if more volume is needed to fill the sample container.
12. Add preservative to the sample container, if required.
13. If using an acidic or caustic preservative, check the pH adjustment with the pH meter.
14. If necessary, add more preservative to achieve the desired pH.
15. If an error is made in collection or preservation, discard the entire sample container into the appropriate waste container and start with a new one.
16. Cap the sample container with a Teflon-lined cap.
17. Attach the completed integrity seal and self-adhesive sample label.
18. Refrigerate the sample in the insulated cooler, if required by analytical protocol.
19. Record information in the field logbook.

20. Complete the sample analysis request sheet and chain-of-custody record.

21. Collect duplicate samples following the steps outlined above.

22. Prepare the QA/QC samples (see Section 2.3 of this plan).

23. Decontaminate the bacon bomb on site according to the guidelines in Section 5.7 of this plan, or dispose of the contaminated sampler in the appropriate waste container. Dispose of used rags and decontamination washings in the appropriate waste container.

24. Doff PPE and dispose of it in an approved waste container.

CHECKLIST 6-3

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Containerized Wastes Using a Bacon Bomb

__________ PPE
__________ Bacon Bomb sampler
__________ Sample containers and preservatives
__________ pH meter
__________ Storage containers for waste decontamination rinsate (if needed)
__________ Kimwipes
__________ Stiff brush
__________ Insulated coolers
__________ Blue ice
__________ Vermiculite for packaging of samples
__________ Plastic sheet
__________ Filtering apparatus (if needed)
__________ Camera and film (if needed)
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

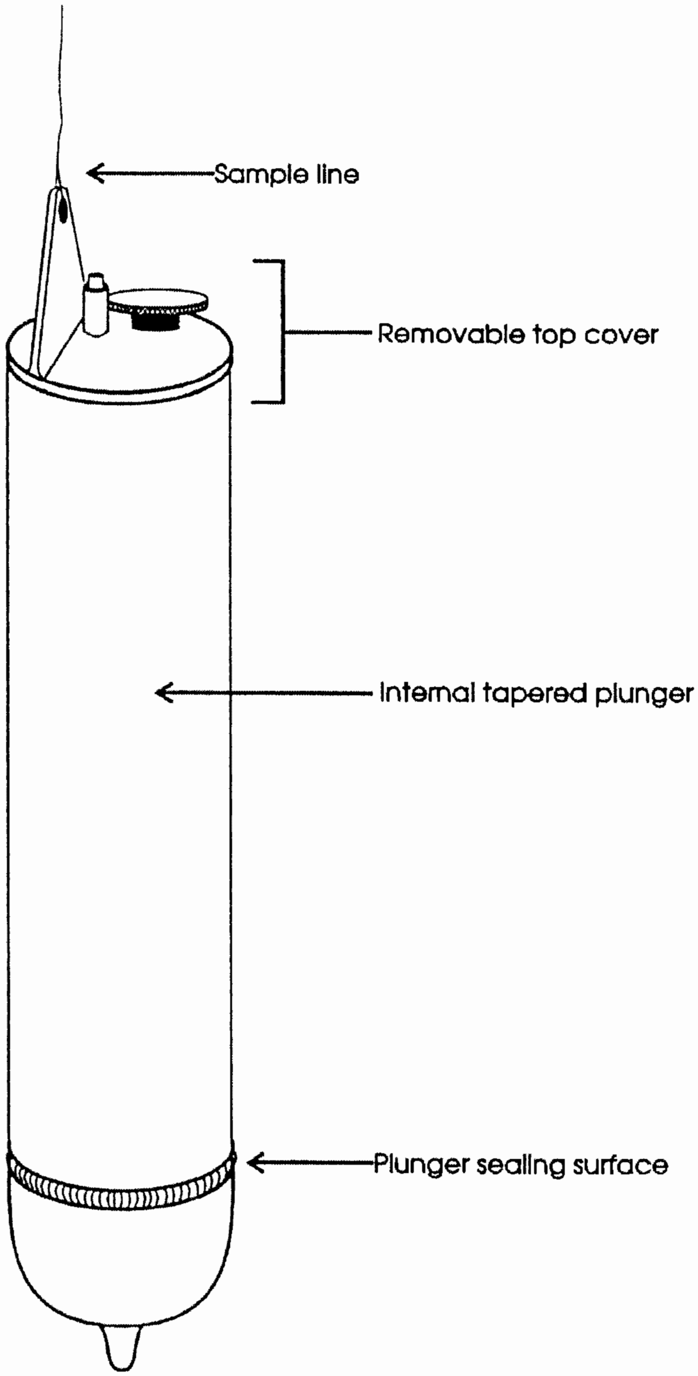

FIGURE 6-3
Bacon Bomb

6.4 Sampling Monitoring Wells with a Bucket Bailer

Bailers are the simplest means of collecting groundwater samples (Figure 6-4). Bucket bailers are tall narrow buckets equipped with a check valve on the bottom. This valve allows water to enter from the bottom as the bailer is lowered, then prevents its release as the bailer is raised. Although top-filling bailers are available and may be useful for well-purging, they generally cause increased sample turbulence and are not recommended for obtaining samples.

The bucket bailer is useful when samples must be recovered from depths greater than the range (or capability) of suction lift pumps, when volatile stripping is of concern, or when well casing diameters are too narrow to accept submersible pumps. It is the method of choice for collecting samples that are susceptible to volatile component stripping or degradation due to the aeration associated with most other recovery systems. Samples can be recovered with minimal aeration if care is taken to gradually lower the bailer until it contacts the water surface and is then allowed to sink as it fills. The primary disadvantages are their limited sample volume and inability to collect a discrete sample from a depth below the water surface.

<u>Guidelines</u>

1. Review health and safety considerations, Section 6.0 of this plan.
2. Don PPE.
3. Using clean, uncontaminated equipment, determine the water level in the well, then calculate the fluid volume in the casing.
4. Purge the well [see *Characterization of Hazardous Waste Sites--A Methods Manual: Volume II. Available Sampling Methods, Second Edition* (EPA 1984, pages 3-25 through 3-31) and/or *The RCRA Ground Water Monitoring Technical Enforcement Guidance Document* (EPA 1986) for additional information about purging wells].
5. Attach the precleaned bailer to a cable or line for lowering.
6. Lower the bailer slowly until it contacts the water surface.
7. With a minimum of surface disturbance, allow the bailer to sink and fill.
8. Slowly raise the bailer to surface. Do not allow the bailer to contact the ground.
9. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.
10. Tip the bailer to allow slow discharge from the top to flow gently down the inside wall of the sample bottle with minimum entry turbulence.

    See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

11. Repeat Steps 5 through 10 as needed to collect sufficient volume.

12. Add preservative to the sample container, if required.
13. If using an acidic or caustic preservative, check the pH adjustment with the pH meter.
14. If necessary, add more preservative to achieve the desired pH.
15. If an error is made in collection or preservation, discard the entire sample container into the appropriate waste container and start with a new one.
16. Cap the sample container with a Teflon-lined cap.
17. Attach the completed integrity seal and self-adhesive sample label.
18. Refrigerate the sample in the insulated cooler, if required by analytical protocol.
19. Record information in the field logbook.
20. Complete the sample analysis request sheet and COC record.
21. Collect duplicate samples following the steps outlined above.
22. Prepare the QA/QC samples (see Section 2.3 of this plan).
23. Use a separate bailer for each well or thoroughly decontaminate the bailer after each use according to guidelines described in Section 5.7 of this plan. Dispose of used rags and decontamination washings in the appropriate waste container.
24. Doff PPE and dispose of it in an approved waste container.

CHECKLIST 6-4

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Monitoring Wells with a Bucket Bailer

__________ PPE
__________ Teflon bailers
__________ Sample containers and preservatives
__________ pH meter
__________ Storage containers for waste decontamination rinsate (if needed)
__________ Kimwipes
__________ Stiff brush
__________ Field kit for chlorine (optional)
__________ Insulated coolers
__________ Blue ice
__________ Vermiculite for packaging of samples
__________ Plastic sheet
__________ Filtering apparatus (if needed)
__________ Camera and film (if needed)
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

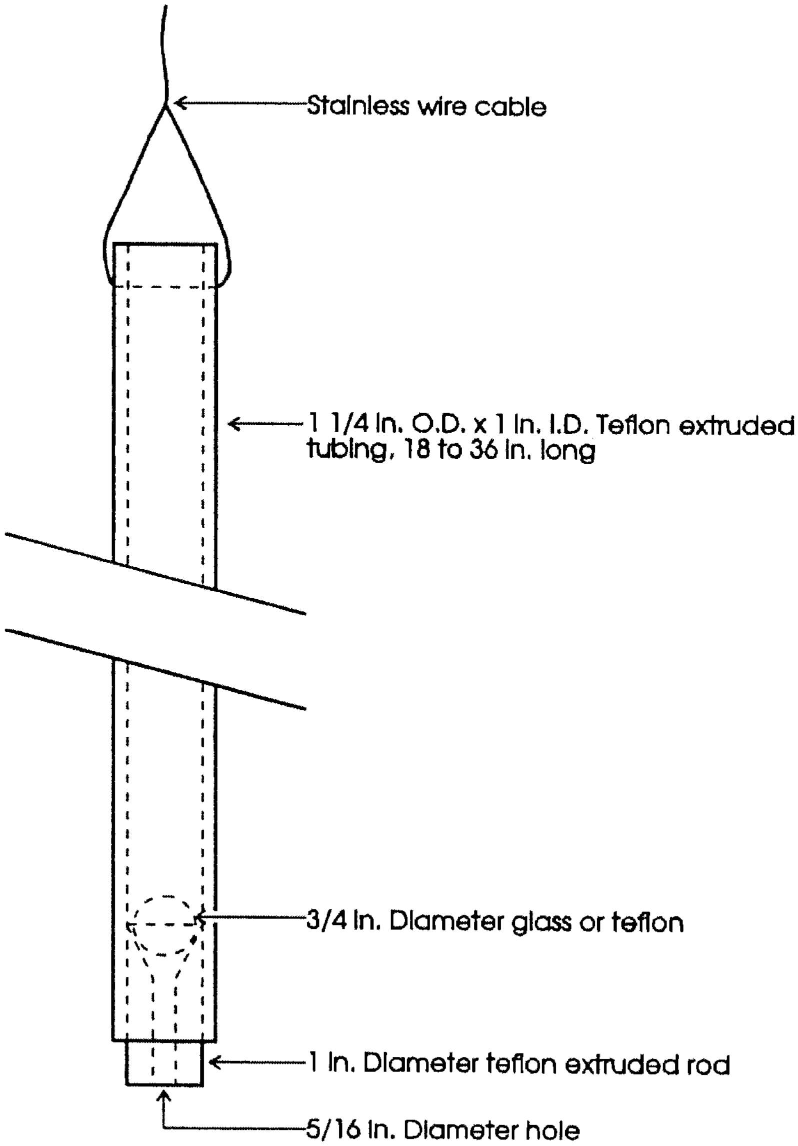

FIGURE 6-4
Bailer

6.5 Sampling Surface Soil with a Spade, Scoop, or Trowel

The simplest, most direct method of collecting soil surface and near surface samples for subsequent analysis is to use a spade, scoop, or trowel (see Spade-Trowel Calibrated- Figure 6-5). Samples should be kept at their at-depth temperature or lower, protected from ultraviolet (UV) light, sealed tightly in glass bottles, and analyzed as soon as possible. Preservation with chemical additives is generally not necessary; preservation is achieved by cooling on Blue Ice (see "General Sampling Guidelines For Solids," Section 5.5 of this plan), supplemented by a minimal holding time.

<u>Guidelines</u>

1. Review health and safety concerns, Section 6.0 of this plan.

2. Don PPE.

3. Monitor the surface area for gross radioactive (alpha and beta/gamma), volatile organic contamination, and high explosives contamination, as necessary, prior to sampling. Clear any surface debris (twigs, rocks, litter) from the immediate area to be samples. Clean plastic sheeting may be placed around the area of the hole to mitigate the spread of contamination as required.

4. Put on disposable poly gloves and begin the sampling as close to the surveyed sample location as possible.

5. Carefully remove the top layer of soil to the desired sample depth with a precleaned spade.

   - Using a precleaned stainless steel scoop or trowel, cut a hole to the prescribed depth. Make the hole big enough to homogenize the sample in the hole or stainless steel bowl and retrieve enough material for all necessary analyses.
   - For composite samples, several different sample locations are chosen and sampled. Take equal numbers of level scoops of homogenized material from each sampling location, place the materials in a stainless steel mixing bowl, and mix thoroughly.

6. Carefully remove a sample with the scoop or trowel.

7. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.

8. Transfer the sample into an amber glass sample bottle using a stainless steel or Teflon scoop, lab spoon, or equivalent. When sampling wet soils, leave enough headspace to allow for expansion.

   See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

9. If an error is made in collection or preservation, discard the entire sample container in an appropriate waste container and start with a new one.

10. Cap the sample container with a Teflon-lined cap.

11. Attach the completed integrity seal and self-adhesive sample label.

12. Refrigerate the sample in the insulated cooler, if required by analytical protocol.

13. Record information in the field logbook.

14. Complete the sample analysis request sheet and chain-of-custody record.

15. Collect duplicate samples following the steps outlined above.

16. Prepare the QA/QC samples (see Section 2.3 of this plan).

17. Backfill the holes and restore the sampling area to its original state (as much as possible).

18. Certify that all discrete sampling locations are surveyed and referenced to the NMSP Coordinate System.

19. Thoroughly decontaminate the scoop or trowel after each use according to guidelines described in Section 5.7 of this plan. In some cases, especially where trace analysis is desired, it may be prudent to use a separate scoop or trowel for each sample.

20. Doff PPE and dispose of it in an approved waste container.

CHECKLIST 6-5

EQUIPMENT AND SUPPLIES CHECKLIST
Soil Sampling with a Spade, Scoop, or Trowel

__________ Level D PPE (Level C highest upgrade)
__________ Stainless steel scoop or lab spoons
__________ Stainless steel shovel or fat-pointed mason trowel
__________ Stainless steel spade
__________ Sample containers and preservatives
__________ pH meter
__________ Storage containers for waste decontamination rinsate (if needed)
__________ Kimwipes
__________ Tape measure (tenths)
__________ Teflon sheets or stainless steel sampling trays
__________ Plastic sheet
__________ Alconox
__________ Brushes (long handle, scrub, and wire)
__________ Galvanized tub (if needed)
__________ Trash bags
__________12 x 12 inch zip-loc bags
__________Disposable poly gloves
__________Sample containers
__________ESP-1 beta/gamma probe
__________Ludlum Model 139 alpha probe
__________Organic vapor analyzer (PID or FID, as required (Hnu)
__________Plastic petri dishes/soil aliquots
__________High-explosive spot test kit, as necessary
__________First Aid kit
__________Two-way communication (cellulars, hand-held radios)
__________ Buckets (galvanized, stainless steel, and plastic)
__________ Kimwipes
__________ Blue Ice
__________ Insulated cooler with padlock
__________ Camera and film (if needed)
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

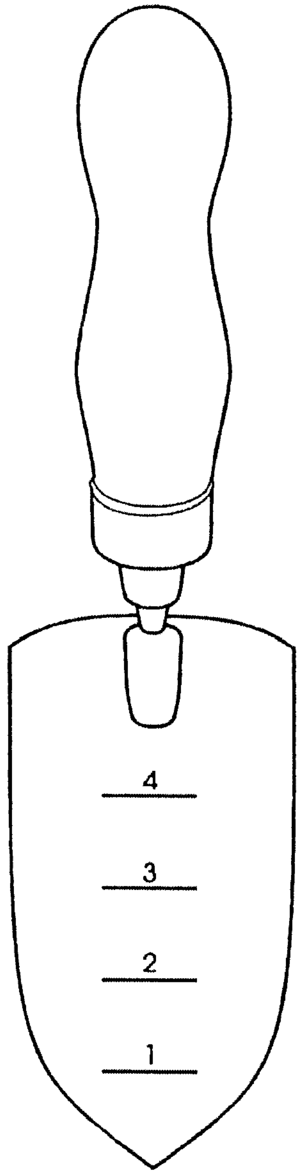

FIGURE 6-5
Spade-Trowel Calibrated

6.6 Sampling Subsurface Soil with Hand Auger and Thin-Walled Sampler

The auger and thin-walled sampler can be used in a wide variety of soil conditions to collect subsurface soil samples (Figure 6-6). This method may be used for obtaining minimally disturbed samples or soil, or other solid material. The hand auger is particularly useful in collecting soil samples at depths greater than 6 inches. This sampling technique destroys the cohesive structure of the soil sample and great care must be taken when sampling in disturbed areas or depths exceeding 6 inches. The presence of rock layers and collapse of any borehole precludes sampling at depths greater than 2 meters. Chemical preservation of soil material is generally not recommended. Minimal holding time supplemented by cooling is usually the best preservation method.

<u>Guidelines</u>

1. Review health and safety concerns, Section 6.0 of this plan.

2. Don PPE.

3. Monitor surface area for gross radioactive (alpha and beta/gamma), volatile organic contamination, and high explosives contamination, as necessary, prior to augering.

4. Clear any surface debris (twigs, rocks, and litter) from the area to be sampled and monitor the cleared area again
   - Spread clean plastic sheeting around the area of the borehole to mitigate the spread of contamination as appropriate.
   - Put on disposable poly gloves and attach the budget auger to the T-rod. Begin augering, periodically, brushing away any accumulated soil material from a round the mouth of the borehole. This prevents accidentally introducing loose material back down the borehole when removing the auger or adding drill extension rods. .
   - Continuously monitor the borehole with an organic vapor detector such as a PID, RID, Hnu, Ludlum 139, or ESP-1. Continuously monitor the borehole for HE contamination, as appropriate.

5. Periodically measure the borehole depth with a tape measure. After reaching desired depth, slowly and carefully remove the auger from the boring. When sampling directly from the auger, collect the sample after the auger is removed from the boring, transfer it into a sample container, and cap the sample container with a Teflon-lined cap.

6. When collecting a composite sample, carefully empty the soil material directly from the bucket auger into a dedicated and decontaminated stainless steel mixing bowl. Monitor this sample material again for radioactive, organic, and high explosive contamination. The soil material may be removed from the budget auger by means of a decontaminated stainless steel geologist's hammer or by using discrete and clean tongue depressors. Homogenize the sample and transfer into a sample container, and cap the sample container with a Teflon-lined cap.

7. When collecting multiple samples from the same boring, remove auger tip from drill rods and replace with a precleaned, decontaminated, thin-walled corer. Install the proper cutting tip.

8. Carefully lower the corer down the borehole, being careful not to scrape soil from the sides of the borehole that will fall into the bottom of the borehole. Gradually force the corer into the soil.

9. Remove the tube sampler and unscrew the drill rods.

10. Remove the cutting tip and remove the core from the sample device.

11. Discard the top 2.5 centimeters (cm) (approximately) of the core which contains any material collected by the tube sampler before it penetrated the layer in question.

12. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.

13. Place the remaining core into a sample container.

    See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

14. Cap the sample container with a Teflon-lined cap.

15. Attach the completed integrity seal and self-adhesive sample label.

16. Refrigerate the sample in the insulated cooler, if required by analytical protocol.

17. Record information in the field logbook including the depth interval from which the sample was taken and a lithological description of the soil (color, grain size, organic content, moisture content).

18. Complete the sample analysis request sheet and chain-of-custody record.

19. Collect duplicate samples following the steps outlined above.

20. Prepare the QA/QC samples (see Section 2.3 of this plan).

21. Clean and decontaminate the sampler after each use and between sampling at new locations according to the guidelines described in Section 5.7 of this plan.

22. Dispose of decontamination rinsate and waste in an appropriate container.

23. Doff PPE and dispose of it in an approved waste container.

CHECKLIST 6-6

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Subsurface with Hand Auger and Thin-Walled Sampler

__________ Level D PPE (level C highest upgrade)
__________ Thin-wall tube sampler
__________ Drill rods and extensions
__________ T handle
__________ Bucket augers
__________ Stainless steel bowls
__________ Stainless steel geologist's hammer
__________ Tape measure
__________ Tongue depressors
__________ 12 x 12 inch zip-loc bags
__________ Disposable poly gloves
__________ ESP-1 beta/gamma probe
__________ Ludlum Model 139 alpha probe
__________ Trash bags
__________ Sample containers and preservatives
__________ pH meter
__________ First Aid kit
__________ Two-way communication (cellulars, hand-held radios)
__________ High-explosive spot test kit, as necessary
__________ Storage containers for waste decontamination rinsate (if needed)
__________ Kimwipes
__________ Decontamination equipment when necessary
__________ Combustible gas indicator
__________ Portable photoionization detector (PID) or flame ionization detector (FID)
__________ Blue ice
__________ Insulated cooler with padlock
__________ Plastic sheet
__________ Camera and film (if needed)
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

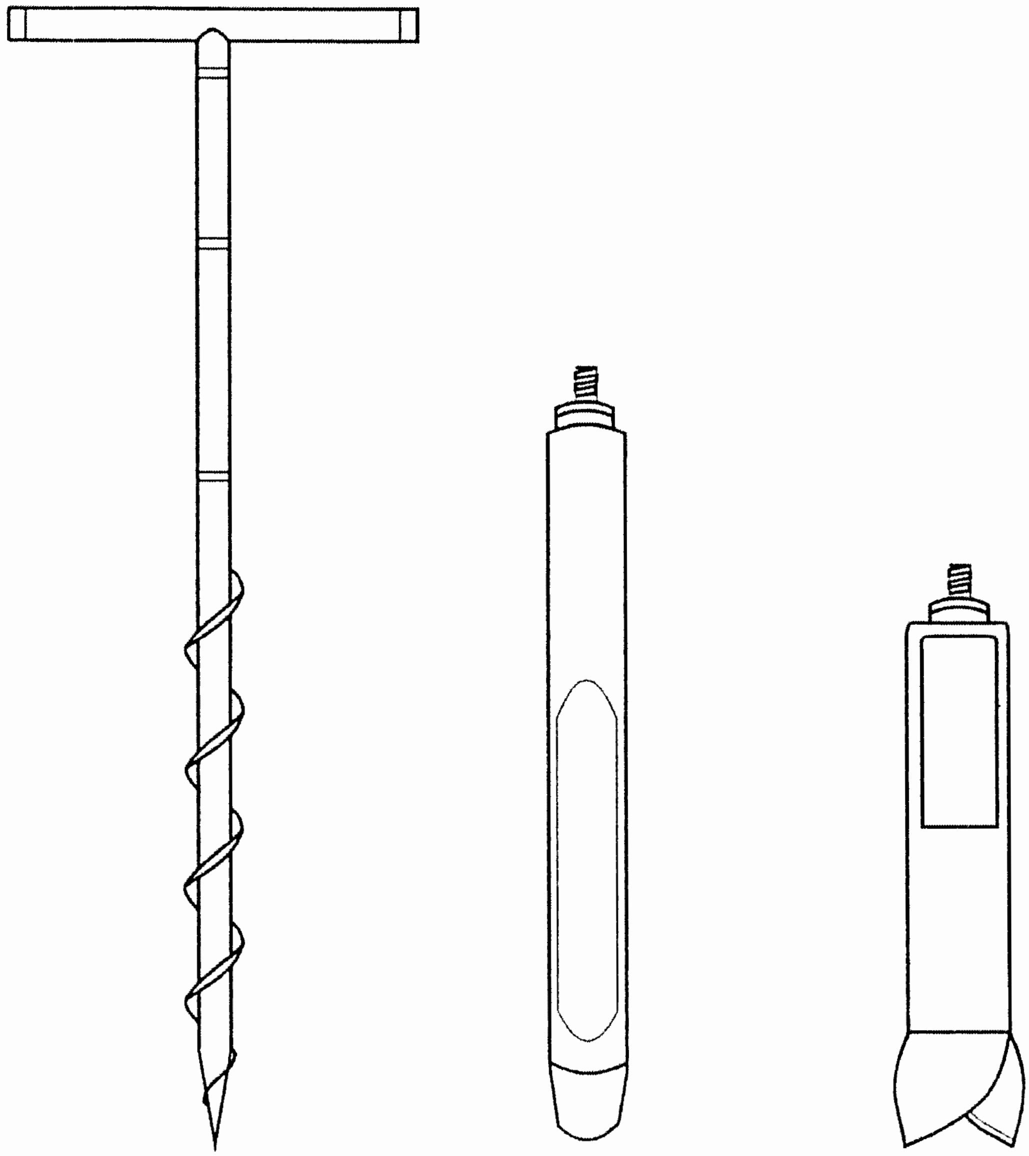

FIGURE 6-6
Augers and Thin-Walled Tube Sampler

6.7 Sampling Sludge or Sediment Samples with a Scoop

Sludge and sediment samples can be collected using a simple laboratory scoop or garden-type trowel (Figure 6-7). This method is a simple, quick, and easy means of collecting a sample of sludge or sediment. (Glass tubes or COLIWASAs may work better for some submerged sludges and sediments. See Sections 6.1 and 6.2 of this plan for more information on sampling sludges and sediments.) Chemical preservation of solids is generally not recommended. Minimal holding time supplemented by cooling is usually the best preservation method.

Guidelines

1. Review health and safety concerns, Section 6.0 of this plan.
2. Don PPE.
3. If sludges have been exposed to air, it may be desirable to remove the first 1 to 2 cm of material before collecting the sample. Insert the scoop or trowel into the material and remove the sample.
4. Transfer the sample into an appropriate sample bottle with a stainless steel lab spoon, or equivalent.

   See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

Repeat Steps 3 and 4 as necessary to collect sufficient volume.

5. Cover the container or drum opening when working with the sample and recording information.
6. If an error is made in collection or preservation, discard the entire container and start with a new one.
7. Cap the sample container with a Teflon-lined cap.
8. Attach the completed integrity seal and self-adhesive sample label.
9. Refrigerate the sample in the insulated cooler, if required by analytical protocol.
10. Record information in the field logbook.
11. Complete the sample analysis request sheet and COC record.
12. Collect duplicate samples following the steps outlined above.
13. Prepare the QA/QC samples (see Section 2.3 of this plan).
14. Doff PPE and dispose of it in an approved waste container.
15. Decontaminate sampling equipment after use and between sample collections.
16. Dispose of decontamination rinsate and waste in an appropriate waste container.

CHECKLIST 6-7

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Sludge or Sediment with a Scoop

__________ PPE
__________ Stainless steel scoop or lab spoons
__________ Wide-mouth jar
__________ Sample containers and preservatives
__________ pH meter
__________ Storage containers for waste decontamination rinsate (if needed)
__________ Kimwipes
__________ Decontamination equipment when necessary
__________ Funnel (if needed)
__________ Teflon sheets or stainless steel sampling trays
__________ Plastic sheet
__________ Buckets (galvanized, stainless steel, and plastic)
__________ Blue Ice
__________ Insulated cooler
__________ Camera and film (if needed)
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

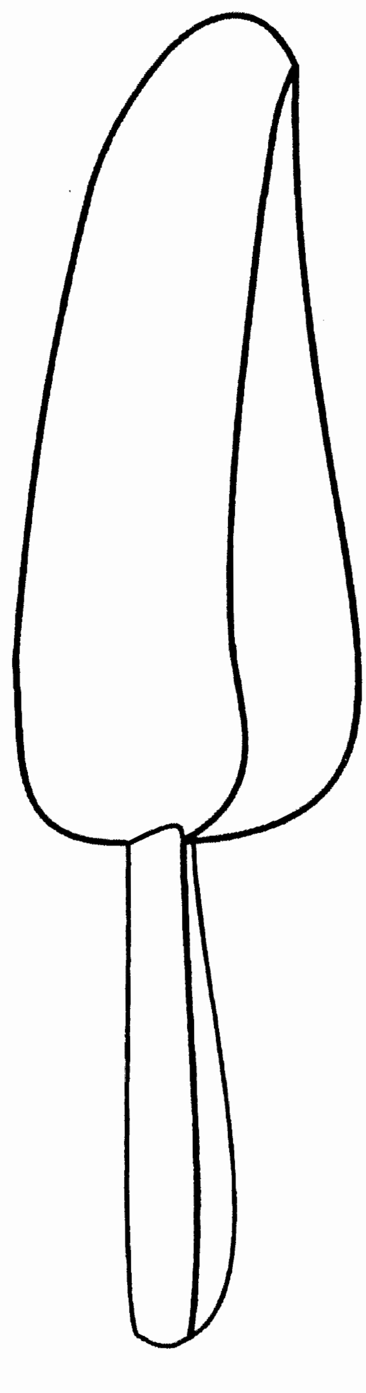

FIGURE 6-7
Scoop

6.8 Sampling Bulk Material with a Grain Thief, Trier, or Scoop

The grain thief is used for sampling powdered or granular wastes or bulk materials in bags, fiberdrums, sacks, or similar containers (Figure 6-8). The grain thief is most useful when the solid particulates are no greater than 0.6 cm in diameter. The lab scoop is used for sampling dry, granular, or powdered bulk material with particulates greater than 0.6 cm in diameter in bins or other shallow containers. The trier is preferred when the powdered or granular bulk material to be sampled is moist or sticky (Figure 6-9). Additionally, the trier is used to obtain soft or loosened soil samples up to a depth of 61 cm. The chemical preservation of bulk material is generally not recommended. Minimal holding time supplemented by cooling is usually the best preservation method.

Guidelines - Grain Thief

1. Review health and safety considerations, Section 6.0 of this plan.
2. Don PPE.
3. While the precleaned grain thief is in the closed position, insert it into the granular or powered material or waste being sampled from a point near a top edge or corner, through the center, and to a point diagonally opposite the point of entry.
4. Rotate the inner tube of the grain thief into the open "o" position.
5. Wiggle the grain thief a few times to allow materials to enter the open slots.
6. Place the grain thief in the closed position and withdraw from the material being sampled.
7. Place the grain thief in a horizontal position with the slots facing upward.
8. Rotate and slide away the outer tube from the inner tube.
9. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.
10. Transfer the collected sample in the inner tube into a suitable sample container.

    See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

11. Repeat Steps 3 through 10 if necessary to collect sufficient volume.
12. Cover the container or drum opening when working with the sample and recording information.
13. If an error is made in collection, discard the entire sample container into the appropriate waste container and start with a new one.
14. Cap the sample container with a Teflon-lined cap.
15. Attach the completed integrity seal and self-adhesive sample label.
16. Record information in the field logbook.

17. Complete the sample analysis request sheet and COC record.

18. Collect duplicate samples following the steps outlined above.

19. Prepare the QA/QC samples (see Section 2.3 of this plan).

20. Clean and decontaminate the grain thief after each use and between sampling at new locations according to the guidelines described in Section 5.7 of this plan.

21. Dispose of decontamination rinsate and waste in an appropriate container.

22. Doff PPE and dispose of it in an approved waste container.

Guidelines-Trier or Scoop

1. Review health and safety concerns, Section 6.0 of this plan.

2. Don PPE.

3. Insert the precleaned trier or scoop into the waste material. Sample extraction may require tilting the waste containers.

4. If using a trier:

   a. Rotate the trier once or twice to cut a core of material.
   b. Slowly withdraw the trier, making sure that the slot is facing upward.

5. If using a scoop:

   a. Rotate the scoop once or twice to cut a core of material.
   b. Slowly withdraw the scoop.

6. Remove the sample container cap. Take extreme care to avoid contaminating the containers and caps.

7. Transfer the sample into the sample container with the aid of a spatula and/or brush.

   See Section 5.6 of this plan for guidance on collecting and maintaining a sample for VOC or semi-VOC analysis.

8. Cover the container or drum opening when working with the sample and recording information.

9. If an error is made in collection, discard the entire sample container into the appropriate waste container and start with a new one.

10. Cap the sample container with a Teflon-lined cap.

11. Attach the completed integrity seal and self-adhesive label.

12. Record information in the field logbook.

13. Complete the sample analysis request sheet and COC record.

14. Collect duplicate samples following the steps outlined above.

15. Prepare the QA/QC samples (see Section 2.3 of this plan).

16. Clean and decontaminate the sampler after each use and between sampling at new locations according to the guidelines described in Section 5.7 of this plan.

17. Dispose of decontamination rinsate and waste in an appropriate container.

18. Doff PPE and dispose of it in an approved waste container.

CHECKLIST 6-8.1

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Bulk Material with a Grain Thief

__________ PPE
__________ Grain Thief
__________ Sample containers and preservatives
__________ Scrub brush
__________ Pan (stainless steel or glass)
__________ Plastic sheet
__________ Kimwipes
__________ Storage containers for waste decontamination solutions (if needed)
__________ Blue Ice
__________ Insulated cooler
__________ Camera and film (if needed)
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

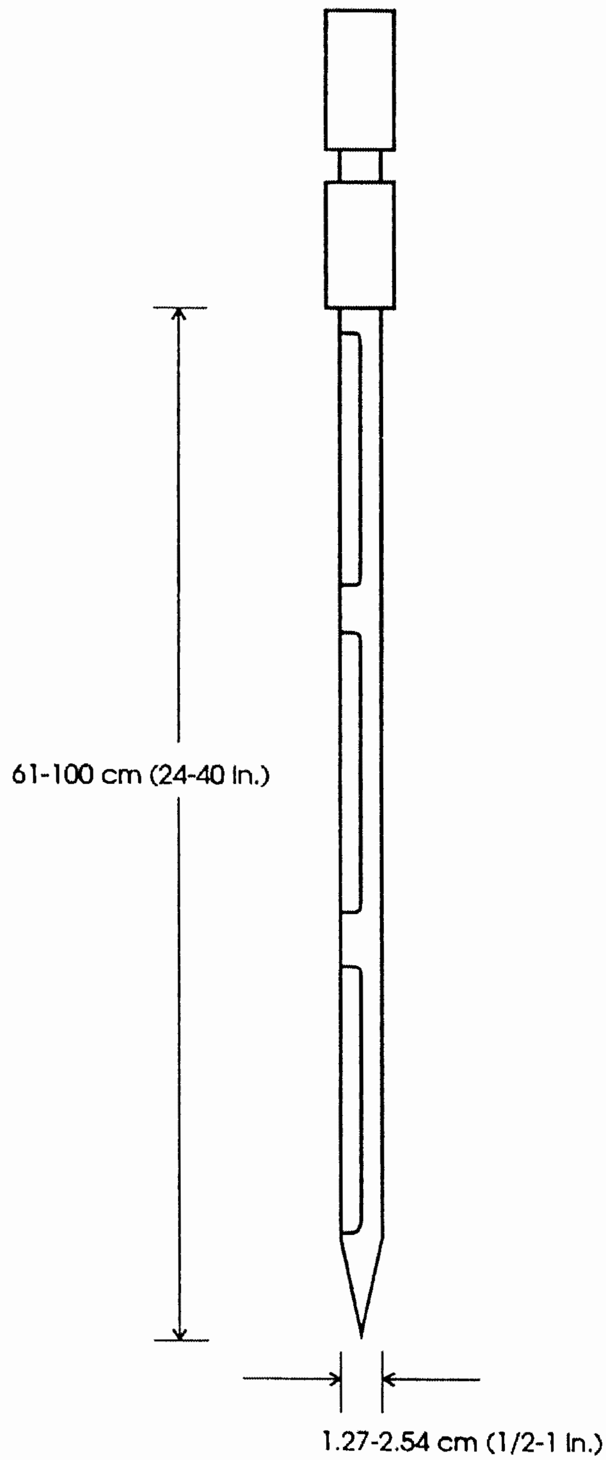

FIGURE 6-8
Grain Thief

CHECKLIST 6-8.2

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Bulk Material with a Scoop

__________ PPE
__________ Stainless steel scoop or lab spoon
__________ Wide-mouth jar
__________ Funnel (if needed)
__________ Sample containers and preservatives
__________ Teflon sheets or stainless steel sampling trays
__________ Plastic sheet
__________ Buckets (galvanized, stainless steel, and plastic)
__________ Cleaning wipes
__________ Kimwipes
__________ Storage containers for waste decontamination solutions (if needed)
__________ Blue Ice
__________ Insulated cooler
__________ Camera and film (if needed)
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

CHECKLIST 6-8.3

EQUIPMENT AND SUPPLIES CHECKLIST
Sampling Bulk Material with a Trier

__________ PPE
__________ Trier
__________ Wide-mouth jar
__________ Funnel
__________ Spoon
__________ Pan (stainless steel or glass)
__________ Plastic sheet
__________ Kimwipes
__________ pH meter
__________ Storage containers for waste decontamination solutions (if needed)
__________ Blue Ice
__________ Insulated cooler
__________ Camera and film (if needed)
__________ Sample containers and preservatives
__________ Field logbook
__________ COC/RFA forms
__________ Integrity seals
__________ Sample labels
__________ Any additional supplies listed in associated procedures

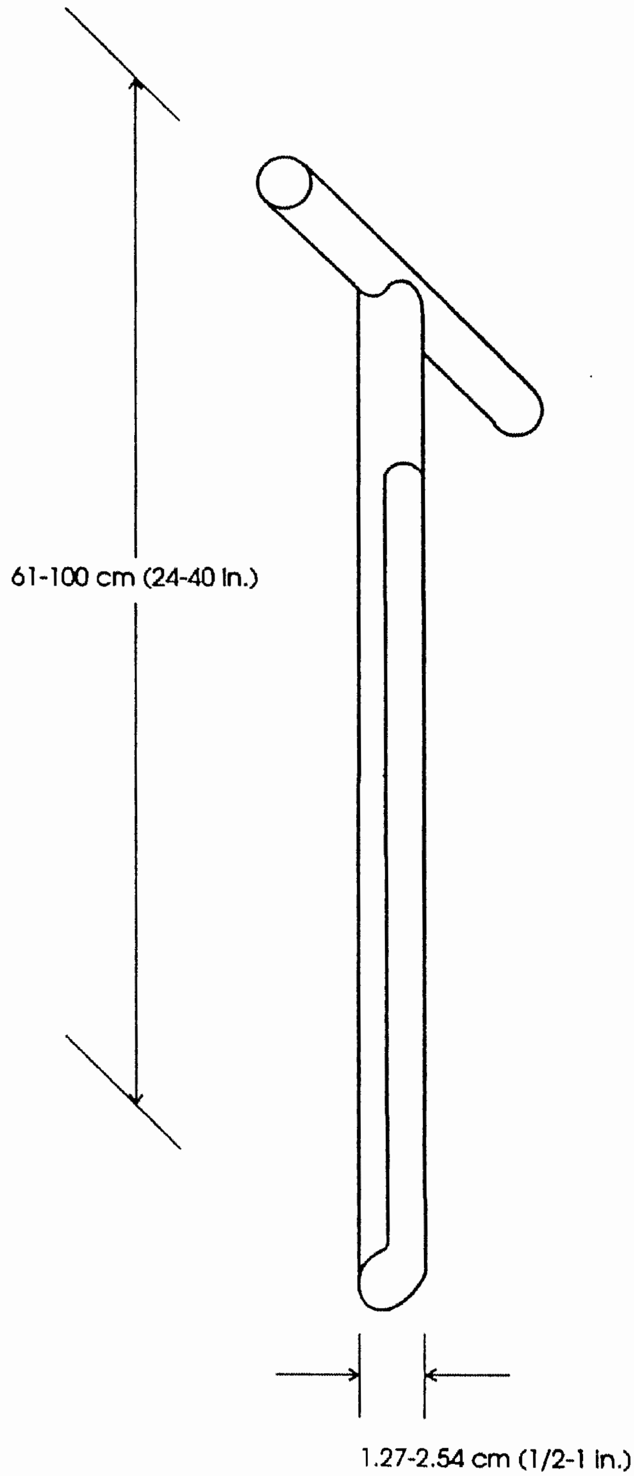

FIGURE 6-9
Sampling Trier

7.0 pH MEASUREMENT GUIDELINES

Sampling personnel determine the pH of waste samples using a pH meter. They first calibrate the pH meter using a series of standard solutions of known pH as specified in the manufacturer's instructions.

7.1 Guidelines for Aqueous and Multiphase Wastes pH Measurement

These guidelines describe measuring pH in aqueous and multiphase wastes. All individuals in the sampling area must wear PPE appropriate for their tasks. The person(s) measuring the pH must wear new gloves for each sample and follow the procedures described below.

7.1.1 Ensure that the following equipment and supplies are present for measuring pH.

- pH meter
- distilled water
- beakers
- thermometer
- glass and reference electrode
- Kimwipes

7.1.2 Calibrate the pH meter according to instructions provided by the manufacturer.

Because of the wide variety of pH meters and accessories, detailed calibration instructions cannot be incorporated into this guideline. Pay special attention to care of the electrodes. Note and record the temperature of calibration buffer solutions. Record the calibration information in the field logbook.

7.1.3 Measure the pH of the sample as described below.

- Thoroughly rinse and gently wipe the electrodes prior to measuring the pH of samples. Immerse the electrodes into the sample beaker or sample stream and gently stir at a constant rate to provide homogeneity and suspension of solids. Note and record sample pH and temperature in the field logbook. Repeat the pH measurement on a duplicate volume of the sample until values differ by <0.1 pH units.

- If the sample temperature differs by more than 2°C from the calibration buffer solution, the measured pH values must be corrected. Instruments are equipped with automatic or manual compensators that adjust for temperature differences. Refer to manufacturer's instructions.

- Rinse the electrodes thoroughly with distilled water between samples.

7.1.4 Decontaminate the pH meter and electrodes following the manufacturer's specifications.

7.1.5 Store the electrodes following the manufacturer's instructions.

7.2 Guidelines for Soil pH Measurement

These guidelines describe measuring pH in soils. The sample is mixed with distilled water, the soil is filtered or allowed to settle, and the pH of the filtered aqueous solution is measured. All individuals in the sampling area must wear PPE appropriate for their tasks. The person(s) measuring the pH must wear new gloves for each sample and follow the procedures described below.

7.2.1 Ensure that the following equipment and supplies are present for measuring pH.

- pH meter
- thermometer
- beakers
- watch
- balance - capable of weighing 0.1 gram (g)
- Kimwipes
- distilled water

7.2.2 Calibrate the pH meter following the manufacturer's instructions.

Because of the variety of pH meters and accessories, detailed instructions for calibration cannot be incorporated into these guidelines. Pay special attention to care of the electrodes. Note and record the temperature of the buffer calibration solutions. Record calibration information in the field logbook.

7.2.3 Measure the pH of the soil sample as described below.

- To 20 g of soil in a 50-mL beaker, add 20 mL of distilled water and stir the suspension several times during the next 30 minutes.

- Let the soil suspension stand for approximately 1 hour to allow most of the suspended soil to settle out from the suspension and carefully decant the aqueous phase into another beaker for pH measurement.

- Adjust the electrodes in the clamps of the electrode holder so that when lowering the electrodes into the beaker, the glass electrode will be immersed just deep enough into the clear supernatant to establish good electrical contact. Insert the electrode into the sample solution in this manner. Note and record the sample pH and temperature in the field logbook.

- If the sample temperature differs by more than 2°C from the buffer solution, the measured pH values must be corrected. Instruments are equipped with automatic or manual compensators that adjust for temperature differences. Refer to manufacturer's instructions.

- Rinse the electrodes thoroughly with distilled water between samples.

7.2.4 Decontaminate the pH meter and electrodes following the manufacturer's specifications.

7.2.5 Store the electrodes following the manufacturer's instructions.

7.3 Guidelines for Solids, Sludges, and Non-Aqueous Liquids pH Measurement

NOTE: Ensure the waste sample does not contain a water reactive substance before proceeding with this method.

These guidelines describe measuring pH in waste samples that are solids, sludges, or nonaqueous liquids. The waste sarnple is mixed with distilled water, and the pH of the resulting aqueous solution is measured. All individuals in the sampling area must wear PPE appropriate for their tasks. The person(s) measuring the pH must wear new gloves for each sample and follow the procedures described below.

7.3.1 Ensure that the following equipment and supplies are present for measuring pH.

- pH meter
- distilled water
- beakers
- Kimwipes
- balance - capable of weighing 0.1 g

7.3.2 Calibrate the pH meter following the manufacturer's instructions.

Because of the variety of pH meters and accessories, detailed instructions for calibration cannot be incorporated into these guidelines. Pay special attention to care of the electrodes. Note and record the temperature of the buffer calibration solutions. Record calibration information in the field logbook.

7.3.3 Measure the pH of the sample as described below.

- To 20 g of the sample in a 50-mL beaker, add 20 mL of distilled water and stir the suspension several times during the next 30 minutes.

- Let the suspension stand for about 15 minutes to allow most of the suspended waste to settle out from the suspension or filter off the aqueous phase for pH measurement.

  NOTE: If the waste is hygroscopic and absorbs all the distilled water, begin the preparation again using 20 g of waste and 40 mL of distilled water.

  NOTE: If the supernatant is multiphasic, decant the oily phase and measure the pH of the aqueous phase. The electrode may need to be cleaned if it becomes coated with oily material.

- Adjust the electrodes in the clamps of the electrode holder so that when lowering the electrodes into the beaker, the glass electrode will be immersed just deep enough into the clear supernatant to establish good electrical contact. Insert the electrode into the sample solution in this manner. Note and record sample pH and temperature in the field logbook.

- If the sample temperature differs by more than 2°C from the buffer solution, the measured pH values must be corrected. Instruments are equipped with automatic or manual compensators that electronically adjust for temperature differences. Refer to manufacturer's instructions.

- Rinse the electrodes thoroughly with distilled water between samples.

7.3.4 Decontaminate the pH meter and electrodes following the manufacturer's specifications.

7.3.5 Store the electrodes following the manufacturer's instructions.

8.0 TRANSPORTATION OF SAMPLES AND SAMPLING MATERIALS

When shipping samples to analytical facilities for analysis, sampling personnel must comply with federal hazardous materials regulations and guidance provided in Packaging and Transportation (SUP-5) Institutional Policy and Implementation Procedure Number IPP 525.0, Hazardous Material (Hazmat) Packaging and Transportation. Following this guidance will ensure sample integrity is maintained during transport and the health and safety of transport personnel, the public, and the environment are protected. IPP 525.0 specifies the marking, labeling, packaging, and shipping paper requirements for hazardous materials.

8.1 Exemptions

Most samples and preservation reagents transported by sampling personnel are either not hazardous materials regulated by DOT or are exempted from some or all of the hazardous materials regulations. This section describes the exemptions applicable to most of the materials that sampling personnel transport. Because some cases may fall outside the guidelines in this section, sampling personnel must be familiar with all applicable hazardous materials regulations and the SUP-5 Packaging and Transportation (IPP 525.0) requirements to ensure proper packaging and transportation. Sampling personnel who transport limited radioactive materials are required to follow training plan 1448 for RAM I Shippers. It is recommended that sampling personnel who transport samples also attend a Hazardous Materials Packaging and Transportation class. Table 8-1 lists the reagents used by ENV-SWRC personnel during sampling operations and the quantities that meet the exemptions.

8.1.1 Small Quantity Exemption

This provision exempts very small volumes of specific hazardous materials from DOT marking, labeling, specification packaging, placarding, and shipping paper regulations, provided that the samples are packaged according to guidance provided in IPP 525.0. Materials authorized for the small quantity exemption must be within one of the following hazard classifications: Class 3 (flammable and combustible liquids), Division 4.1 (flammable solids), Divisions 5.1 and 5.2 (oxidizers and organic peroxides), Division 6.1 (poisonous materials), Class 8 (corrosives), and Class 9 (miscellaneous hazardous materials). The maximum quantities authorized for the small quantity exemption are 30 mL for liquids, 30 g for solids, and 1 g for Division 6.1, Packing Group I, liquids or solids. There are specific materials in these hazard classes and divisions that cannot be considered in this exemption. Class 7 (radioactive) materials are authorized for the small quantity exemption only if they meet the limited quantity exemption for the isotopes being transported and also meet the definition of one of the other authorized hazard classes or divisions.

Table 8.1

Quantity Exemptions for Reagents

HNO3	0.28 weight %
H2SO4	0.38 weight %
HCl	0.20 weight %
NaOH	0.20 weight %

8.1.2 Limited Quantity Exemption

The term limited quantity means the maximum amount of a hazardous material for which there is a specific labeling or packaging exception. For chemicals, limited quantity refers to the volume of the material; for radionuclides, it refers to the total activity within a package. This provision exempts certain amounts of materials from labeling, specification packaging, and placarding requirements. Marking and shipping paper requirements still apply to these materials. However, for radioactive materials, this provision also exempts the material from shipping paper requirements, provided that the material is packaged and transported in accordance with IPP 525.0.

8.1.3 Low Specific Activity

This provision exempts certain types of uranium, thorium, tritium oxide, and radioactively contaminated materials from specification packaging and labeling requirements, provided the materials are packaged and transported as specified in IPP 525.0. If sampling personnel are required to sample low specific activity (LSA) materials, the materials will most likely meet one of the following two LSA criteria. These and other LSA criteria are defined at 49 CFR § 173.403.

1. Material in which the radioactivity is uniformly distributed and in which the estimated average concentration of contents does not exceed one of the following:

   a. 0.0001 millicurie per gram (mCi/g) of radionuclides for which the A_2 quantity is not more than 0.05 curie (Ci) (A_2 is the maximum activity of radioactive material other than special form or LSA radioactive material permitted in a Type A package; see also 49 CFR §§ 173.433 and 173.435)

   b. 0.005 mCi/g of radionuclides for which the A_2 quantity is more than 0.05 Ci, but not more than 1 Ci

   c. 0.3 mCi/g of radionuclides for which the A_2 quantity is more than 1 Ci

2. Objects of nonradioactive material externally contaminated with radioactive material, provided that the radioactive material is not readily dispersible and the surface contamination, when averaged over an area of 1 m^2, does not exceed 0.0001 mCi (220,000 disintegrations per minute) per cm^2 of radionuclides for which the A_2 quantity is not more than 0.05 Ci, or does not exceed 0.001 mCi (2,200,000 disintegrations per minute) per cm^2 for other radionuclides.

8.2 Determining Regulatory Status for Transportation

Sampling personnel use the completed *Presampling Questionnaire and SSSP* to identify major constituents of the waste to be sampled. Sampling personnel then apply their experience and knowledge of the sample to determine if it is a hazardous material and to tentatively assign a hazard class and shipping name to the sample. Based on the waste's characteristics, sampling personnel should know, or reasonably suspect, if the sample meets the definition of one or more of the DOT hazard classes or divisions identified under the hazardous materials regulations and guidance provided by IPP 525.0.

Sampling personnel consult SUP-5 personnel, IPP 525.0, hazardous materials regulation and the possible exemptions described in Section 8.1 of this plan to determine if the sample is regulated. Samples not regulated as placardable materials may be transported by ENV-SWRC personnel. All placardable material will be transported by SUP-5.

Sampling personnel can refer to the following subsections to determine transportation requirements for reagents, hazardous samples, mixed waste samples, and radioactive samples. Figures 8-1 and 8-2 outline the steps in making these determinations.

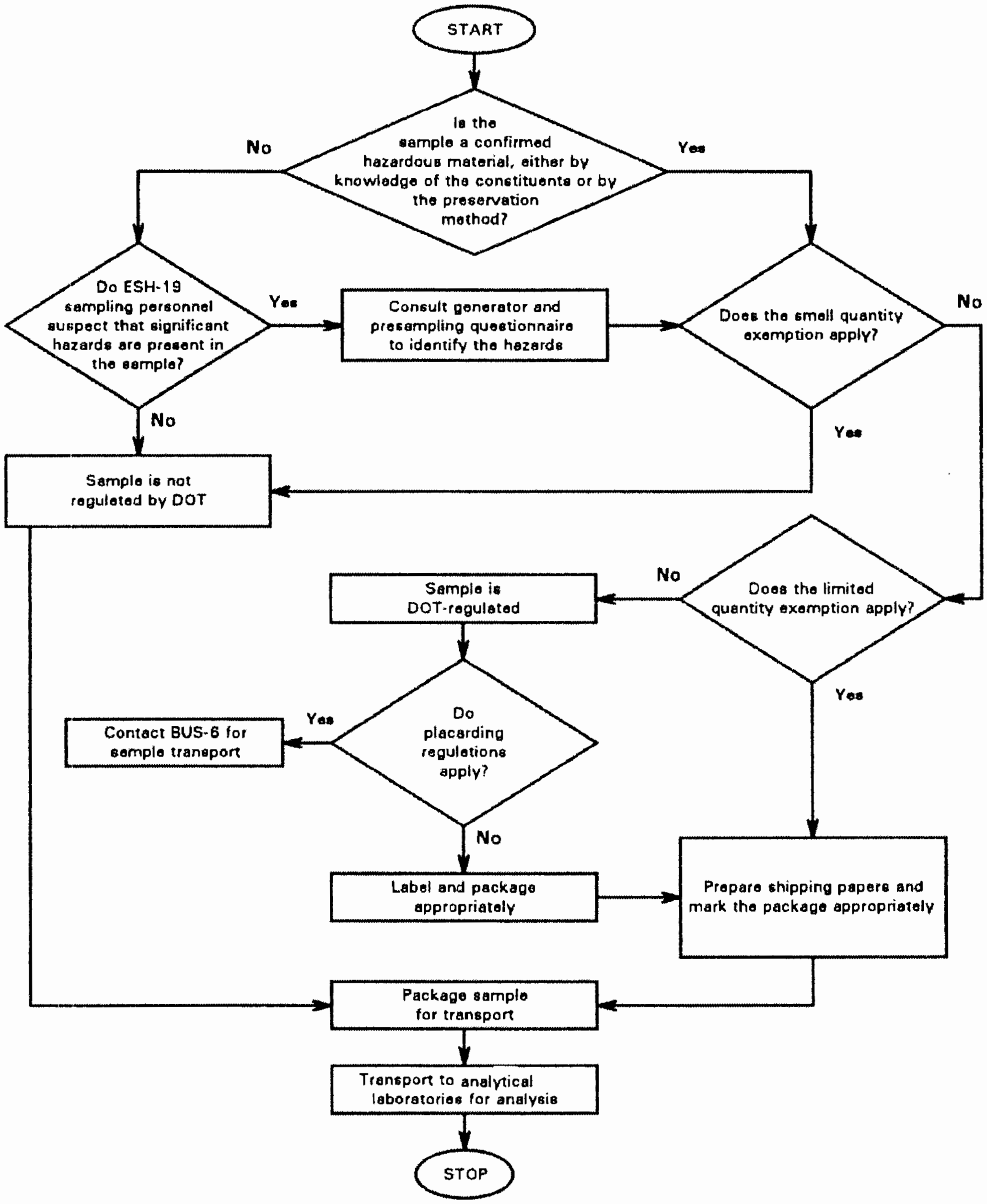

FIGURE 8-1
Hazardous Material
Flowchart

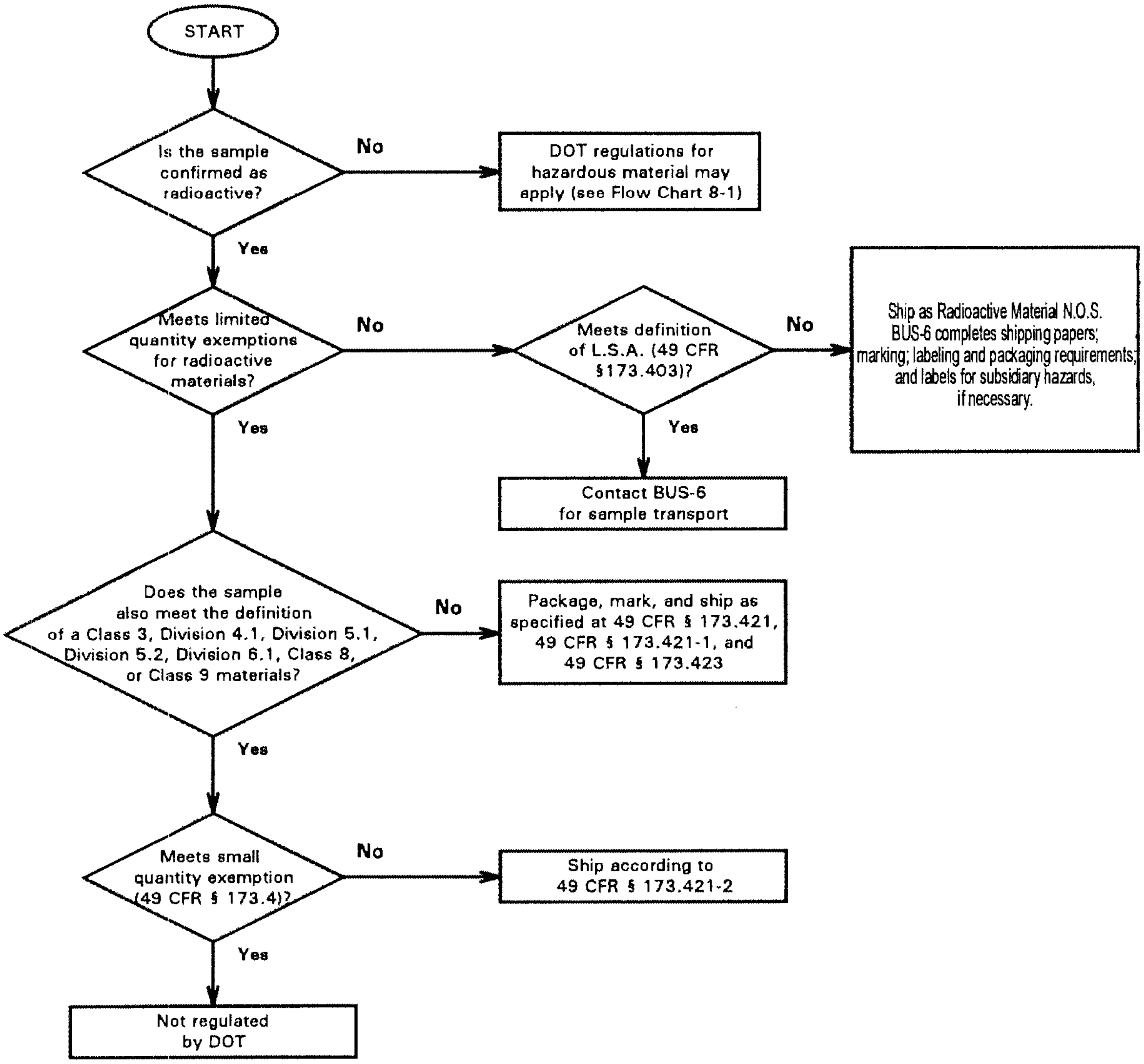

FIGURE 8-2
Radioactive Material Flowchart

8.2.1 Reagents

Sampling personnel should follow Table 8.1 to determine the amount of reagents that should be in a preserved sample.

8.2.2 Hazardous Samples

Sampling personnel transport waste samples based on the known or reasonably suspected sample constituents. Some hazardous constituents are hazardous material regulated only because they are EPA hazardous wastes. However, under certain circumstances, the EPA exempts **samples** of hazardous waste from being regulated as hazardous wastes. In such cases, these samples are no longer hazardous material regulated.

There is no limited quantity exemption for poisonous materials that are poison-inhalation hazards. However, unless specifically prohibited at 49 CFR § 173.4(a)(11), these materials qualify for the small quantity exemption if the sample is less than 1.0 g. Poisonous materials that are not limited quantity or small quantity exempt must be packaged, labeled, marked, and documented by shipping papers as specified by hazardous materials regulations and guidance provided by IPP 525.0. If a hazardous materials regulated sample contains a poisonous material that is a poison-inhalation hazard and also is in Packing Group I, the transport vehicle must be placarded. Placarding regulations also pertain to regulated samples of materials that are designated "Dangerous When Wet." ENV-SWRC sampling personnel do not sample other hazardous materials in quantities sufficient to require placarding. Drivers of placarded vehicles must have a commercial driver's license (CDL) and must have attended SUP-5 training beyond that required for Driver III classification. Therefore, sampling personnel must have a CDL and appropriate training before they drive a placarded vehicle or they must contact SUP-5 to arrange shipment of these samples

Except for those water solution listed in Section 8.1, samples preserved by the corrosive reagents (Hazard Class 8) listed in Table 8-1 will also be hazardous materials regulated as corrosive if the resulting pH levels are either less than 2.0 or greater than 12.5. Those samples listed in Section 8.1.4 and those with final pH levels between 2.0 and 12.5 are not hazardous materials regulated. In most cases, corrosive samples with pH levels between 2.0 and 1.0 can be placed into Packing Group III. Samples preserved with nitric acid, if they meet the definition of corrosive material and do not meet the requirement described in Section 8.1.4, must be packaged, marked, labeled, and documented by shipping papers according to hazardous materials regulations pertaining to nitric acid and guidance provided by IPP 525.0

8.2.3 Radioactive Samples

HSR-1 RCTs survey the waste to be sampled to determine the detectable activity. Sampling personnel should request a survey of the waste if they suspect it to be radioactively contaminated or if it is from an area controlled for radioactive contamination. Transport containers must possess a radioactive tag before transport occurs.

Hazardous materials regulations define radioactive material as any material having a specific activity greater than 0.002 microcurie per gram (μCi/g). Sampling personnel must contact SUP-5 for transport of any material having a specific equal to or less than 0.00uCl/g as a Class y material or as a limited quantity of radioactive material. Sampling personnel should mark sample containers of this type of material with the words "Radioactive Waste" because DOE has not established activity levels that are below regulatory concern.

As shown in Table 8-1, there is no small quantity exemption for materials that are solely radioactive. However, there are limited quantity exemptions established for individual radionuclides (see 49 CFR §§ 173.423 and 173.435). Limited quantities of radioactive materials are exempt from specification packaging, shipping paper, marking, and labeling requirements provided the materials are packaged according to hazardous materials regulations and guidance provided by IPP 525.0.

For radioactive materials, the limited quantity exemption is radionuclide specific. This creates a problem if the radionuclides in a waste are unknown. If this is the case, sampling personnel should review the appropriate operating procedure and extensively interview the waste generator and others knowledgeable of the waste to determine what radionuclides may be present in the waste. Based on the results of the HSR-1 RCT's survey, sampling personnel determine if the sample meets the limited quantities for those isotopes identified as potentially present in the sample. If the isotopes potentially present in the waste cannot be determined, any activity level within a package that is less than 2 μCi for solids or 0.2 μCi for liquids (49 CFR § 173.423) qualifies for the limited quantity exemption. These cutoff levels are based on the A_2 values for radionuclides whose identities are unknown [49 CFR § 173.433(a)(3) and (b)(6)].

Sampling personnel may sample radioactive materials that are LSA. Sampling personnel must have SUP-5 package and transport samples that are LSA.

8.2.4 Mixed Waste Samples

Mixed waste is any hazardous waste that also contains a radioactive component (*Hazardous and Mixed Waste Requirements for Generators* LIR 404-00-03.0). When determining a tentative shipping name for mixed waste samples, sampling personnel must consider both the hazardous and the radioactive components. Hazardous waste materials regulations and IPP 525.0 provide guidance on which hazard class or division takes precedence over the other classes or divisions associated with the sample.

Generally, the regulations pertaining to Class 7 (radioactive) take precedence over the regulations pertaining to other hazard classes or divisions, except when there is a limited quantity of Class 7 materials. However, there are exceptions to this general rule, namely that Division 5.2 (organic peroxides) and Division 6.2 (infectious substances) always have precedence over all other hazard classes and divisions, including Class 7. Under certain circumstances EPA exempts samples of hazardous waste from hazardous waste regulations (see Section 8.1.2 of this plan).

8.3 Accidents During Transportation

If an accident occurs during the transportation of samples, sampling personnel follow established Laboratory requirements described in LIR 201-00-04.0, *LANL Incident Reporting Process*, and take the appropriate health and safety measures. If the samples include radioactive material, the notification requirements specified in LIR 404-00-05.1, *Managing Radioactive Waste* must be followed.

9.0 PERSONNEL TRAINING

ENV-SWRC sampling personnel must meet specific training criteria before being allowed to perform sampling operations. The training program for safely performing sampling operations in support of this plan requires, at a minimum, the courses listed below:

- General Employee Training (GET)
- 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER), as required by OSHA at 29 CFR § 1910.120
- Radiological Worker (RADWORKER) II
- Basic Hazardous Materials Transportation
- Basic Radioactive Materials Transportation

  RAM I Shipper Training Plan 1448 Course #30462
- Respirator use
- Resource Conservation and Recovery Act (RCRA) Personnel Training
- Training on sampling procedures, such as
  - ENV-SWRC-QP-070, Sample Management Laboratory
  - ENV-SWRC-QP-103, Compliance Sampling.
  - ENV-SWRC-QP-115, Sample Analysis
    RRES-ES-Field
    RRES-ES-Driving
- Training on the Laboratory's *Emergency Management Plan*
- Training for spill prevention, including the Laboratory's LIR's Water Pollution Control LIR 404-50-01.0 and Abnormal Events LIR 402-130-01..
- Training on the Laboratory's hazard communication program
- American Red Cross approved standard first-aid and adult cardiopulmonary resuscitation (CPR) training
- Beryllium, Lead, Confined Space, Lockout/Tagout, Electrical Safety, Asbestos Awareness Training
- EPA's 165.9 Sampling for Hazardous Materials
- The ENV-SWRC training coordinator maintains documentation of sampling personnel training that qualifies them to perform sampling operations. The training coordinator updates the Laboratory's training database, the Employee Development System (EDS), with current training information. Additional training, specific to the sampling operations of this plan, may be developed after the ENV-SWRC performs a task analysis. The task analysis will examine the specific task functions of sampling operations. From this task analysis, the Environmental –Solid Waste Regulatory Compliance Group (ENV/SWRC) will develop a definitive training curriculum for the sampling

operations, completion of which will be required before personnel are permitted to sample the waste

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APPENDIX A

Guidelines for Collecting Samples

TABLE A-1

Guidelines for Collecting Water, Waste Water, and Liquid Samples Using a COLIWASA (See Section 6.2)

Analyte	Container Type	Minimum Sample Size	Sample Preservation	Special Conditions
Metals	500 ml polyethylene (see special conditions)	250 ml x 3	Acidify to pH <2 with HNO_3.	No special conditions[a]
Corrosivity	500 ml polyethylene	500 ml x 3	No special preservation requirements	No special conditions
Flash Point	250 ml glass bottle	250 ml x 3	No special preservation requirements	No special conditions
Volatiles No residual chlorine	40 ml VOA vials with Teflon lined septum caps	40 ml x 3	Refrigerate at 4°C.	Introduce sample into the sample vial gently without introducing any air bubbles. If bubbling occurs, pour sample out and resample. Fill the sample vial completely so that when the septum cap is fitted and sealed and the vial inverted, no headspace is visible.
Volatiles Residual chlorine	125 ml container and 40 ml VOA vials with Teflon lined septum caps	40 ml x 3	Adjust pH <2 with H_2SO_4, HCl or solid $NaHSO_4$. Refrigerate at 4°C.	Collect sample (without introducing air bubbles, as above) in a 125 ml container which contains 4 drops of 10% sodium thiosulfate solution (preservative). Gently swirl to mix sample and transfer to 40 ml VOA vials.
Semi-volatiles No residual chlorine	Amber or clear wide-mouth glass bottles with Teflon-lined caps	1 L x 3	Refrigerate at 4°C.	Fill the sample container completely.
Semi-volatiles Residual chlorine	Amber or clear wide-mouth glass bottles with Teflon-lined caps	1 L x 3	Refrigerate at 4°C.	Add 3 ml 10% sodium thiosulfate solution per gallon (may be added to container in the lab prior to field sampling).
pH	polyethylene	25 ml x 3	No special preservation requirements	Fill sample bottles to the top to prevent a change in pH because of the presence of air. Analyze samples immediately.
Residual Chlorine	500 ml polyethylene	200 ml x 3	No special preservation requirements	Analyze as soon as possible. Avoid excessive light and agitation.
Total Cations	500 ml polyethylene	25 ml x 3	No special preservation requirements	Analyze as soon as possible.

Sources: The sources listed in the bibliography were used to develop this table, especially SW-846 (EPA 1992b).

[a]When sampling strong alkali or hydrofluoric acid solutions use inert glass or HDPE sample containers and plastic or HDPE sampling equipment.

TABLE A-2

Guidelines for Collecting Ground Water and Surface Water Samples Using a Bucket Bailer (See Section 6.4)

Analyte	Container Type	Minimum Sample Size	Sample Preservation	Special Conditions
Total metals or total recoverable elements	Plastic	100 ml x 3	Add 1 N HNO_3 to pH 2.	Treat glassware according to CST instructions. Do not filter the sample before processing.
Dissolved elements	None specified	500 ml x 3	Filter through a 0.45 μm filter. Use the first 50-100 ml of filtered sample to rinse the filter flask. Discard this portion and collect the required volume of filtrate. Acidify the filtrate with 1:1 HNO_3 (normally 3 ml of 1:1 acid per liter should be sufficient to preserve the sample).	Treat glassware according to CST instructions.
Suspended elements	Plastic	500 ml x 3	No special preservation requirements.	Treat glassware according to CST instructions. Filter a measured volume of unpreserved sample through a 0.45 μm membrane filter as soon as practical after collection. Transfer the filter plus the suspended material to a separate container for storage and shipment.
Gross alpha, gross beta particle activities	Plastic	100 ml x 3	Add 1N HNO_3 to pH 2.	
Volatiles No residual chlorine	40 ml VOA vials with Teflon lined septum caps	40 ml x 3	Refrigerate at 4°C.	Introduce sample into the sample vial gently without introducing any air bubbles. If bubbling occurs, pour sample out and resample. Fill the sample vial completely so that when the septum cap is fitted and sealed and the vial inverted, no headspace is visible.
Volatiles Residual chlorine	125 ml container and 40 ml VOA vials with Teflon lined septum caps	40 ml x 3	Adjust pH <2 with H_2SO_4, HCl or solid $NaHSO_4$. Refrigerate at 4°C.	Collect sample (without introducing air bubbles, as above) in a 125 ml container which contains 4 drops of 10% sodium thiosulfate solution (preservative). Gently swirl to mix sample and transfer to 40 ml VOA vials.

TABLE A-2

Guidelines for Collecting Ground Water and Surface Water Samples Using a Bucket Bailer (See Section 6.4) (Continued)

Analyte	Container Type	Minimum Sample Size	Sample Preservation	Special Conditions
Semi-volatiles No residual chlorine	Amber or clear wide-mouth glass bottles with Teflon-lined caps	1 L x 3	Refrigerate at 4°C.	Fill the sample container completely.
Semi-volatiles Residual chlorine	Amber or clear wide-mouth glass bottles with Teflon-lined caps	1 L x 3	Refrigerate at 4°C.	Add 3 ml 10% sodium thiosulfate solution per gallon (may be added to container in the lab prior to field sampling).
Total Organic Halides	Amber glass 250 ml bottles with Teflon lined caps	100 ml x 3	Acidify with H_2SO_4 to pH $\leq$ 2. Refrigerate at 4°C, protected from sunlight and atmospheric oxygen.	Eliminate headspace in container.
Total Organic Carbon	Glass bottles preferable	None specified	Acidify with HCl or H_2SO_4 to pH $\leq$ 2 if analysis cannot be performed within 2 hours from sampling. Refrigerate at 4°C.	Protect from sunlight and atmospheric oxygen.
Phenolics	None specified	500 ml x 3	Acidify with H_2SO_4 to pH < 4. Refrigerate at 4°C.	None specified
pH	None specified	25 ml x 3	Refrigerate at 4°C.	No special conditions
Conductivity	None specified	10 ml x 3	Refrigerate at 4°C.	No special conditions
Sulfate	None specified	100 ml x 3	Refrigerate at 4°C.	No special conditions
Chloride	None specified	100 ml x 3	Refrigerate at 4°C.	No special conditions
Nitrate	None specified	10 ml x 3	Refrigerate at 4°C.	No special conditions
Total Coliform	None specified	200 ml x 3	If water samples are high in copper or zinc or for waste waters high in heavy metals, use EDTA: 372 mg/L, pH 6.5. Add EDTA to bottle before sterilization (0.3 ml 15% solution in a 120 ml bottle).	When collecting sample, leave ample air space in the bottle (at least 2.5 cm). Do not handle stopper or cap, or the neck of the bottle. Hold the bottle near the base, fill it without rinsing, replace cap or stopper immediately.

TABLE A-3

Collecting Soil, Sediment, and Sludge Samples
Using a Spade, Scoop, or Trowel (See Section 6.5)

Analyte	Container Type	Minimum Sample Size	Sample Preservation	Special Conditions
Total Metals	None specified	24 g x 3	Refrigerate at 4°C.	Analyze as soon as possible.
Inorganic TCLP	None specified	400 g x 3	DO NOT ADD PRESERVATIVES to the samples.	Sludges from TA-50 or TA-57 must be handled in a glove box. The handler must wear an anti-C lab coat, safety glasses, and rubber gloves.
Volatiles	40-ml screw-cap VOA vials with Teflon-lined silicone septa	50 g x 3	Refrigerate at 4°C.	Gently fill the VOA vials as completely as possible. Tap the vial slightly as you are filling it to minimize free air space. Avoid excessive headspace. Two VOA vials should be filled at each sample location.
Non-volatile and semi-volatile organic compounds	Amber or clear wide-mouth glass containers with Teflon-lined caps	100 g x 3	Refrigerate at 4°C. Analyze as soon as possible.	Gently fill the sample container as completely as possible. Tap the container slightly as you are filling it to minimize free air space. Avoid excessive headspace.
PCBs (water insoluble/slightly soluble) 1 to 50 μg PCB per gram sample	Wide-mouth glass container with Teflon-lined lid	20 g x 3	No special preservation requirements.	No special conditions.
Organochlorine pesticides	Wide-mouth glass container with Teflon-lined lid	20 g x 3	Refrigerate at 4°C.	No special conditions
pH	None specified	120 g x 3	No special preservation requirements.	None specified

TABLE A-4

Collecting Oil, Fuel, and Grease Samples Using Glass Tube (See Section 6.1)

Analyte	Container Type	Minimum Sample Size	Sample Preservation	Special Conditions
Total Metals	None specified	12 g x 3	Store undiluted at room temperature.	Collect samples without headspace. Process and analyze as soon as possible.
Mobile Metal Concentration	None specified	150 ml x 3	No special preservation specified	None specified
Organics	None specified	1 g x 3	No special preservation specified	None specified
Chlorine	None specified	5 mg x 3	Refrigerate at 4°C.	Collect samples without headspace.

APPENDIX B

Sampling Tools Recommended for Various Types of Wastes

TABLE B-1

Sampling Tools Recommended for Various Types of Wastes

Sampling Tool	Applications	Waste Category	Limitations
Glass tube	Liquids, slurries	Liquids	Sample may be lost, especially when sampling less viscous fluids, because of difficulty in maintaining vacuum.
COLIWASA	Most containerized liquids, sludges, slurries	Liquid organic Corrosive acid Corrosive base Liquid mixed waste	Do not use for containers 1.5 m deep. Difficult, if not impossible to decontaminate in the field. Plastic: Not for wastes containing ketones nitrobenzene, dimethylformamide, mesityloxide, tetrahydrofuran, or VOA. Glass: Not for wastes containing hydrofluoric acid and concentrated alkali solutions.
Bacon bomb	Viscous material in storage tanks and lagoons	Viscous liquid	This is limited to viscous material in large storage tanks or lagoons.
Bucket bailer	Ground water	Liquids	This has limited sample volume and is unable to collect discrete samples from depth below the water surface.
Trowel/scoop/spade	Dry wastes in shallow containers	Solid waste	These are not applicable to sampling deeper than 8 cm (3 in.). They also make it difficult to obtain reproducible mass of samples.
Hand auger	Sludges, solids	Solid organic Solid inorganic Solid mixed waste	Care should be taken to choose a corer of a material that will not compromise the intended analytical procedures.
Grain thief	Powdered or granular solids	Solid organic Solid inorganic Solid mixed waste	It has limited application for sampling moist and sticky solids with a diameter of 0.6 cm and greater.
Sampling trier	Powdered or granular solids	Solid waste	It may incur difficulty in retaining core sample of very dry granular materials during sampling.

Sources: EPA 1984, pp. 2-10, 2-19, 2-22, 3-19, 3-22; EPA 1980, P. 29

APPENDIX C

Quick Reference Card
Sampling Procedures

1. Conduct the safety briefing reviewing the SSSP, and surveying the site. If a hazardous situation exists, do not proceed with the sampling event (see Section 3.0), contact the waste generator group's site safety officer or an Industrial Hygenist (IH). In conjunction with the site safety officer and HSR-5 IH, ensure that existing or potential hazards have been mitigated or minimized before initiating the sampling event.

2. Don PPE.

3. Ensure that an HSR-1 Radiological Control Technician (RCT) has monitored the area, if sampling known or suspect radioactively contaminated waste.

4. Prepare an equipment rinsate blank (see Section 2.3.1).

5. Collect samples (note special precautions in Sections 5.0 and 6.0, and Appendices A and B of this plan).

6. Immediately cap the sample container.

7. Affix the completed integrity seal and the self-adhesive sample label on the sample container.

8. Seal the sample in the appropriate holding vessel (insulated cooler with frozen blue ice at 4°C.

9. Complete the chain-of-custody forms and enter appropriate information in the field logbook (see Section 2.11 of this plan).

10. Collect duplicate grab samples from the same source using the same sampling equipment. Decontaminate sampling equipment between samples, if necessary. If decontamination is performed, prepare an equipment rinsate blank.

11. Prepare the field blank(s) (see Section 2.3.1).

12. Label, seal, and record the field blank(s) following steps 9 through 11.

13. Place the trip blank and equipment rinsate blank in the holding vessel with the samples and field blanks.

14. Decontaminate equipment, if necessary.

15. Doff PPE.

16. Properly dispose of used disposable sampling equipment and PPE in the appropriate waste containers maintained at the waste generator's site.

17. Conduct chemical and radiological self-monitoring and monitor samples, equipment, and supplies for radioactive contamination, if required.

18. Review transportation requirements (Section 8.0).

19. Deliver the samples to the analytical laboratory personnel as soon as practical.

'-31-010

Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Stewardship Division (ENV-DO)
Water Quality & Hydrology Group (ENV-WQH)
P.O. Box 1663, Mail Stop K497
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(505) 667-7969/FAX: (505) 665-9344

Date: January 25, 2006
Refer To: ENV-WQH: 06-011
LA-UR-06-0453

Mr. Christopher F. Vick
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132) QUARTERLY REPORT, FOURTH QUARTER 2005

Dear Mr. Vick:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the fourth quarter (October, November, and December) of 2005. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at four Mortandad Canyon alluvial wells during the fourth quarter of 2005. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results from sampling at MCA-5, MCO-4B, MCO-6, and MCO-7 were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS). Monitoring well MCA-5 is a new, replacement well for MCO-3; additional information on monitoring well MCA-5 was provided to your agency in an April 5, 2005, letter (ENV-WQH: 05-069).

RLWTF Effluent Monitoring Results
Table 2.0 presents the analytical results from weekly composite sampling of the RLWTF's effluent. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during a 7-day period. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen (NO_3-N), perchlorate (ClO_4, by Ion Chromatography), fluoride (F), and total dissolved solids (TDS) for the fourth quarter of 2005. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/lm

Attachments: a/s

Cy: M. Leavitt, NMED/SWQB, Santa Fe, NM, w/att.
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, NM, w/att.
M. Johansen, NNSA/LASO, w/att., MS A316
G. Turner, NNSA/LASO, w/att., MS A316
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J. Dewart, ENV-ERS, w/att., MS M992
S. Rae, ENV-WQH, w/att., MS K497
M. Saladen, ENV-WQH, w/att., MS K497
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C. Del Signore, NWIS-TA-50, w/att., MS E518
ENV-WQH File, w/att., MS K497
IM-9, w/att., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, Analytical Results, 4th Quarter, 2005.

Sampling Location	Sample Date	Perchlorate by LC/MS/MS[2] (ug/L)	Perchlorate by IC[3] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCA-5 (MCO-3 Replacement)	10/12/2005	11.8	10.0J	0.811	0.203	<0.010	287	0.45
MCO-4B	10/3/2005	27.2	28.3	1.04	<0.010	<0.010	278	1.04
MCO-4B, GEL QC replicate[4]	10/3/2005			1.14				
MCO-4B, field duplicate[5]	10/3/2005	28.1	27.9	1.24	0.068J	<0.010	272	1.03
MCO-6	10/4/2005	25.1	25.9	1.72H	0.067HJ	<0.010H	316H	1.16H
MCO-6, GEL QC replicate	10/4/2005			1.70H				
MCO-7	10/6/2005	35.1	35.1	2.56	0.222	<0.010	308	1.46
NM WQCC 3103 Ground Water Standards (mg/L)				*10*[1]			*1000*	*1.6*

Notes:

[1]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

[2]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[3] IC means the EPA Method 314, perchlorate analysis by Ion Chromatography.

[4]GEL performs replicate analyses on randomly selected samples as part of their QC program.

[5]LANL collects duplicate samples as part of its QC program.

NS means that no sample was collected due to insufficient water in the well.

J indicates an estimated value. The result was less than the reporting limit, but greater than the detection limit.

H means that the sample exceeded the analytical hold time.

All analyses by General Engineering Laboratories, Charleston, SC.

All samples filtered.

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, Analytical Results, 4th Quarter, 2005.

		RLWTF Final Weekly Composite Results (mg/L)		
Monitoring Period	**Sample Composite Date**	**NO3+NO2-N[1] (mg/L)**	**Fluoride[1] (mg/L)**	**TDS[1] (mg/L)**
September, 2005	9/12/2005	2.34	0.30	334
	9/19/2005	1.63	0.28	306
	9/26/2005	1.80	0.26	295
October, 2005	10/3/2005	1.24	0.20	263
	10/11/2005	2.48	0.36	511
	10/17/2005	2.54	0.45	665
	10/24/2005	2.03	0.41	548
	10/31/2005	2.10	0.28	389
November, 2005	11/7/2005	1.56	0.27	380
	11/14/2005	2.55	0.22	337
	11/21/2005	3.20	0.27	418
	no discharges 11/21-11/28			
December, 2005	12/5/2005	3.79	0.25	364
	12/12/2005	3.17	0.19	310
	results pending			
	results pending			
4th Quarter 2005 Averages (mg/L)[3]		**2.3**	**0.29**	**394**
NM WQCC 3103. Ground Water Standards (mg/L)		*10[2]*	*1.6*	*1000*

Notes:

[1]Analysis by General Engineering Laboratories, Inc., Charleston, SC

[2]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

[3]2nd quarter averages include results from June 2005.

H means that the hold-time was exceeded.

J means the reported value is greater than the Method Detectio Limit (MDL) but less than the Reporting Limit (RL).

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 4th Quarter, 2005.

Monitoring Period	RLWTF FMC Results[1]			
	NO3-N (mg/L)	Perchlorate by IC (ug/L)	TDS (mg/L)	F (mg/L)
October, 2005	1.01	0 +/-1	375	0.39
November, 2005	1.21	0 +/-1	334	0.34
December, 2005	1.01	0 +/-1	135	0.14
NM WQCC 3103. Ground Water Standards (mg/L)	*10*	*NA*	*1000*	*1.6*

Notes:
[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.

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GROUND WATER

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BUREAU

Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Protection Division
Water Quality & RCRA Group (ENV-RCRA)
P.O. Box 1663, Mail Stop K490
Los Alamos, New Mexico 87545
(505) 667-0666/FAX: (505) 667-5224

Date: March 8, 2010
Refer To: ENV-RCRA-10-052
LAUR: 10-01288

Mr. William Olson, Chief
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502

Dear Mr. Olson:

SUBJECT: TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132), UPGRADE PROJECT 60% DESIGN

In accordance with 20.6.2.3107.C of the New Mexico Water Quality Control Commission Regulations, Los Alamos National Laboratory (Laboratory) is providing you with a copy of the 60% design package—plans and specifications—for the construction of a new Radioactive Liquid Waste Treatment Facility (RLWTF) at Technical Area (TA)-50. This letter and the enclosed CDs (2) are supporting documents to the Laboratory's August 16, 1996, Ground Water Discharge Plan Application (DP-1132) for the TA-50 RLWTF. The Laboratory will provide you with a copy of the 90% design package once it becomes available. The tentative project schedule is as follows:

<u>2010</u>
Final design and Request For Proposals (RFP) for installation of lay-down areas and fire suppression water tower only

<u>2011-2012</u>
Construction of lay-down areas and fire suppression water tower

<u>2012 – 2017</u>
Construction of nuclear treatment facility, central utility building, and zero liquid discharge

<u>2017</u>
Start-up, cold (potable water) operations and operational readiness review

<u>2018</u>
Place into service, commence hot (radioactive liquid waste) operations

: 03394

Please contact me at (505) 667-7969 if you have questions regarding this matter.

Sincerely,

Robert Beers
Water Quality & RCRA Group

Enclosures: a/s

Cy: Glenn Saums, NMED/SWQB, Santa Fe, NM, w/o enc.
James Bearzi, NMED/HWB, Santa Fe, NM, w/o enc.
Gene Turner, LASO-EO, w/enc., A316
Steve Yanicak, LASO-GOV, w/enc., M894
Michael B. Mallory, PADOPS, w/o enc., A102
J. Chris Cantwell, ADESHQ, w/o enc., K491
Randy Johnson, ENV-EAQ, w/o enc., E500
Mike Saladen, ENV-RCRA, w/o enc., K490
Robert C. Mason, TA55-DO, w/o enc., E583
Hugh McGovern, TA-55 RLW, w/o enc., E518
Pete Worland, TA-55-RLW, w/o enc., E518
Keith Orr, PMF-DO, w/o enc., P137
Ed Artiglia, ES-PE, w/o enc., P137
ENV-RCRA File, w/enc., K490
IRM-RMMSO, w/enc., A150

Los Alamos
NATIONAL LABORATORY
EST. 1943

APR 28 2006

Environmental Stewardship Division (ENV-DO)
Water Quality & Hydrology Group (ENV-WQH)
P.O. Box 1663, Mail Stop K497
Los Alamos, New Mexico 87545
(505) 667-7969/FAX: (505) 665-9344

Date: April 25, 2006
Refer To: ENV-WQH: 06-065
LA-UR: 06-2856

Mr. Christopher F. Vick
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132) QUARTERLY REPORT, FIRST QUARTER 2006

Dear Mr. Vick:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the first quarter (January, February, and March) of 2006. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at four Mortandad Canyon alluvial wells during the first quarter of 2006. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results from sampling at MCO-3, MCO-4B, MCO-6, and MCO-7 were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS). Monitoring well MCA-5, the new replacement well for MCO-3, was dry so MCO-3 was sampled instead.

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Laboratory's Water Quality Database (http://wqdbworld.lanl.gov/).

RLWTF Effluent Monitoring Results
Table 2.0 presents the analytical results from weekly composite sampling of the RLWTF's effluent. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during a 7-day period. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen (NO_3-N), perchlorate (ClO_4, by Ion Chromatography), fluoride (F), and total dissolved solids (TDS) for the first quarter of 2006. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/tml

Cy: M. Leavitt, NMED/SWQB, Santa Fe, NM
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, NM
M. Johansen, NNSA/LASO, MS A316
G. Turner, NNSA/LASO, MS A316
K. Wethington, NNSA/LASO, MS A316
K. Hargis, ENV-DO, MS J591
D. Stavert, ENV-DO, MS J591
T. George, ENV-ES, MS J591
J. Dewart, ENV-ERS, MS M992
S. Rae, ENV-WQH, MS K497
M. Saladen, ENV-WQH, MS K497
D. Cox, NWIS-DO, MS J910
B. Palmer, NWIS-DO, MS J910
C. Douglass, NWIS-TA-50, MS E518
D. Moss, NWIS-TA-50, MS E518

Cy (continued):
P. Worland, NWIS-TA-50, MS E518
B. McClenahan, NWIS-TA-50, MS E518
C. Del Signore, NWIS-TA-50, MS E518
ENV-WQH File, MS K497
IM-9, MS A150

APR - 8 2006

Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, Analytical Results, 1st Quarter, 2006.

Sampling Location	Sample Date	Perchlorate by LC/MS/MS[2] (ug/L)	Perchlorate by IC[3] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	2/14/2006	1.40	<4.00	3.90	0.096J	0.056	217	0.42
MCO-4B	2/6/2006	17.7	18.6	1.26	0.262	<0.050	296	0.89
MCO-4B, GEL QC replicate[4]	2/6/2006			1.33	0.321		300	
MCO-4B, field duplicate[5]	2/6/2006	17.3	17.0	1.52	0.238	<0.050	297	0.89
MCO-6	2/8/2006	24.7	27.0	1.39	0.207	<0.010	298	1.08
MCO-6, GEL QC replicate	2/8/2006			1.40	0.249	<0.010		
MCO-7	2/8/2006	26.9	28.9	2.01	0.238	<0.050	265	1.43
NM WQCC 3103 Ground Water Standards (mg/L)				*10*[1]			*1000*	*1.6*

Notes:

[1]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

[2]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[3] IC means the EPA Method 314, perchlorate analysis by Ion Chromatography.

[4]GEL performs replicate analyses on randomly selected samples as part of their QC program.

[5]LANL collects duplicate samples as part of its QC program.

NS means that no sample was collected due to insufficient water in the well.

J indicates an estimated value. The result was less than the reporting limit, but greater than the detection limit.

H means that the sample exceeded the analytical hold time.

All analyses by General Engineering Laboratories, Charleston, SC.

All samples filtered.

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, Analytical Results, 1st Quarter, 2006.

Monitoring Period	Sample Composite Date	RLWTF Final Weekly Composite Results (mg/L)		
		NO3+NO2-N[1] (mg/L)	Fluoride[1] (mg/L)	TDS[1] (mg/L)
December, 2005	12/19/2005	2.62	<0.030	66H
	12/26/2005-no discharges	NS	NS	NS
January, 2006	1/3/2006	0.63	0.058J	36
	1/9/2006	0.32	0.056J	33
	1/17/2006	1.17	<0.030	38
	1/23/2006	0.24	<0.030	34
	1/30/2006	0.17	0.048J	39
February, 2006	2/6/2006	0.23	<0.030	14
	2/13/2006	0.45	0.054J	45
	2/19/2006	0.51	0.056J	17
	2/27/2006	1.08	<0.030	30
March, 2006	3/6/2006	0.75	<0.030	47
	3/13/2006	0.64	<0.030	17
	3/20/06-results pending			
	3/27/06-results pending			
1st Quarter 2006 Averages (mg/L)[3]		**0.7**	**0.04**	**35**
NM WQCC 3103. Ground Water Standards (mg/L)		*10[2]*	*1.6*	*1000*

Notes:

[1]Analysis by General Engineering Laboratories, Inc., Charleston, SC

[2]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

[3]1st quarter averages include results from December 2005.

H means that the hold-time was exceeded.

J means the reported value is greater than the Method Detectio Limit (MDL) but less than the Reporting Limit (RL).

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 1st Quarter, 2006.

	RLWTF FMC Results[1]			
Monitoring Period	**NO3-N (mg/L)**	**Perchlorate by IC (ug/L)**	**TDS (mg/L)**	**F (mg/L)**
January, 2006	3.72	0 +/-1	<70	0.34
February, 2006	0.45	0 +/-1	<70	<0.01
March, 2006	0.55	0 +/-1	<70	<0.01
NM WQCC 3103. Ground Water Standards (mg/L)	*10*	*NA*	*1000*	*1.6*

Notes:
[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.

Los Alamos
NATIONAL LABORATORY
EST.1943

Environment, Safety, Health and Quality
P.O. Box 1663, Mail Stop K491
Los Alamos, New Mexico 87545
505-667-4218/Fax 505-665-3811

Date: June 19, 2006
Refer To: ESH&Q: 06-004

Mr. Ron Curry, Secretary
New Mexico Environment Department
Harold S. Runnels Building
1190 St. Francis Drive, Suite 4050 North
Santa Fe, NM 87502-01 10

Mr. Richard Greene, Regional Administrator
U. S. Environmental Protection Agency, Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

SUBJECT: Delegation of Authorized Representative for the Solid Waste Disposal Act (SWDA), the New Mexico Solid Waste Act (SWA), the Resource Conservation and Recovery Act (RCRA), the New Mexico Hazardous Waste Act (HWA), and the Toxic Substances Control Act (TSCA)

Dear Messrs. Curry and Greene:

The purpose of this letter is to inform the New Mexico Environment Department (NMED) and the Environmental Protection Agency (EPA) Region 6 of a change in signatory authority for the operator of Los Alamos National Laboratory (LANL). Los Alamos National Security, LLC (LANS) became the Laboratory's management and operations contractor in place of the University of California (UC), effective June 1, 2006. This letter delegates the LANS "authorized representative" for certifying and signing permits and documents required under the compliance programs for solid waste, hazardous waste, and toxic substances, pursuant to the Solid Waste Disposal Act (SWDA), the New Mexico Solid Waste Act (SWA), the Resource Conservation and Recovery Act (RCRA), the New Mexico Hazardous Waste Act (HWA), and the Toxic Substances Control Act (TSCA).

As the designated LANS signatory official for permit and compliance programs for solid waste, hazardous waste, and toxic substances (Please see Enclosure 1), I wish to confirm that I have delegated to the positions of Division Leader and Deputy Division Leader of the Laboratory's Environmental Protection (ENVP) Division the authority to certify, review, approve and/or sign as certifying official all permit applications, permit modifications, registrations, certifications, and other information as required by NMED and EPA.

In addition, the positions of Group Leader and Deputy Group Leader of the Laboratory's Water Quality and RCRA Group (ENVP-3) are hereby designated as authorized representatives to sign regulatory compliance reports, plans, notices of changed conditions, and other compliance documents and information as may be required for the management and operation of these compliance programs.

Please note that delegation of "authorized representative" for compliance documents and information submitted under the NMED Consent Order dated March 1, 2005 will be addressed by Andrew K. Phelps, Associate Director for Environmental Programs, under separate cover.

Please contact Tori George at (505)-667-7883 if additional information would be helpful. Thank you for your assistance.

Sincerely,

Richard S. Watkins
Associate Director
Environment, Safety, Health and Quality
Los Alamos National Security, LLC

GROUND WAT
JUN 30 2006
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RSW:PS/tag

Enclosure: a/s

Cy:

John Blevins, 6EN, USEPA, Region 6, Dallas, TX
Carl Edlund, 6PD, USEPA, Region 6, Dallas, TX
Troy Hill, 6PD, USEPA, Region 6, Dallas, TX
Steve Vargo, 6PD, USEPA, Region 6, Dallas, TX
Aurelle Ashley-Marx, NMED
James Bearzi, NMED
Jim Davis, NMED
Tracy Hughes, NMED
Marcy Leavitt, NMED
Fernando Martinez, NMED
Jim Norton, NMED
Bill Olson, NMED
Cindy Padilla, NMED
Mary Uhl, NMED
John Volkerding, NMED
E. Wilmot, NNSA-LASO, A316
G. Turner, NNSA-LASO, A316
G. Rodriguez, NNSA-LASO, A316
F. Dickson, LC, A183
D. Woitte, LC-LESH, A187
E. Louderbough, LC-LESH, A187
A. Phelps, ENV, T002
D. Stavert, ENV, M992
D. McInroy, ENV, M992
A. Grieggs, ENVP-RCRA, K490
D. Wilburn, ENVP-1, J978
V. George, ENVP-DO, J978
ENVP-RCRA. File, w/enc., K490
IRM-RMMSO, w/enc., MS A150

ENCLOSURE 1

LOS ALAMOS
National Security, LLC

Los Alamos Research Park
4200 W. Jemez Rd., Suite 400
Los Alamos, NM 87544
505-663-5837
Fax: 505-663-5862

April 13, 2006

25154-006-T00064

Richard S. Watkins
Associate Director
Environmental, Safety and Health and Quality
Los Alamos National Security

Subject: **Contract Number: DE-AC52-06NA25396, Delegation of Authority for Permits, Authorizations and Other Documents as an Operator or Co-Operator Under Environmental Permits for the Los Alamos National Laboratory**

I, Michael R. Anastasio, President of Los Alamos National Security, LLC (LANS), the "Company," hereby delegate authority to you, Richard S. Watkins, Associate Director, Environmental, Safety and Health and Quality (ES&HQ) for LANS, to execute on behalf of the Company permits, authorizations, or other documents necessary for the Company to become an operator or co-operator under the environmental permits for the Los Alamos National Laboratory, which permits are currently in the name of the University of California.

This delegation shall remain in effect while you are in the position of Associate Director, ES&HQ or until revoked by me.

Sincerely,

Michael Anastasio, President
Los Alamos National Security, LLC

WE:cac

Copies:
J. T. Mitchell, Deputy Director Designate, LANS, LLC
J. Van Prooyen, PAD, Operations, LANS, LLC
A. Phelps, Environmental Programs, LANS, LLC
R. Humphries, Legal, LANS, LLC
B. Eklund, Board Secretary, LANS, LLC
J. Scarpino, Senior Executive, LANS, LLC
M. Rafferty, Prime Contacts, LANS, LLC
T. F. Gioconda, Transition Manager, LANS, LLC
LANS Transition File

: 03407

GROUND WATER

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Los Alamos NATIONAL LABORATORY EST.1943

Environmental Protection Division
Water Quality & RCRA (ENV-RCRA)
P.O. Box 1663, Mail Stop K490
Los Alamos, New Mexico 87545
(505) 667-0666/FAX: (505) 667-5224

Date: July 27, 2006
Refer To: ENV-RCRA: 06-039
LA-UR: 06-5125

Mr. Christopher F. Vick
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: GROUND WATER DISCHARGE PLAN QUARTERLY REPORT, SECOND QUARTER 2006, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (DP-1132)

Dear Mr. Vick:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the second quarter (April, May, and June) of 2006. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at three Mortandad Canyon alluvial wells, MCO-4B, MCO-6, and MCO-7, during the second quarter of 2006. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results from sampling at MCO-4B, MCO-6, and MCO-7 were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Table 1.0 also presents the results from sampling conducted at alluvial ground water well MCO-3 on July 13, 2006. Sampling at MCO-3 was delayed past the end of the quarter due to waste management issues regarding the containerization of sampling purge water. Please note that alluvial monitoring well MCA-5, the recently constructed replacement well for MCO-3, was dry so MCO-3 was sampled instead.

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Laboratory's Water Quality Database (http://wqdbworld.lanl.gov/).

RLWTF Effluent Monitoring Results

Table 2.0 presents the analytical results from weekly composite sampling of the RLWTF's effluent. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during a 7-day period. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen (NO_3-N), perchlorate (ClO_4, by Method 314.0, Ion Chromatography), fluoride (F), and total dissolved solids (TDS) for the second quarter of 2006. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & RCRA Group

BB/tag

Cy: M. Leavitt, NMED/SWQB, Santa Fe, NM,
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, NM,
M. Johansen, NNSA/LASO, MS A316
G. Turner, NNSA/LASO, MS A316
J. Dewart, LWSP, MS M992
D. Watkins, ADESH,
T. George, ENV-DO, MS J591
T. Sandoval, ENV-RCRA, MS K490
M. Saladen, ENV-RCRA, MS K497
D. Cox, EMO-DO, MS J910
C. Douglass, RLW, MS E518
P. Worland, EMO-RLW, MS E518
B. McClenahan, EMO-RLW, MS E518

<u>Cy (continued):</u>
C. Del Signore, EMO-RLW, MS E518
D. Moss, RLW, MS E518
ENV-RCRA File, MS K490
IRM-RMMSO, w/enc., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, Analytical Results, 2nd Quarter, 2006.

Sampling Location	Sample Date	Perchlorate by LC/MS/MS[2] (ug/L)	Perchlorate by IC[3] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	7/13/2006	3.79	<4.00	2.21	0.89	0.02	271	0.45
MCO-4B	6/27/2006	15.9	15.1	1.78	0.25	0.14	314	0.82
MCO-6	5/12/2006	22.2	21.2	1.56	0.20	<0.01	309	1.14
MCO-7	5/12/2006	27.1	31.4	1.86	0.17	<0.01	286	1.48
MCO-7, field duplicate	5/12/2006	27.0	32.1	1.79	0.13	<0.10	286	1.48
NM WQCC 3103 Ground Water Standards (mg/L)				*10*[1]			*1000*	*1.6*

Notes:

[1]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

[2]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[3] IC means the EPA Method 314, perchlorate analysis by Ion Chromatography.

[4]GEL performs replicate analyses on randomly selected samples as part of their QC program.

[5]LANL collects duplicate samples as part of its QC program.

NS means that no sample was collected due to insufficient water in the well.

J indicates an estimated value. The result was less than the reporting limit, but greater than the detection limit.

H means that the sample exceeded the analytical hold time.

All analyses by General Engineering Laboratories, Charleston, SC.

All samples filtered.

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, Analytical Results, 2nd Quarter, 2006.

		RLWTF Final Weekly Composite Results (mg/L)		
Monitoring Period	**Sample Composite Date**	**NO3+NO2-N[1] (mg/L)**	**Fluoride[1] (mg/L)**	**TDS[1] (mg/L)**
March, 2006	3/20/2006	0.801	0.079J	57
	3/27/2006	0.564	0.086J	50
April, 2006	4/4/2006	0.298	0.084J	55
	4/10/2006	0.671	0.056J	59
	4/17/2006	0.821	0.061J	50
	4/24/2006	0.999	0.073J	60
	4/24/2006-duplicate	0.997	0.074J	71
May, 2006	5/1/2006	0.393	0.059J	74
	5/9/2006	0.258	0.073J	69
	5/16/2006	0.406	0.062J	65
	5/30/2006	0.746	0.087J	85
	5/30/2006-duplicate	0.762	0.092J	86
June, 2006	6/5/2006	0.509	0.17	225
	6/12/2006	0.587	0.18	228
2nd Quarter 2006 Averages (mg/L)[3]		**0.63**	**0.09**	**88**
NM WQCC 3103. Ground Water Standards (mg/L)		*10[2]*	*1.6*	*1000*

Notes:

[1]Analysis by General Engineering Laboratories, Inc., Charleston, SC

[2]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

[3]2nd quarter averages include results from March 2006.

H means that the hold-time was exceeded.

J means the reported value is greater than the Method Detectio Limit (MDL) but less than the Reporting Limit (RL).

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 2nd Quarter, 2006.

	RLWTF FMC Results[1]			
Monitoring Period	**NO3-N (mg/L)**	**Perchlorate by IC (ug/L)**	**TDS (mg/L)**	**F (mg/L)**
April, 2006	0.5 +/- 0.05	0 +/-1	32 +/- 4	0.0 +/- 0.01
May, 2006	0.5 +/- 0.05	0 +/-1	37 +/- 4	0.0 +/- 0.01
June, 2006	0.6 +/- 0.06	0 +/-1	57 +/- 6	0.23 +/ -0.02
NM WQCC 3103. Ground Water Standards (mg/L)	*10*	*NA*	*1000*	*1.6*

Notes:
[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.

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Title: Radioactive Liquid Waste Treatment Facility

Annual Report for 2005

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Los Alamos
NATIONAL LABORATORY

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Radioactive Liquid Waste Treatment Facility Annual Report For 2005

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Acronyms and Abbreviations

Ci	curie (3.7 x 10^{10} disintegrations per second)
COD	chemical oxygen demand
DCG	derived concentration guidelines
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
Final50	composite sample of effluent from the RLWTF
IX	ion exchange
Kg	kilogram
L	liter
LANL	Los Alamos National Laboratory
MDL	method detection limit
meq/L	milliequivalents per liter
mg/L	milligram per liter
mrem	millirem (10^{-3} rem)
MTP	main treatment process
nCi/L	nanocuries per liter (10^{-9} curies per liter)
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
pCi/L	picocuries per liter (10^{-12} curies per liter)
Raw50	composite sample of daily influent to RLWTF
RLW	radioactive liquid waste
RLWTF	radioactive liquid waste treatment facility
RO	reverse osmosis
SVOC	semi-volatile organic chemical(s)
TA	technical area
TDS	total dissolved solids
TSS	total suspended solids
TUF	tubular ultrafilter
VOC	volatile organic chemical(s)
µS/cm	microSiemens per centimeter
µg/L	microgram per liter

1. Overview of Facilities and Operations

There are four Radioactive Liquid Waste Treatment Facilities at the Los Alamos National Laboratory, one each at TA-21 and TA-53, and two at TA-50. The RLW facilities at TA-50 are housed within the same structure, but treat different radioactive liquid waste (RLW) streams and have different safety basis and quality assurance classifications and requirements.

1.1 TA-50 RLWTF for Low-Level RLW

The facility at TA-50 receives and treats low-level RLW from more than 1000 generating points at LANL. RLW are sent from generator facilities to TA-50 via an underground collection system that has about four miles of double-walled collection pipes. Treated waters are discharged to the environment through an outfall in Mortandad Canyon. One state and two federal agencies monitor the quality of these treated waters.

Primary structures at the TA-50 RLWTF for the treatment of low-level RLW are Building 50-01, 50-02, 50-90, 50-248, and a trailer-based evaporator. These structures, with a combined area of approximately 55,000 square feet, house process areas, operations support areas, analytical laboratories, and offices (Del Signore, 07/19/01). The facility has a main treatment process (MTP) with five unit operations, and a secondary treatment process consisting of two unit operations for the treatment of wastes generated by the MTP. Although the facility has been designated a Hazard Category 2 nuclear facility, low-level RLW operations primarily have Management Level 3 quality assurance requirements.

The TA-50 RLWTF is now 43 years old. Because of its age, and because of changing regulations, this facility has undergone significant modifications. The infusion of capital into the TA-50 facility for repairs and upgrades has exceeded $15 million since 1997, including projects for stack consolidation, repair of tanks and equipment, and the installation of new processes to address more stringent discharge standards. The facility is currently being modified to install 300,000 gallons of new influent storage capacity.

1.2 TA-53 Facility

The facility at TA-53 treats RLW from accelerator research at the Los Alamos Neutron Science Center through water storage, to allow radioisotope decay, and solar evaporation. The TA-53 facility started operation in December 1999, and is not categorized as a nuclear facility.

Water flows by gravity into lift stations adjacent to Experimental Area A and the Lujan center. The RLW is pumped from the lift stations through double-walled underground piping to one of three 30,000-gallon tanks inside the RLWTF, Building 53-945, at the east end of TA-53. The tanks allow decay of radioisotopes generated by operation of the LANSCE accelerator beam, most of which have short half-lives. After aging, the RLW is pumped to one of two evaporator basins, each with a capacity of 125,000 gallons.

Tritiated waters are occasionally trucked directly to the TA-53 basins for evaporation. Typically, the waters have been treated at the TA-50 RLWTF and meet NPDES, NMED, and DOE discharge standards, but fail to meet the voluntary commitment to discharge at 20,000 nanocuries per liter (i.e., at 1% of the DOE limit for tritium).

1.3 Transuranic RLW Facility

The Room 60 facility receives and treats transuranic RLW streams from the plutonium facility at TA-55. Transuranic RLW are transferred to TA-50 via two underground double-walled collection pipes. Treated transuranic waters are sent to the low-level processes at TA-50.

Structures for the treatment of transuranic RLW consist of 50-201, 50-66, and Room 60 within Building 50-01. Two influent storage tanks are in 50-66, and the treatment process resides within Room 60. This facility has been designated a Hazard Category 2 nuclear facility, and primarily has Management Level 2 quality assurance requirements.

Current facility modifications include the activation of four new transfer lines between TA-55 and TA-50, replacement of the caustic tank in 50-66, and equipment repairs and replacement in Room 60 itself.

1.4 TA-21 Facility

The facility at TA-21 pre-treats RLW from tritium research at TA-21 using a clarifier and a gravity filter. Effluent from the facility is transferred to either the TA-50 low-level RLWTF or the TA-53 Facility for further treatment.

The facility is small (4200 ft^2) and is 39 years old (LANL, 09/30/03, p.B-3). Process equipment is smaller than that at the TA-50 RLWTF because volumes are smaller. For example, the TA-21 clarifier has a capacity of 4,000 gallons, while that at TA-50 can hold 24,000 gallons. Associated with the facility are an office trailer and a number of above-ground and below-grade storage tanks. The TA-21 RLWTF is not categorized as a nuclear facility.

2. TA-50 Operations Summary for 2005

2.1 Effluent Quality

Two federal and one state agency monitor the quality of treated waters discharged from the TA-50 RLWTF into Mortandad Canyon. The United States Environmental Protection Agency (USEPA) regulates discharges via NPDES permit number #NM0028355 under the National Pollutant Discharge Elimination System (NPDES). The permit stipulates sampling method, sampling frequency, and water quality requirements (i.e., discharge limits) for 21 water parameters. (EPA, 12/29/00) Additionally, the TA-50 RLWTF effluent must meet the guidelines of the United States Department of Energy (DOE) Order 5400.5, "Radiation Protection of the Public and the Environment". (DOE, 01/17/93)

LANL also has voluntary commitments (a) to the New Mexico Environment Department (NMED) to meet groundwater standards set by the New Mexico Water Quality Control Commission for fluoride, nitrate-nitrogen and total dissolved solids (TDS), (b) to the NMED to meet the proposed EPA discharge standard for perchlorates, and (c) to the DOE to discharge at less than 1% of the DCG for tritium.

During calendar year 2005, TA-50 RLWTF effluent:

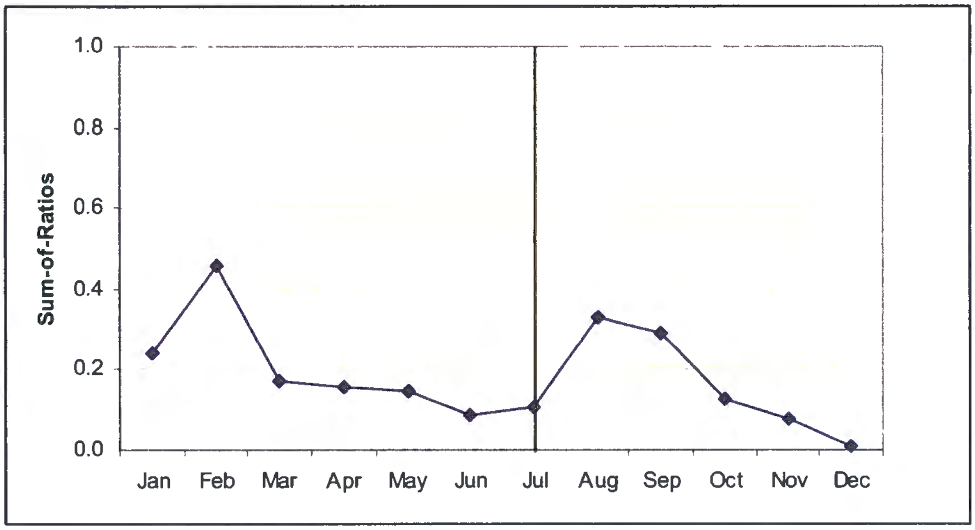
- met all DOE standards set forth in Order 5400.5 for radiological discharges, and has now done so for six consecutive years;
- was in compliance with all twenty-one (21) NPDES water quality parameters, also for the sixth consecutive year; and
- met NMED ground water standards for fluoride, nitrate, and TDS, and has now met these voluntary standards for all but two weeks of the last six years[1].

Effluent radiological quality during 2005 is illustrated in Figure 2-1 by plotting the sum-of-ratios for each month. The DOE discharge standard, set forth in Order 5400.1, is that the sum-of-ratios of (the discharge concentration of each radioisotope divided by the discharge standard for that radioisotope) must be less than 1.0. The highest monthly sum-of-ratios value occurred in February (0.46); the average sum-of-ratios for all of 2005 was 0.18, or less than 20% of the DOE discharge standard.

Effluent quality versus NPDES discharge limits and NMED groundwater standards is summarized in Table 2-1. The table lists the 21 EPA parameters and their discharge standards, the three NMED parameters and their groundwater standards, and the average concentration of each parameter in RLWTF effluent during 2005. Annual average discharge concentrations were less than 20% of the discharge standard for each of the 24 non-radiological parameters.

[1] Two weekly composite samples of RLWTF effluent slightly exceeded the groundwater standard for fluoride during 2003. Sample values of 2.07 mg/L and 1.64 mg/L were obtained, versus the groundwater standard of 1.6 mg/L. (Watkins and Worland, March 2004, p. 30.)

Figure 2-1
Sum-of-Ratios in Effluent from
the TA-50 RLWTF During 2005



2.2 Flows and Quantities

The TA-50 RLWTF received 6,985,000 liters of influent during 2005, and discharged 6,796,000 liters to Mortandad Canyon (Del Signore, 03/28/06). Influent consisted primarily of water brought to the RLWTF via the underground collection system, but included 177,000 liters of water transported from generator facilities via truck, primarily from TA-15 and TA-54. No influent was received during 2005 from the TA-21 facility. Effluent consisted entirely of permeate from the reverse osmosis unit; monthly discharge volumes are detailed in Table 2-2.

The influent brought with it 0.37 curie of radioactivity in 0.55 kilogram of radioactive materials. Uranium-238 accounted for nearly all of the radioactive mass, while plutonium and americium isotopes accounted for 86% of the radioactivity in the influent. Effluent contained just 0.03 curie in less than one gram of radioactive materials. Approximately 97% of the radioactivity in the effluent was due to the presence of tritium, which cannot be removed by RLWTF processes.

A total of 1,460 kilograms of impurities entered the plant in the form of suspended solids (147 kilograms) and dissolved solids (1,320 kilograms). A total of 1,230 kilograms of dissolved solids were discharged with effluent into Mortandad Canyon. Sodium accounted for one-half of the dissolved solids in the effluent.

Table 2-1
TA-50 Effluent During 2005 Compared to NPDES and NMED Standards

Regulator	Regulated Parameter	Units	Standard	FINAL Avg.
NPDES	ALUMINUM	ug/L	5,000	26
NPDES	ARSENIC	ug/L	368	*
NPDES	BORON	ug/L	5,000	120
NPDES	CADMIUM	ug/L	50	*
NPDES	COBALT	ug/L	1,000	0.6
NPDES	COD	mg/L	125	15
NPDES	COPPER	ug/L	1,393	17
NPDES	IRON	ug/L	Report Only	99
NPDES	LEAD	ug/L	423	0.42
NPDES	MERCURY	ug/L	0.77	0.001
NPDES	NICKEL	ug/L	Report Only	17
NPDES	PERCHLORATE	ug/L	Report Only	*
NPDES	RADIUM*	pCi/L	30*	*
NPDES	SELENIUM	ug/L	5	1
NPDES	TOTAL CHROMIUM	ug/L	1,340	3
NPDES	TOXIC ORGANICS**	ug/L	1,000	*
NPDES	TSS	mg/L	30	*
NPDES	VANADIUM	ug/L	100	7
NPDES	ZINC	ug/L	4,370	9
NPDES	pH	s.u.	6.0 - 9.0	7.5
NMED	FLUORIDE	ug/L	1,600	246
NMED	NITRATE-N	mg/L	10	2
NMED	TDS	mg/L	1,000	182

FINAL Avg. = Flow-weighted average concentration in effluent.
* Less than detection limit

Treating these waters produced solid wastes, which result from removal of solids from the influent during water treatment, from the addition of chemicals needed to treat the influent, from facility maintenance, and from day-to-day operational activities. During 2005, a total of 32,100 kilograms of solid radioactive wastes, seven kilograms of chemical wastes, and four kilograms of mixed wastes were generated by RLWTF activities. Another 64,800 kilograms of low-level radioactive wastes (soil and debris) resulted from construction work for the new influent pump house and storage tanks.

Table 2-2
Effluent Flows From the TA-50 RLWTF During 2005

Month	No. of Discharges	Volume of Discharges (liters)
Jan-05	7	506,100
Feb-05	5	363,400
Mar-05	9	661,080
Apr-05	6	431,300
May-05	10	735,700
Jun-05	9	626,900
Jul-05	5	368,000
Aug-05	9	669,200
Sep-05	10	737,800
Oct-05	10	740,800
Nov-05	7	515,100
Dec-05	6	440,900
2005 Totals	93	6,796,280

2.3 Facility and Process Modifications

Although no significant facility modifications were *completed* during 2005 for any of the four RLW facilities, several planning and construction activities took place. Construction, which started in 2004, continued for the new pump house and influent storage facility. This project may be completed during 2006. In addition, planning began or continued for a number of modifications to the transuranic RLW facility, including (a) activation of a new set of underground transfer piping between TA-55 and TA-50, (b) a replacement storage tank for caustic wastes from TA-55, and (c) equipment replacement in Room 60 itself.

One process modification was made during 2005, the recycle of reverse osmosis (RO) concentrate. Historically, RO concentrate has been drawn out of the main treatment process for subsequent treatment as a secondary waste stream. The process change, initiated in August, was accompanied by a six-week plant test in order to assess the impacts of the change (Del Signore and McClenahan, March 2006). The test showed that up to 70% of the RO concentrate could be recycled without deleterious near-term effects. Attendant savings include reduced evaporation costs, reduced transportation of bottoms for solidification, and reduced solidification costs.

3. Radiological Nature of TA-50 RLWTF Waters

3.1 Radionuclides Detected

The influent wastewater to the TA-50 RLWTF is radioactive due to the presence of radionuclides that emit alpha and beta particles, gamma rays and neutrons. RLWTF influent and effluent samples are analyzed for thirty-eight (38) such radionuclides which, from past experience, are probable in LANL radioactive liquid wastes. Twenty of these radionuclides were detected in the RLWTF influent and 11 were detected at very low activities in the RLWTF effluent during 2005. Table 3-2, shown on the next page, summarizes the radionuclides for which analyses are performed, and the radionuclides that were detected in the RLWTF influent and effluent.

3.2 Radionuclide Removal

Table 3-1 shows the *mass* of the nine alpha-emitting radionuclides analyzed for in the RLWTF influent and effluent from the RLWTF in 2005. The table indicates that uranium-238 comprised more than 98% of the mass of these radionuclides in RLWTF influent, and shows that the treatment processes removed 99.97% of the mass of these alpha emitters from the wastewater stream (552 grams in, 0.14 gram out).

Table 3-1
Mass of Alpha Emitting Radionuclides in RLWTF Influent and Effluent During 2005

Alpha Particle Emitting Radionuclide	Mass in Influent (grams)	Mass in Effluent (grams)
Am-241	36.4 E-3	8.8 E-6
Np-237	*	*
Ra-226	*	*
Pu-238	6.8 E-3	158. E-9
Pu-239	1.2 E0	36.1 E-6
Th-232	3.9 E0	*
U-234	322. E-3	597. E-6
U-235	2.7 E0	1.4 E-3
U-238	544. E0	137. E-3
Totals	552. E0	139. E-3

* Less than Detection Limit

Table 3-2
Radionuclide Analyses of the RLWTF Influent and Effluent in CY 2005

Radionuclides Analyzed for in the RLWTF Influent and Effluent	Radionuclides Present in RLWTF Influent	Radionuclides Detected in RLWTF Effluent
Alpha Particle Emitters		
Am-241	X	X
Np-237		
Ra-226		
Pu-238	X	X
Pu-239	X	X
Pu-240	X	X
Th-232	X	X
U-234	X	X
U-235	X	X
U-238	X	X
Beta Particle Emitters		
As-74		
Be-7	X	
Ce-141	X	
Co-56 and Co-57		
Co-58 and Co-60	Co-60	
Cs-134	X	
Cs-137	X	X
Eu-152		
H-3	X	X
I-133	X	
Mn-52 and Mn-54	Mn-52	
Na-22	x	
Ra-228		
Rb-83	X	X
Rb-84	X	
Sc-46 and Sc-48		
Se-75		
Sn-113		
Sr-85	X	
Sr-89	X	
Sr-90		
V-48		
Y-88		
Zn-65		X
38 Total	**20 Total**	**11 Total**

Note: Due to the similarity of their energy peaks, Pu-239 and Pu-240 are analyzed together, and reported as Pu-239.

A similar perspective is obtained by examining removal of alpha *radioactivity* during 2005. As shown in Table 3-3, the treatment process at the RLWTF removed 99.98% of the radioactivity of the alpha emitters from the wastewater stream (0.32 curie in, 39 microcuries out).

Table 3-3
Removal of Alpha Radioactivity
From RLWTF Influent During 2005

Date	Raw (Ci)	Final (Ci)	Removal Factor 100X(INF - EFF)/INF
Jan-05	20.4 E-3	5. E-6	99.976
Feb-05	10.6 E-3	7.2 E-6	99.932
Mar-05	11.1 E-3	3.6 E-6	99.967
Apr-05	16.5 E-3	1.5 E-6	99.991
May-05	21.6 E-3	3.2 E-6	99.985
Jun-05	31.5 E-3	1.7 E-6	99.995
Jul-05	32.2 E-3	*	100
Aug-05	41. E-3	6.6 E-6	99.984
Sep-05	32.9 E-3	6.1 E-6	99.981
Oct-05	37.9 E-3	2.7 E-6	99.993
Nov-05	29.7 E-3	1.2 E-6	99.996
Dec-05	31.3 E-3	*	100
Total	**317. E-3**	**38.8 E-6**	**99.983**
Volume of Flow: Influent = 6,985,360 liters Final = 6,796,280 liters			

* Less than Detection Limit

Removal of the two major beta-emitting radioisotopes was less remarkable. About 92% of the mass and radioactivity of cesium-137 was removed (0.503 microcuries in, 39 microcuries out). With a valence state of +1, cesium is soluble in water and, as such, is largely removed only by the reverse osmosis unit. Tritium was the other significant beta emitter detected in RLWTF waters during 2005. Tritium is present *as* water, and the RLWTF is not equipped to treat or remove tritium. Hence, the quantities entering and leaving the plant were the same (0.022 curie).

Although treatment for and removal of beta-emitting radioisotopes was not as effective as for alpha-emitting radioisotopes, the quantities encountered were much smaller. This is illustrated in Table 3-4, which summarizes radioactivity (curies) into and out of the RLWTF for 2005.

Table 3-4
TA-50 RLWTF Radionuclide Summary For 2005

	RAW Avg (nCi/L)	Maximum (nCi/L)	Minimum (nCi/L)	Total (Ci)	FINAL Avg (pCi/L)	Maximum (pCi/L)	Minimum (pCi/L)	Total (Ci)
Am-241	17.9 E0	36. E0	8.1 E0	125. E-3	4.4 E0	12. E0	1.6 E0	30.1 E-6
As-74	*	*	*	*	9.5 E0	34. E0	15. E0	64.5 E-6
BETA	3.5 E0	20. E0	1.3 E0	24.6 E-3	62.4 E0	140. E0	31. E0	424. E-6
Be-7	57.2 E-3	720. E-3	720. E-3	399. E-6	1.2 E0	13. E0	13. E0	8.1 E-6
Ce-141	12. E-3	100. E-3	22. E-3	83.6 E-6	*	*	*	*
Co-56	*	*	*	*	*	*	*	*
Co-57	*	*	*	*	*	*	*	*
Co-58	*	*	*	*	*	*	*	*
Co-60	1.2 E-3	12. E-3	12. E-3	8.3 E-6	*	*	*	*
Cs-134	6.4 E-3	65. E-3	65. E-3	44.7 E-6	*	*	*	*
Cs-137	71.9 E-3	150. E-3	82. E-3	503. E-6	5.7 E0	17. E0	12. E0	38.9 E-6
Eu-152	*	*	*	*	*	*	*	*
H-3	*			0	3.2 E3	7.2 E3	1.6 E3	21.5 E-3
I-133	214. E-3	2.7 E0	2.7 E0	1.5 E-3	7.6 E0	70. E0	70. E0	51.6 E-6
Mn-52	19.1 E-3	240. E-3	240. E-3	133. E-6	*	*	*	*
Mn-54	*	*	*	*	*	*	*	*
Na-22	7.5 E-3	94. E-3	94. E-3	52.1 E-6	*	*	*	*
Np-237	*	*	*	*	*	*	*	*
Pu-238	16.7 E0	33. E0	4.6 E0	117. E-3	398. E-3	2.3 E0	830. E-3	2.7 E-6
Pu-239	10.4 E0	28. E0	4.5 E0	72.8 E-3	330. E-3	1.6 E0	620. E-3	2.2 E-6
Ra-226	*	*	*	*	*	*	*	*
Ra-228	*	*	*	*	*	*	*	*
Rb-83	2. E0	17. E0	57. E-3	13.6 E-3	41.5 E0	310. E0	11. E0	282. E-6
Rb-84	654. E-3	6.8 E0	700. E-3	4.6 E-3	21.5 E0	220. E0	27. E0	146. E-6
Sc-46	*	*	*	*	*	*	*	*
Sc-48	*	*	*	*	*	*	*	*
Se-75	*	*	*	*	*	*	*	*
Sn-113	*	*	*	*	*	*	*	*
Sr-85	519. E-3	4. E0	2.3 E-3	3.6 E-3	*	*	*	*
Sr-89	135. E-3	1.7 E0	1.7 E0	943. E-6	*	*	*	*
Sr-90	*	*	*	*	*	*	*	*
Th-232	62.2 E-6	440. E-6	150. E-6	435. E-9	*	*	*	*
U-234	289. E-3	1.8 E0	42. E-3	2. E-3	543. E-3	6.4 E0	2.7 E0	3.7 E-6
U-235	847. E-6	1.4 E-3	450. E-6	5.9 E-6	454. E-6	5. E-3	2.5 E-3	3.1 E-9
U-238	26.2 E-3	60. E-3	11. E-3	183. E-6	6.8 E-3	92. E-3	3.8 E-3	46.1 E-9
V-48	*	*	*	*	*	*	*	*
Y-88	*	*	*	*	*	*	*	*
Zn-65	*	*	*	*	*	*	*	*

Volume of Flow: Influent = 6,985,360 liters Final = 6,796,280 liters
Twelve influent samples and 12 effluent samples for each isotope.
* Less than Detection Limit

3.3 Regulatory Performance

In 1990 DOE issued Order 5400.5, "Radiation Protection of the Public and the Environment," which revised Derived Concentration Guidelines (DCGs) for all radionuclides discharged from DOE facilities. The concentration of each radionuclide divided by its particular DCG value results in a ratio. For waters containing more than one radionuclide, a ratio is to be found for each radionuclide, and these ratios are to be summed. To be in compliance with Order 5400.5, the sum of the ratios cannot exceed 1.0.

Compliance with Order 5400.5 insures that the yearly dose will be less than 100 millirem to a person drinking two liters of water (i.e., effluent) per day. The *millirem* is a unit for measuring the biological effects of radiation on the human body. For comparison to the 100 millirem standard, the average annual radiation dose received by a member of the general population in the United Sates is about 360 millirem, from both natural (296 mrem) and man-made (65 mrem) radiation sources.

Table 3-5 provides flow-weighted sum-of-the-ratios for individual isotopes, and shows that the average for all of 2005 was 0.18. Figure 2-1 also demonstrated that RLWTF effluent was in compliance with DOE Order 5400.5 during 2005. Note that the isotope Am-241 accounts for more than 80% of the sum of the ratios in the RLWTF effluent during 2005.

3.4 Graphs of Radiological Data

Following Table 3-5 are a series of figures that illustrate significant information about the radiological nature of the TA-50 RLWTF influent and effluent during 2005.

Figures 3-1, 3-2, and 3-3 chart average concentrations in RLWTF influent and effluent for each month of 2005 for the three major radionuclides of concern: Pu-238, Pu-239, and Am-241. It is important to note that the ordinate of the upper graphs are scaled in nanocuries per liter while the lower graphs are scaled in picocuries per liter, a factor of 1,000 times different. The graphs show that the decontamination factor for each of these radioisotopes is four orders of magnitude (i.e., 10,000) or more, and that effluent concentrations are well within the Derived Concentration Guidleines set forth in DOE Order 5400.5. Effluent concentrations for any of the three typically were less than 15% DCG.

Figure 3-4 charts average concentrations by month, in picocuries per liter, of tritium and gross alpha in RLWTF effluent during 2005. While more than 90% of gross alpha is attributable to the radionuclides Pu-238, Pu-239, and Am-241, the graph in Figure 3-4 does not seem to represent the sum of the lower graphs in Figures 3-1, 3-2, and 3-3. The reason for this is that the analytical procedure for gross alpha is not as accurate as that for the individual radionuclides. The lower chart shows that tritium concentrations in RLWTF effluent were less than 10% of the Guideline in DOE Order 5400.5 every month of the year.

Table 3-5
TA-50 RLWTF Effluent During 2005 Compared With DOE Order 5400.5

Radioactive Isotopes	Mean Concentration (pCi/L)	DCG 5400.5 (pCi/L)	Percent Of DCG
Am-241	4.4 E0	30	15
As-74	9.5 E0	40,000	0.02
Be-7	1.2 E0	1,000,000	0.0001
Ce-141	*	50,000	*
Co-56	*	10,000	*
Co-57	*	100,000	*
Co-58	*	40,000	*
Co-60	*	5,000	*
Cs-134	*	2,000	*
Cs-137	5.7 E0	3,000	0.19
H-3	3.2 E3	2,000,000	0.16
Eu-152	*	20,000	*
I-133	7.6 E0	10,000	0.08
Mn-52	*	20,000	*
Mn-54	*	50,000	*
Na-22	*	10,000	*
Np-237	*	30	*
Pu-238	398. E-3	40	1.0
Pu-239	329.5 E-3	30	1.1
Ra-226	*	100	*
Ra-228	*	100	*
Rb-83	41.5 E0	20,000	0.2
Rb-84	21.5 E0	10,000	0.2
Sc-46	*	20,000	*
Sc-48	*	20,000	*
Se-75	*	20,000	*
Sn-113	*	50,000	*
Sr-85	*	70,000	*
Sr-89	*	20,000	*
Sr-90	*	1,000	*
Th-232	*	50	*
U-234	543.3 E-3	500	0.1
U-235	453.5 E-6	600	0.0001
U-238	6.8 E-3	600	0.001
V-48	*	20,000	*
Y-88	*	30,000	*
Zn-65	*	9,000	*
Sum of Ratios = 0.178			

* Less Than Detection Limit

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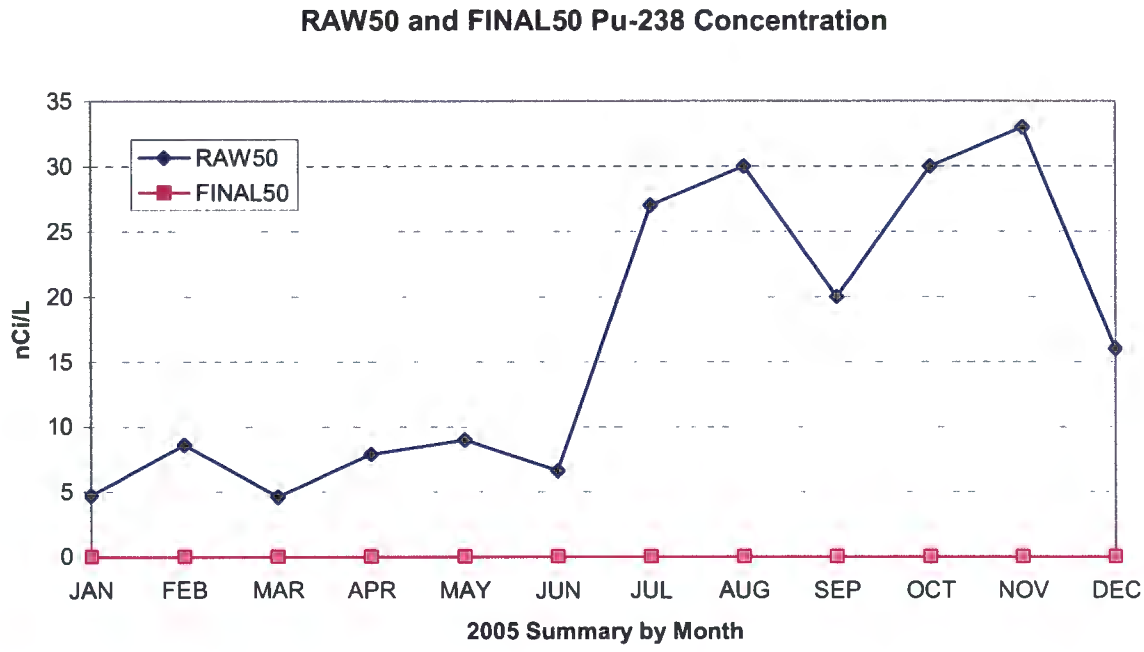
Figure 3-1
Pu-238 in RLWTF Influent and Effluent During 2005



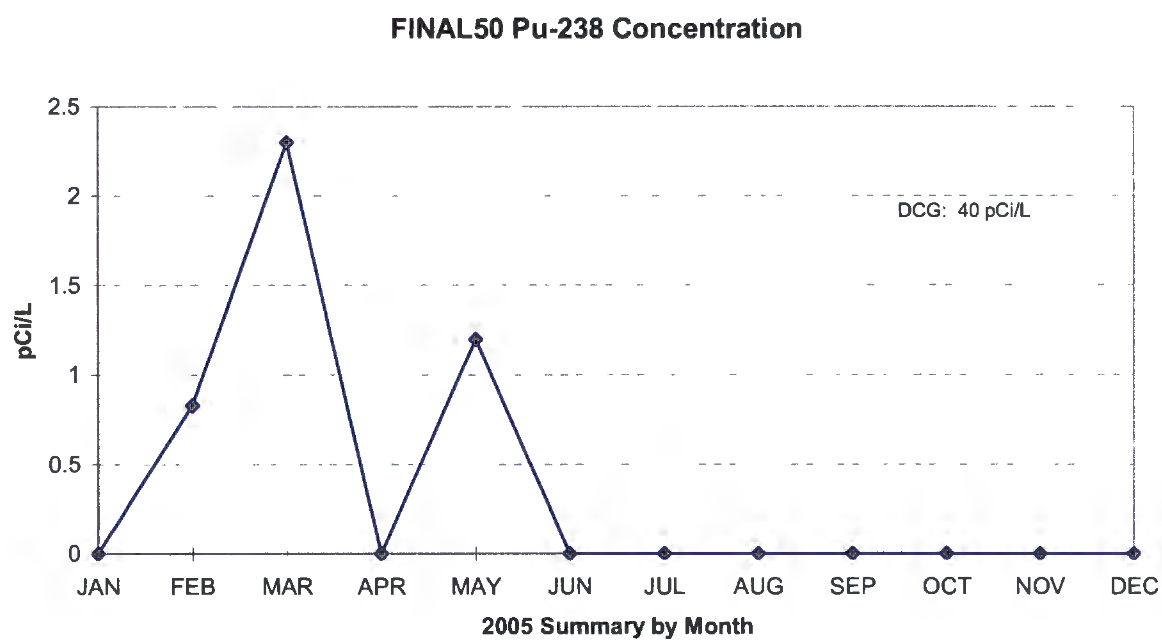


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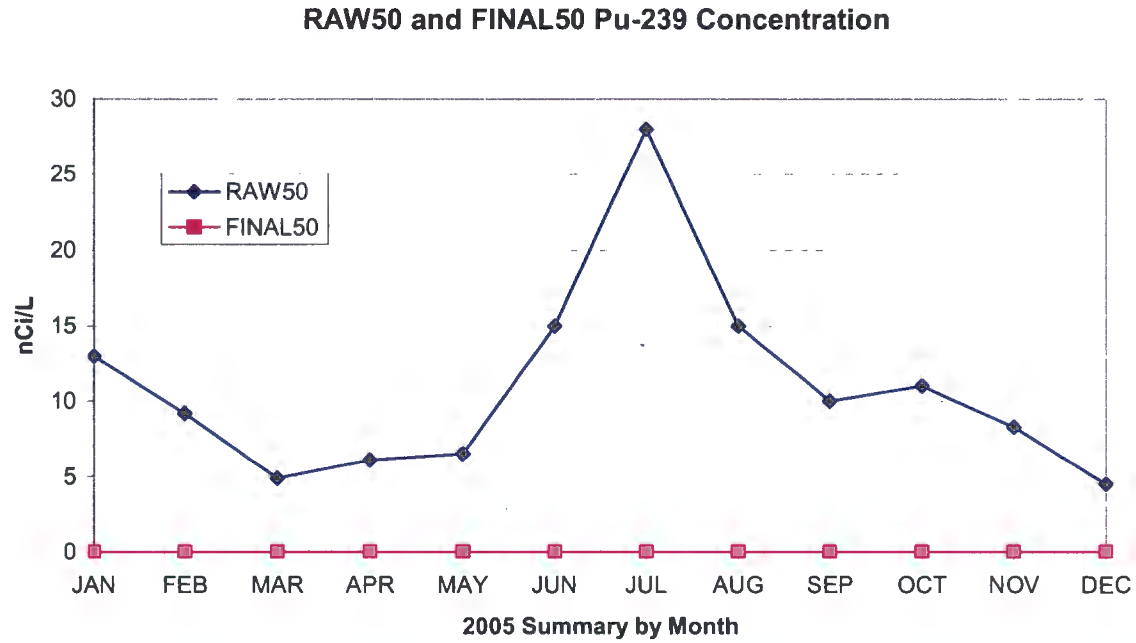
Figure 3-2
Pu-239 in RLWTF Influent and Effluent During 2005



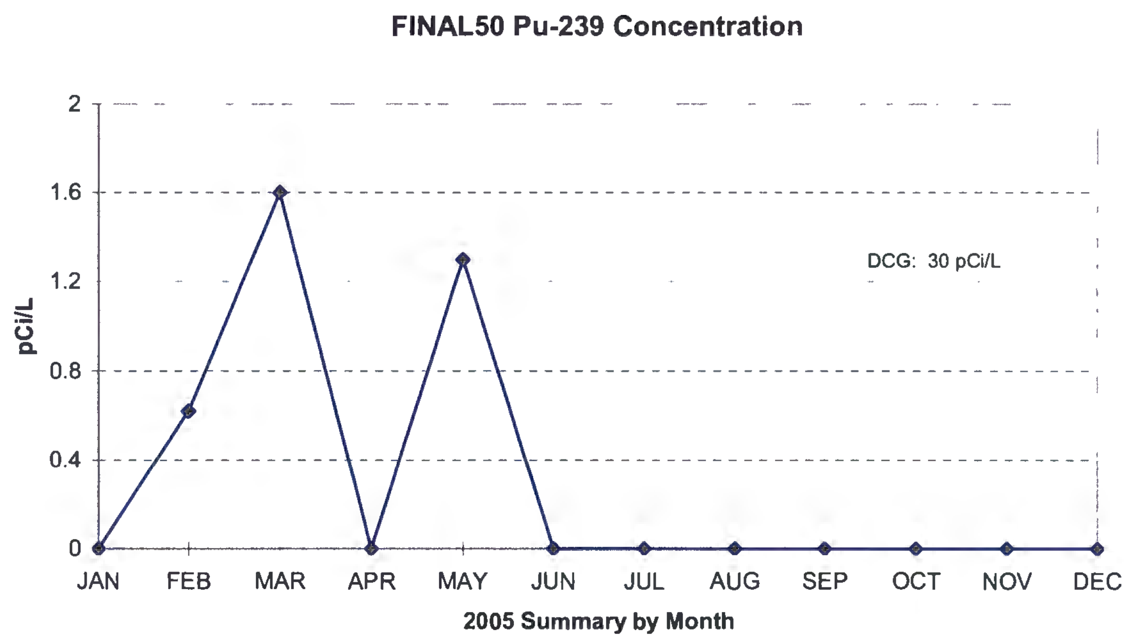


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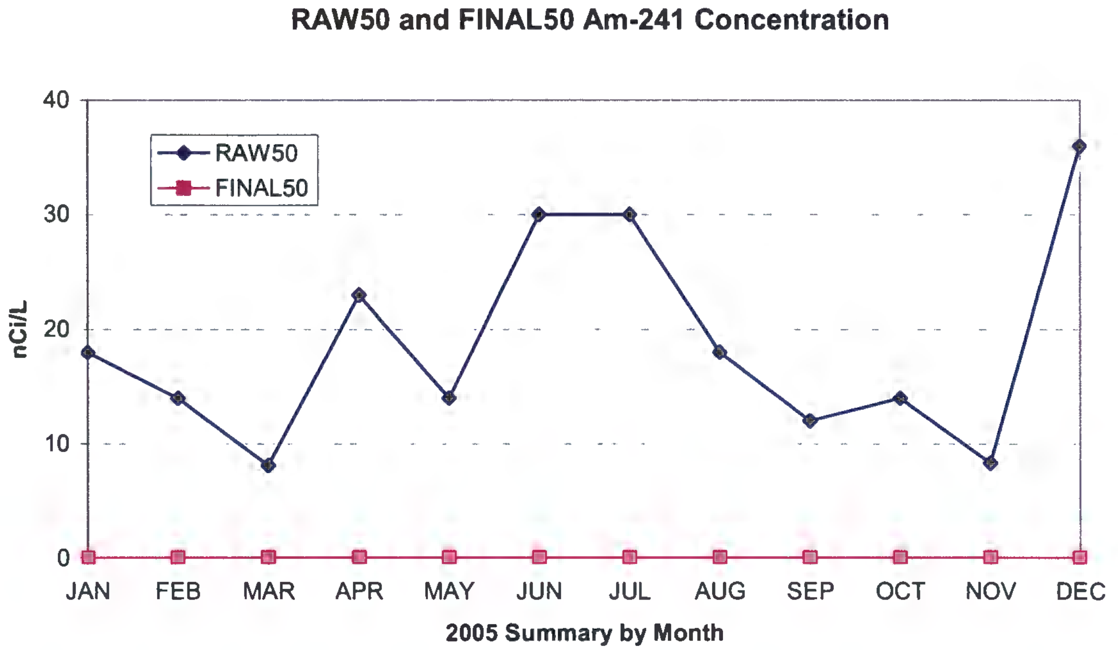
Figure 3-3
Am-241 in RLWTF Influent and Effluent During 2005



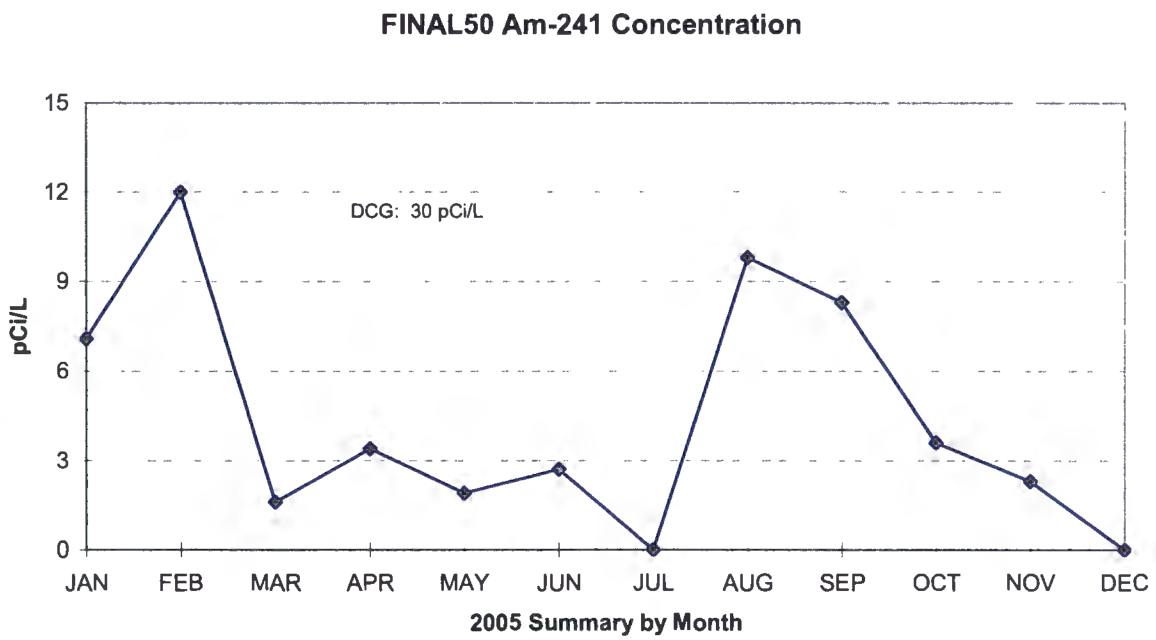
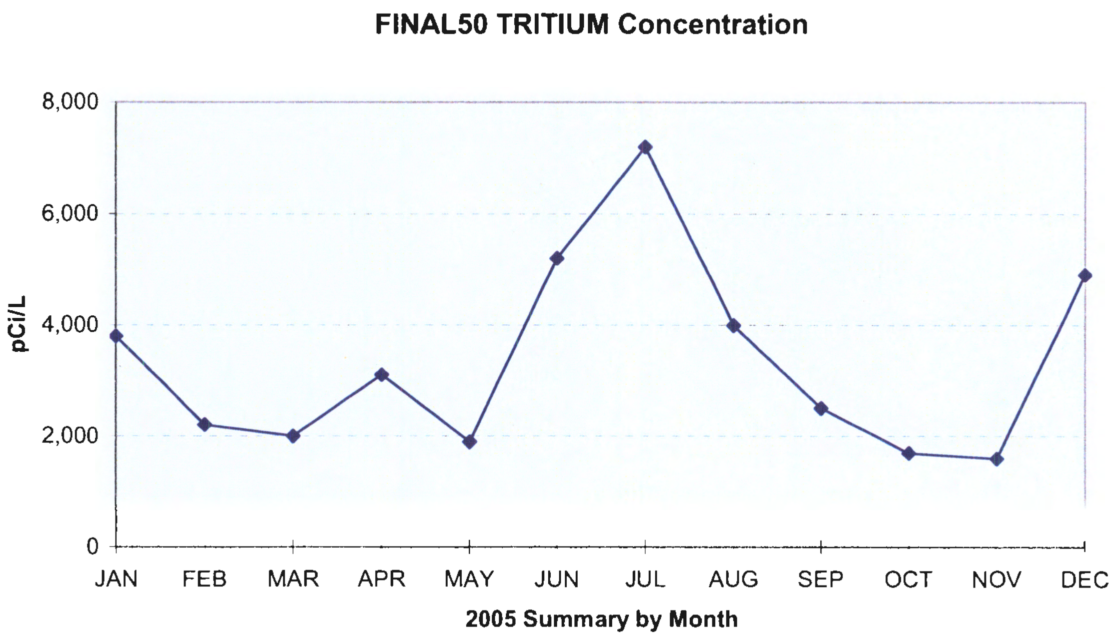
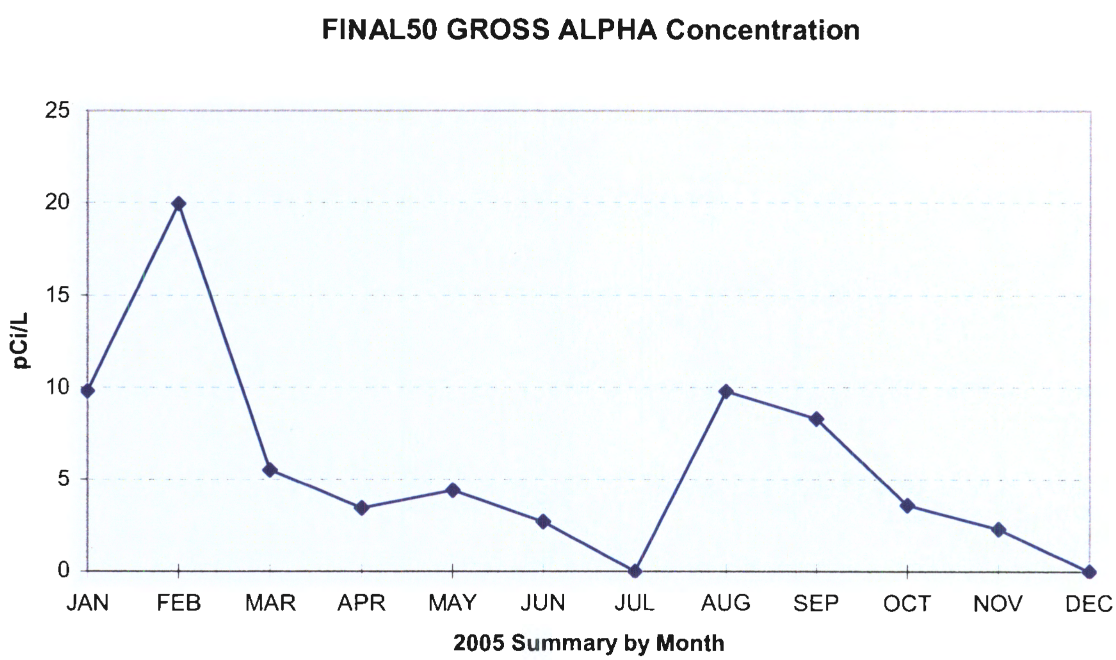


Figure 3-4
Tritium and Gross Alpha Activity in RLWTF Effluent During 2005





4. Non-Radiological Nature of TA-50 RLWTF Waters

4.1 Minerals Detected

RLWTF influent samples are analyzed for 42 non-radiological water quality parameters; effluent samples are analyzed for the same 42 parameters and for total toxic organics. These non-radiological analyses can be aggregated into five categories:

(a) eight traditional water quality measures – chemical oxygen demand, conductivity, hardness, pH, total dissolved solids, total suspended solids, and two measurements for alkalinity.
(b) a total of 25 cation (metals) measurements, including total cations.
(c) five anions: chloride, fluoride, cyanide, sulfate, and perchlorate
(d) four nitrogen measurements – nitrogen as nitrates, nitrogen as ammonia, nitrogen as nitrites, and total Kjedahl nitrogen
(e) total toxic organics (effluent only)

All 42 non-radiological parameters were detected in the RLWTF influent, but only 33 were detected in the RLWTF effluent during 2005.

Samples are also analyzed for volatile and semi-volatile organic compounds, which are discussed in Section 4.5.

4.2 Removal of Minerals

Table 4-1 provides a summary of mineral concentrations and quantities received by (influent) and discharged from (effluent) the RLWTF during 2005. The information shows that 1,460 kilograms of contaminants entered the facility in the form of suspended solids (150 kilograms) and dissolved solids (1320 kilograms)[2].

In treating the influent, RLWTF personnel added lime at the clarifier to soften the water, ferric sulfate at the clarifier to precipitate radionuclides, and potassium permanganate at the neutralization chamber to adjust pH. Small amounts of other chemicals, including sodium hydroxide and hydrochloric acid were used to clean the TUF and RO membranes. Data does not exist for the quantities of these additional chemicals required for water treatment, so that the total quantity of chemicals seen in RTLWTF waters in 2005 is not known. As a rule of thumb, however, the sum of non-radiological chemicals added during and as part of treatment operations approximates the quantity of non-radiological chemicals and minerals that enter the RLWTF with the influent.

[2] This quantity is just 50% of the total of 2,890 kilograms present in 2004 influent, despite the fact that influent volumes were not that different (8,418,000 liters in 2004 versus 6,985,000 liters in 2005).

Table 4-1
TA-50 RLWTF Mineral Summary For 2005

	RAW Average	Maxi-mum	Mini-mum	No. Samp.	Total In (Kg)	FINAL Average	Maxi-mum	Mini-mum	No. Samp.	Total Out (Kg)
ALKALINITY-MO**	54.2 E0	161. E0	27. E0	12	378.8 E0	164.4 E0	360. E0	62. E0	12	1.1 E3
ALKALINITY-P**	*	*	*	12	*	*	*	*	12	*
ALUMINUM	528.3 E-3	1.2 E0	33. E-3	12	3.7 E0	25.7 E-3	57. E-3	10. E-3	12	174.9 E-3
AMMONIA-N	7.6 E0	13.1 E0	6.3 E0	12	53.3 E0	4.4 E0	8.1 E0	390. E-3	12	30. E0
ARSENIC	857.3 E-6	10. E-3	10. E-3	12	6. E-3	*	*	*	12	*
BARIUM	34.8 E-3	79. E-3	20. E-3	12	243.3 E-3	53.5 E-6	1. E-3	1. E-3	12	363.4 E-6
BERYLLIUM	402.7 E-6	2. E-3	1.4 E-3	12	2.8 E-3	*	*	*	12	*
BORON	83.4 E-3	220. E-3	38. E-3	12	582.6 E-3	119.9 E-3	240. E-3	53. E-3	12	814.6 E-3
CADMIUM	889.6 E-6	5. E-3	1.2 E-3	12	6.2 E-3	*	*	*	12	*
CALCIUM	10.4 E0	19.3 E0	6. E0	12	72.8 E0	4.4 E0	8.7 E0	290. E-3	12	30. E0
CHLORIDE	22.9 E0	28. E0	18.4 E0	12	159.9 E0	12.4 E0	18. E0	5.8 E0	12	84.2 E0
COBALT	30.3 E-3	210. E-3	2.9 E-3	12	211.4 E-3	595. E-6	3. E-3	1.7 E-3	12	4. E-3
COD	124.5 E0	171. E0	93. E0	12	869.9 E0	14.7 E0	24. E0	9. E0	12	99.9 E0
CONDUCTIVITY**	335.2 E0	585. E0	273. E0	12	2.3 E3	429.4 E0	815. E0	286. E0	12	2.9 E3
COPPER	442.2 E-3	770. E-3	194. E-3	12	3.1 E0	16.8 E-3	30. E-3	4.5 E-3	12	113.9 E-3
CYANIDE	9.4 E-3	20. E-3	20. E-3	12	65.6 E-3	*	*	*	12	*
FLUORIDE	473.4 E-3	800. E-3	350. E-3	12	3.3 E0	245.7 E-3	390. E-3	10. E-3	12	1.7 E0
HARDNESS**	39.4 E0	85.8 E0	21.6 E0	12	274.9 E0	9.2 E0	63.1 E0	930. E-3	12	62.7 E0
IRON	1.6 E0	9.4 E0	500. E-3	12	10.9 E0	98.7 E-3	824. E-3	10. E-3	12	670.8 E-3
LEAD	107.9 E-3	250. E-3	47. E-3	12	753.5 E-3	423.2 E-6	1.8 E-3	1. E-3	12	2.9 E-3
MAGNESIUM	3.6 E0	13.7 E0	1.6 E0	12	25. E0	1.3 E0	11.8 E0	40. E-3	12	9. E0
MERCURY	925.6 E-6	2. E-3	200. E-6	12	6.5 E-3	1.3 E-6	20. E-6	20. E-6	12	8.8 E-6
NICKEL	364.9 E-3	1.5 E0	40. E-3	12	2.5 E0	16.8 E-3	37. E-3	1.2 E-3	12	114.2 E-3
NITRATE-N	6.4 E0	11. E0	3.1 E0	12	45. E0	1.6 E0	6.9 E0	400. E-3	12	10.9 E0
NITRITE-N	369.7 E-3	890. E-3	140. E-3	12	2.6 E0	2.1 E0	6.8 E0	820. E-3	12	14.2 E0
PERCHLORATE	259.6 E-3	730. E-3	73. E-3	12	1.8 E0	*	*	*	12	*
PHOSPHORUS	2.9 E0	5.9 E0	2.3 E0	12	20. E0	119.6 E-3	280. E-3	32. E-3	12	812.8 E-3
POTASSIUM	3.4 E0	12. E0	270. E-3	12	23.9 E0	2.5 E0	8.3 E0	130. E-3	12	17.2 E0
SELENIUM	2.3 E-3	10. E-3	5.7 E-6	12	15.9 E-3	1.1 E-3	2.5 E-3	1.3 E-6	12	7.4 E-3
SILICON	28. E0	41. E0	19. E0	12	195.5 E0	7.7 E0	25. E0	2.5 E0	12	52.4 E0
SILVER	2.3 E-3	10. E-3	1.1 E-3	12	15.9 E-3	227.2 E-6	3. E-3	300. E-6	12	1.5 E-3
SODIUM	34.6 E0	92.5 E0	22. E0	12	241.9 E0	88.3 E0	188. E0	46. E0	12	600.1 E0
SULFATE	20.2 E0	46. E0	9. E0	12	141.1 E0	14.1 E0	26. E0	5.4 E0	12	95.9 E0
TDS	188.4 E0	288. E0	157. E0	12	1.32 E3	181.6 E0	375. E0	118. E0	12	1.23 E3
TKN	9.7 E0	13.6 E0	2.1 E0	12	67.9 E0	4.6 E0	10. E0	410. E-3	12	31.4 E0
TOTAL CATIONS**	2.5 E0	3.1 E0	2. E0	12	17.6 E0	3.9 E0	8.3 E0	2.3 E0	12	26.5 E0
TOTAL CHROMIUM	100.3 E-3	590. E-3	24. E-3	12	700.5 E-3	2.6 E-3	13. E-3	1.5 E-3	12	17.9 E-3
TOXIC ORGANICS**	n.m.	n.m.	n.m.	n.m.	n.m.	*	*	*	12	*
TSS	21. E0	44. E0	8. E0	12	146.7 E0	*	*	*	12	*
URANIUM	94.4 E-3	180. E-3	33. E-3	12	659.2 E-3	27.3 E-6	270. E-6	74. E-6	12	185.7 E-6
VANADIUM	8.3 E-3	27. E-3	10. E-3	12	58.2 E-3	7.4 E-3	70. E-3	10. E-3	12	50.2 E-3
ZINC	273.7 E-3	1.8 E0	50. E-3	12	1.9 E0	9.5 E-3	110. E-3	2.3 E-3	12	64.4 E-3
pH	6.4 E0	8.1 E0	6. E0	12	---	7.5 E0	8.3 E0	7.1 E0	12	---
Volume of Flow: Influent = 6,985,360 liters Final = 6,796,280 liters										
**Units: All figures in mg/L except: Alkalinities and hardness as mg CaCO3/l; Conductivity as uS/cm; Total Cations as meq/l; Toxic Organics as ug/l.										
* Less than Detection Limit n.m.: Not measured										

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As shown in the final column of Table 4-1, the total amount of chemicals leaving the facility with the effluent was 1,230 kilograms, the sum of total dissolved solids and total suspended solids. This was about 80% of the total quantity entering as influent, and an estimated 40% of the total of influent chemicals plus chemicals required for water treatment. Nine inorganic chemicals comprised the large majority (~76%) of these chemicals in effluent; they are summarized in Table 4-2, along with percent removed from the RLWTF influent.

Table 4-2
Mass of Major Inorganic Minerals in RLWTF Influent and Effluent During 2005

Mineral	Mass in Influent (Kgs)	Mass in Effluent (Kgs)	Percent Removed
Calcium	73	30	59
Chloride	160	84	47
Nitrogen-as-Ammonia	53	30	44
Nitrogen-as-Nitrate	45	11	76
Nitrogen-as-Nitrite	3	14	-370
Potassium	24	17	28
Silicon	195	52	87
Sodium	242	600	-150
Sulfate	141	96	32
Subtotal, Major Minerals	936	935	26
Total Solids*	1,460	1,230	16

*Total Dissolved Solids + Total Suspended Solids

4.3 Regulatory Performance

Twenty-one (21) parameters in the effluent from the RLWTF are regulated by the National Pollutant Discharge Elimination System in compliance with the Federal Clean Water Act (EPA, 12/29/00). LANL also has a voluntary commitment with the New Mexico Environment Department to not discharge effluent from the TA-50 RLWTF that exceeds groundwater standards set by the New Mexico Water Quality Control Commission (NMED, 04/20/05) for three water quality parameters: fluoride, nitrogen-as-nitrate, and total dissolved solids. Table 4-3 identifies these 24 discharge parameters, indicates the frequency of sampling required for each, and identifies their regulatory limits.

During calendar year 2005, TA-50 RLWTF effluent, for the sixth consecutive year, was in compliance with all twenty-one (21) NPDES water quality parameters. TA-50 effluent also met NMED ground water standards for fluoride, nitrate, and TDS every week of the year, and has now met these voluntary standards for 310 of the last 312 weeks[3].

[3] Two weekly composite samples of RLWTF effluent slightly exceeded the groundwater standard for fluoride during 2003. Sample values of 2.07 mg/L and 1.64 mg/L were obtained, versus the groundwater standard of 1.6 mg/L. (Watkins and Worland, March 2004, p. 30.)

Table 4-3
NPDES and NMED Regulated Parameters

Parameter	Sampling Frequency	Units	Monthly Average	Daily Max
NPDES Parameters				
Chemical Oxygen Demand	1	mg/L	125	125
Flow	4	----	Report	Report
Perchlorate	3		Report	Report
pH	1	s.u.	6 – 9 su	6 – 9 su
Radium 226 + Radium 228	3	pCi/L	30	30
Tritium (accelerator produced)	3	pCi/L	20,000	20,000
Total Aluminum	3	µg/L	5,000	5,000
Total Arsenic	3	µg/L	368	368
Total Boron	3	µg/L	5,000	5,000
Total Cadmium	1	µg/L	50	50
Total Chromium	1	µg/L	1,340	2,680
Total Cobalt	3	µg/L	1,000	1,000
Total Copper	1	µg/L	1,393	1,393
Total Iron	1	----	Report	Report
Total Lead	1	µg/L	423	524
Total Mercury	1	µg/L	0.77	0.77
Total Nickel	2		Report	Report
Total Selenium	3	µg/L	5	5
Total Suspended Solids	1	mg/L	30	45
Total Toxic Organics	2	µg/L	1,000	1,000
Total Vanadium	3	µg/L	100	100
Total Zinc	1	µg/L	4,370	8,750
NMED Parameters				
Fluoride	5	mg/L	1.6	
Nitrogen-as-Nitrate	5	mg/L	10	
Total Dissolved Solids	5	mg/L	1,000	

Sampling frequencies:

[1] weekly grab sample
[2] monthly grab sample
[3] yearly grab sample
[4] continuous record
[5] weekly composite sample

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4.4 Graphs of Non-Radiological Data

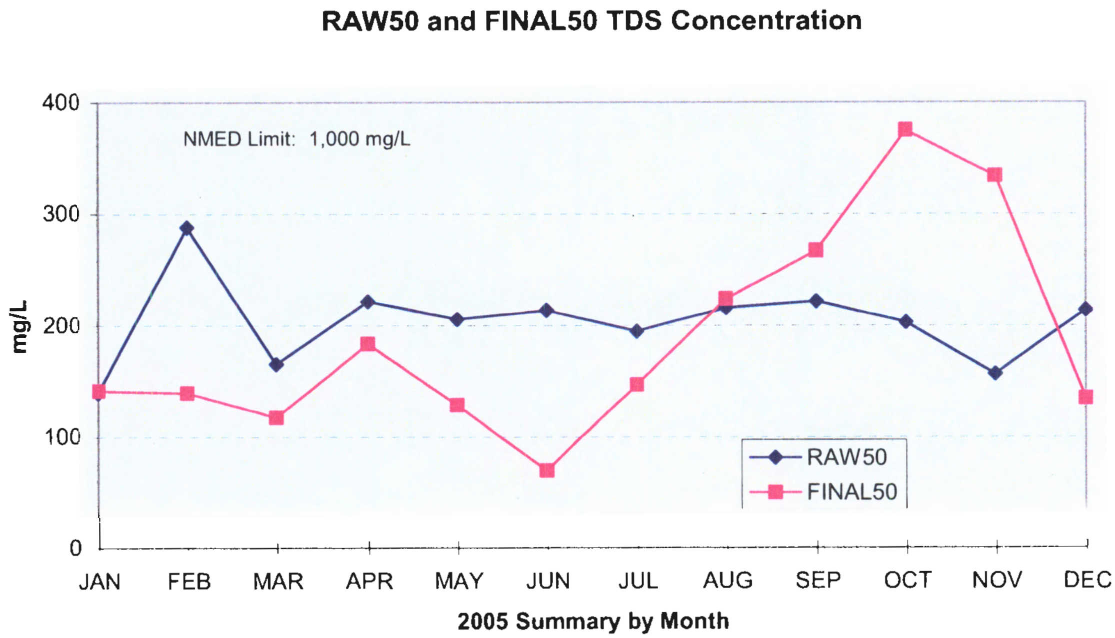
The following series of graphs highlight important information about non-radiological components of the TA-50 RLWTF influent and effluent. Some of the minerals are of regulatory concern. Mercury, for example, has an extremely low NPDES discharge limit of 0.77 microgram per liter. Some of the minerals present processing challenges; silicon and calcium, for example, can precipitate and plug process piping and pumps. Others have been selected because they are among the major inorganic minerals present in waters discharged to Mortandad Canyon. Each figure plots mineral concentration in RLWTF influent and effluent by month during 2005.

Figure 4-1 shows total dissolved solids and total suspended solids in RLWTF influent and effluent during 2005. These two parameters provide general information about water purity since they represent the sum of all contaminants present. Both parameters also have regulatory discharge limits – 1000 mg/L for TDS and 30 mg/L for TSS. In the RLWTF treatment process, the gravity filter and ultrafilter remove essentially all suspended solids. Reverse osmosis removes varying percentages of dissolved solids, depending upon particle mass and size.

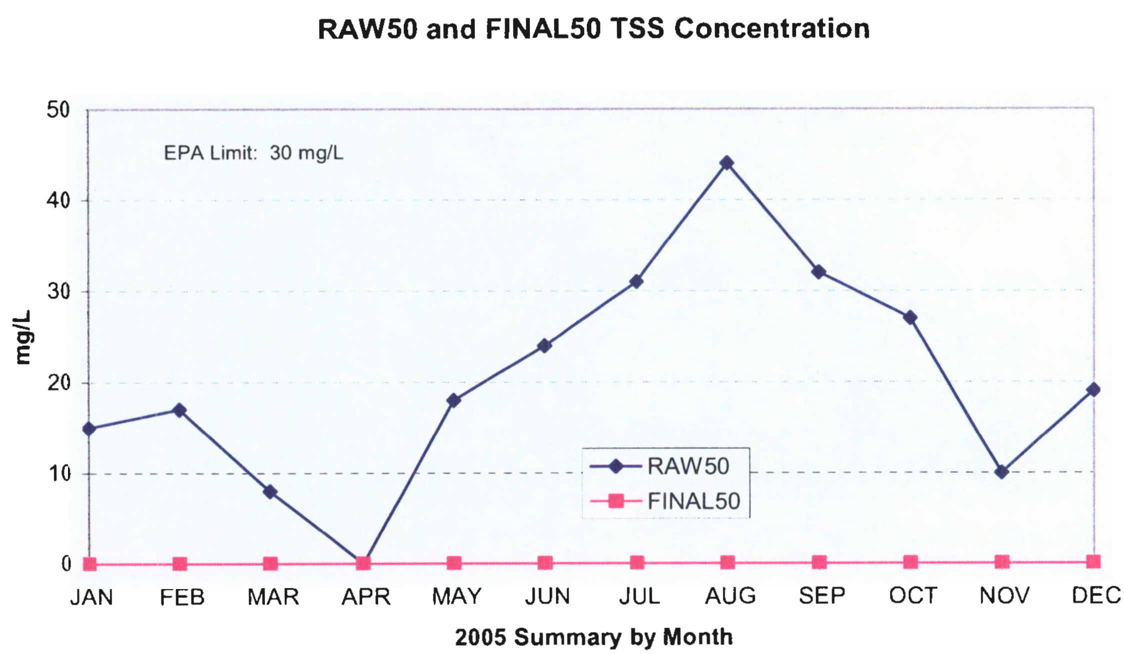
- The TDS graph is particularly illuminating. It shows a steady increase in effluent concentrations for the period August through November, followed by a sharp decrease in December. The climb resulted from two factors – a process change to recycle most reverse osmosis concentrate (which re-introduces high concentrations of dissolved solids to the Main Treatment Process), and deteriorating RO membranes. New membranes were installed on December 5^{th}, and TDS concentrations promptly decreased.

- The TSS graph shows varying influent concentrations, but consistent effluent concentrations of zero. All twelve monthly composite results for 2005 were less than the Method Detection Limit of 4 mg/L.

Figure 4-1
Dissolved and Suspended Solids in RLWTF Waters During 2005



Jan RAW50, and Feb and Jun FINAL50 concentrations, plotted at MDL.



The next four graphs provide information about nitrogen compounds in RLWTF influent and effluent during 2005. Nitrogen discharges are of concern to the NMED Groundwater Bureau, which may impose limits for nitrates and/or total nitrogen. Figure 4-2 graphs total nitrogen and ammonia concentrations in RLWTF influent and effluent, while Figure 4-3 illustrates nitrogen-as-nitrate and nitrogen-as-nitrite concentrations. These allow the following observations:

- TKN: Nitrogen removal occurred for the first five months of 2005, but not thereafter. The reasons for this are not known. There is no discharge standard for total nitrogen.

- Ammonia: Influent concentrations were fairly consistent in the range of 7-12 mg/L. Effluent concentrations were slightly lower than influent concentrations, except for April and November. There is no discharge standard for ammonia.

- Nitrate: Both influent and effluent concentrations were consistent. Effluent concentrations were typically just 10% - 15% of the NMED discharge standard of 10 mg/L.

- Nitrite: Except for a spike in effluent concentration in November, both influent and effluent concentrations were very consistent. The most interesting information from this chart, however, is that nitrite effluent concentrations were always greater than nitrite influent concentrations. This phenomenon implies an oxidation of ammonia from a valence of +3 to a valence of +5. There is no discharge standard for nitrite.

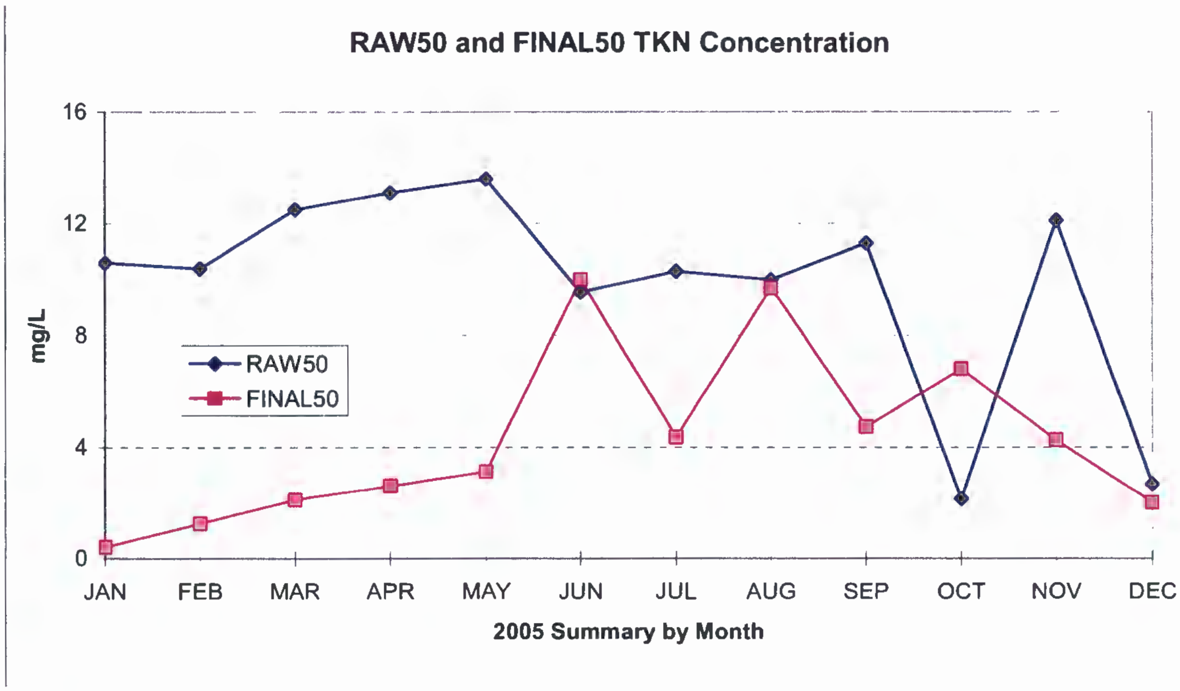
Table 4-5 presents average concentrations for nitrogen compounds for the year.

Table 4-4
Nitrogen Compounds in RLWTF Waters During 2005

	Influent*	Effluent*
Total Kjedahl Nitrogen	9.7	4.6
Nitrogen-as-Ammonia	7.6	4.4
Nitrogen-as-Nitrate	6.4	1.6
Nitrogen-as-Nitrite	0.4	2.1

* Average concentration for 2005, in mg/L.

Figure 4-2
Total Kjedahl Nitrogen and Nitrogen-as-Ammonia in RLWTF Waters During 2005



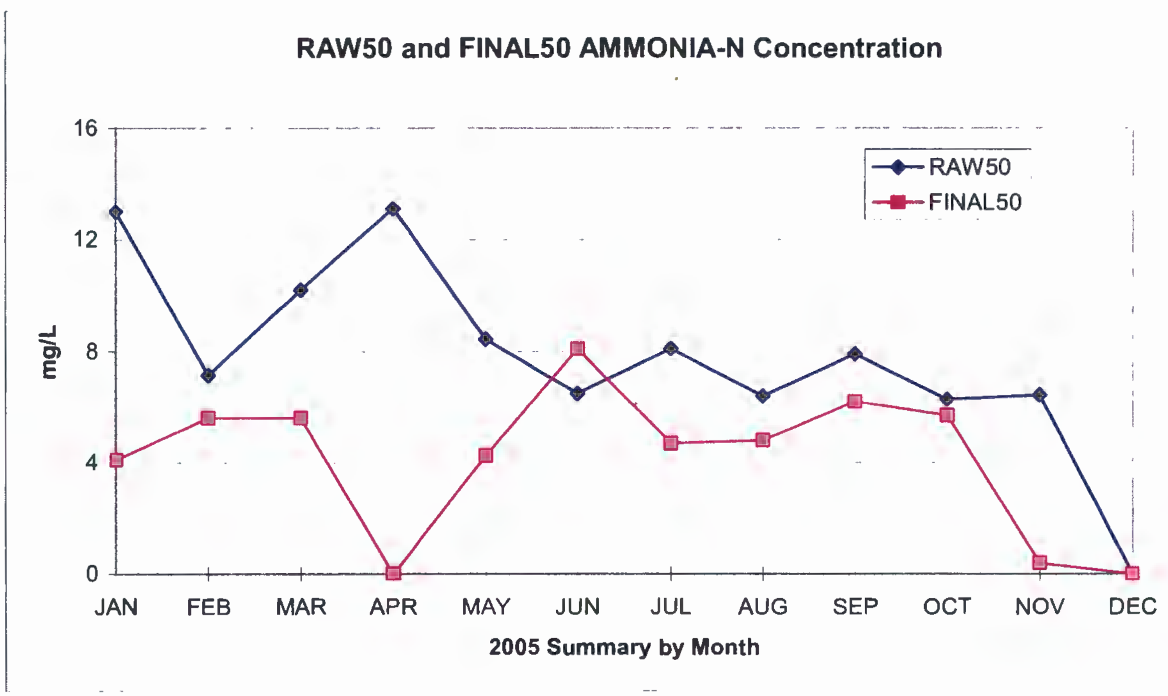
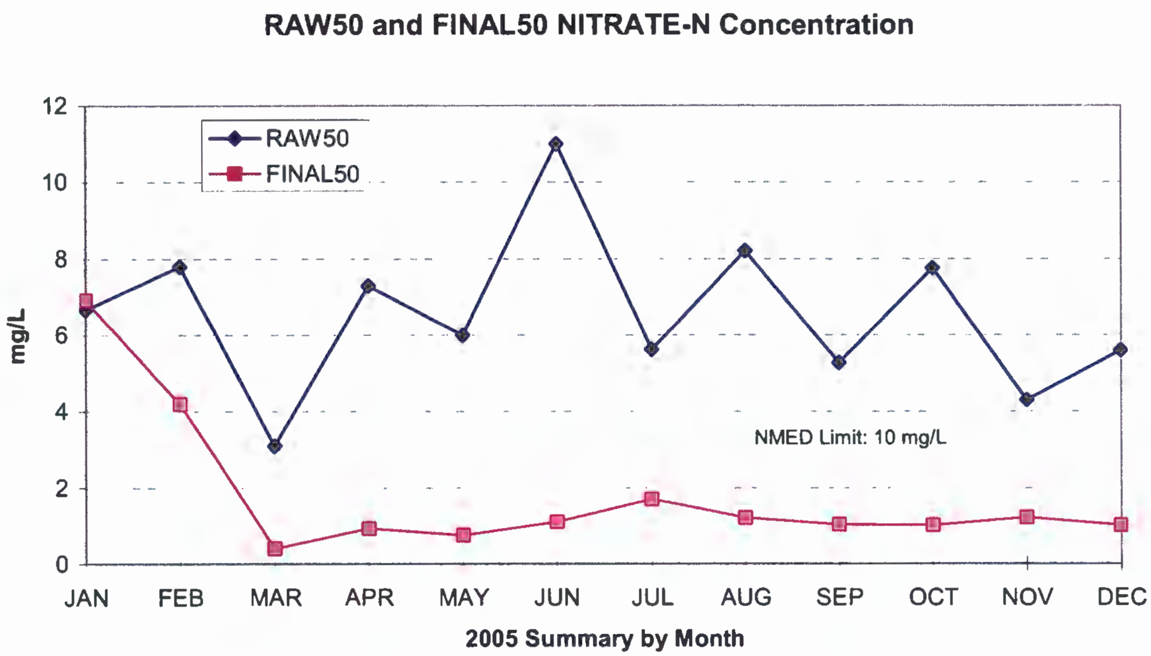
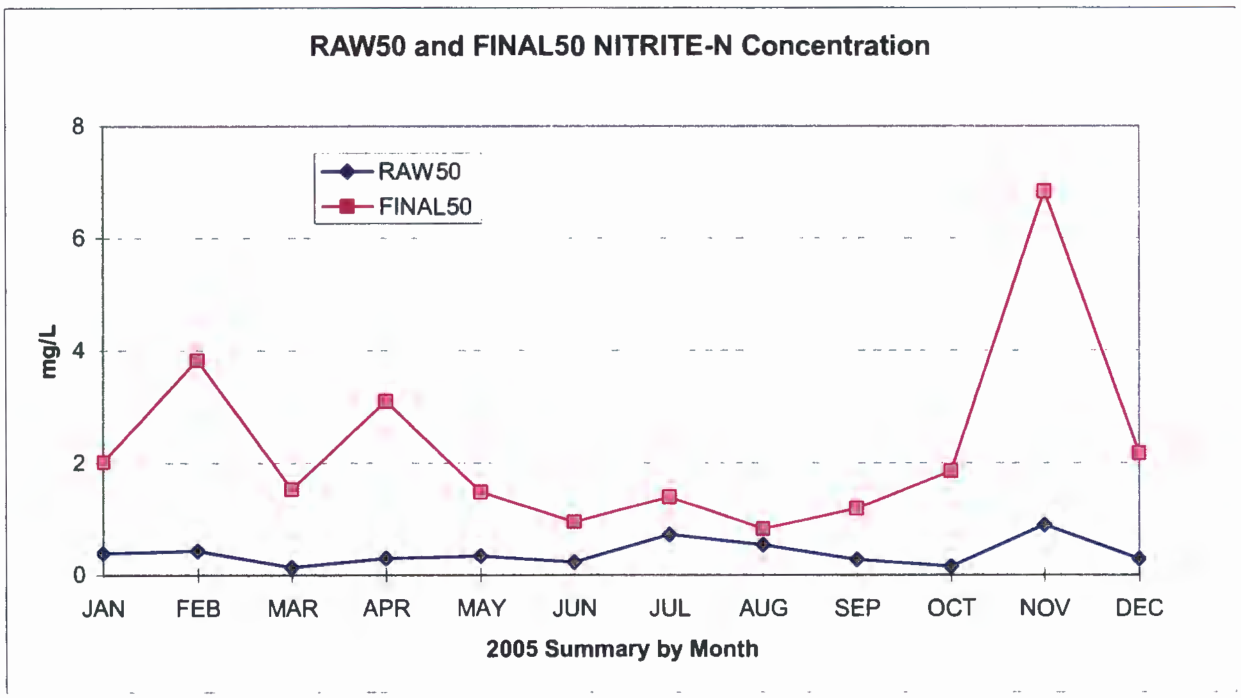


Figure 4-3
Nitrogen-as-Nitrate and Nitrogen-as-Nitrite
in RLWTF Waters During 2005





The next eight graphs provide information about parameters of regulatory concern. Each figure plots mineral concentration in RLWTF influent and effluent during 2005.

- Figure 4-4 charts concentrations for mercury and perchlorates, the two chemicals with the most restrictive discharge limits. The NPDES limit for mercury is just 0.77 µg/L (i.e., less than one part per billion). All effluent concentrations were below the Method Detection Limit of 0.02 µg/L except for December, for which the concentration was equal to the MDL. Perchlorate has a voluntary discharge limit of just four parts per billion, for which ion exchange treatment columns were installed in 2002. No perchlorate has been detected in effluent in concentrations at or above the Method Detection Limit of one part per billion since the ion exchange columns were installed, including during 2005.

- Figure 4-5 illustrates influent and effluent concentrations of selenium and cadmium, both of which have discharge standards well below one milligram per liter (just 5 µg/L for selenium, and 50 µg/L for chromium.) Selenium effluent concentrations are seen to have averaged about 2 µg/L; cadmium effluent concentrations were all below the Method Detection Limit of 1 µg/L.

- Figure 4-6 graphs another two parameters of regulatory concern, arsenic and copper. The discharge standard for arsenic is 368 µg/L, still well below one milligram per liter. The existing discharge standard for copper is 1.4 milligrams per liter, but the standard *proposed* by the Groundwater Bureau, 8.6 µg/L, is lower by a factor of 160.

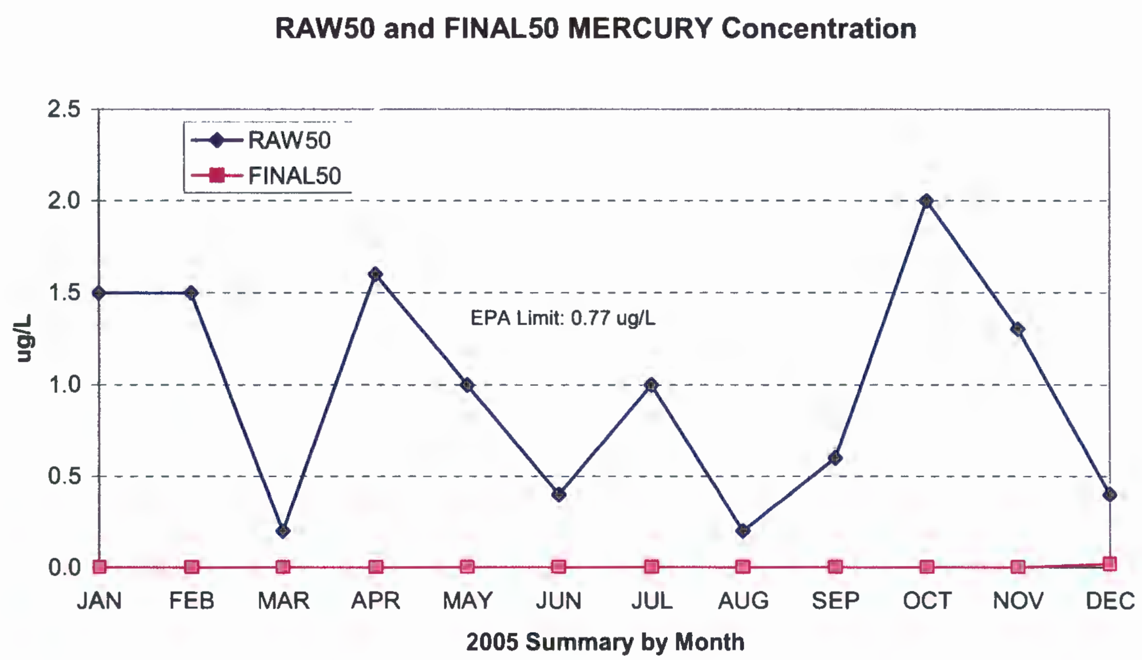
  - As shown in the graphs, there was no difficulty in meeting current EPA discharge standards during 2005 for either arsenic or copper.

  - However, effluent concentrations for copper ranged from five to 30 µg/L, and were less than the proposed standard of 8.6 µg/L for only two months in 2005.

  - A Plant Test conducted during 2005 (Del Signore and McClenahan, March 2006, p.33) showed that copper is one of several metals that exist in both the soluble and insoluble states. Enough of the soluble fraction survives the Main Treatment Process to appear in plant effluent in concentrations greater than the proposed discharge standard. The draft NPDES permit allows three years to achieve compliance with the proposed standard, which should give sufficient time to install cation exchange or another treatment step.

- Figure 4-7 shows zinc and fluoride concentrations for 2005. Zinc remains on the list of minerals of concern because zinc discharges were the last NPDES violations experienced at the RLWTF, back in 1999. Fluoride has an NMED discharge limit of just 1.6 mg/L. Zinc influent concentrations were all below the *discharge* standard during 2005, and the highest effluent concentration was just 0.01 mg/L (December). Fluoride effluent concentrations ranged from 0.15-0.4 mg/L, and were all comfortably below the discharge standard.

Figure 4-4
Mercury and Perchlorate in RLWTF Waters During 2005



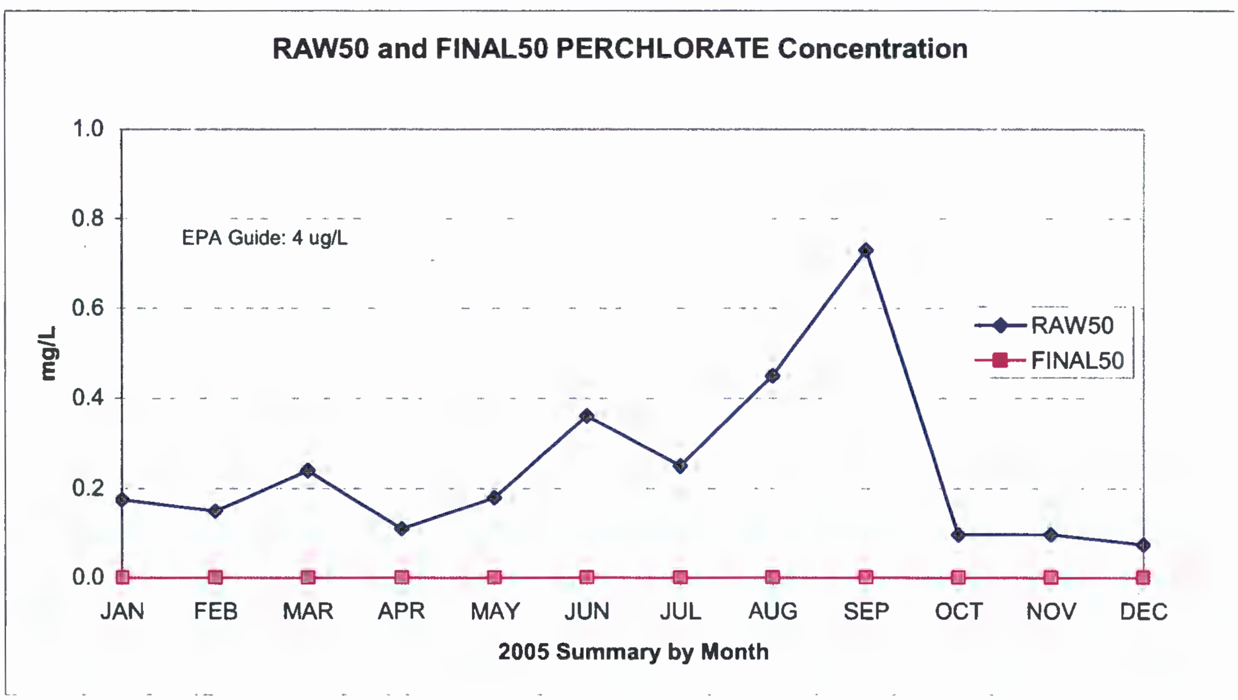
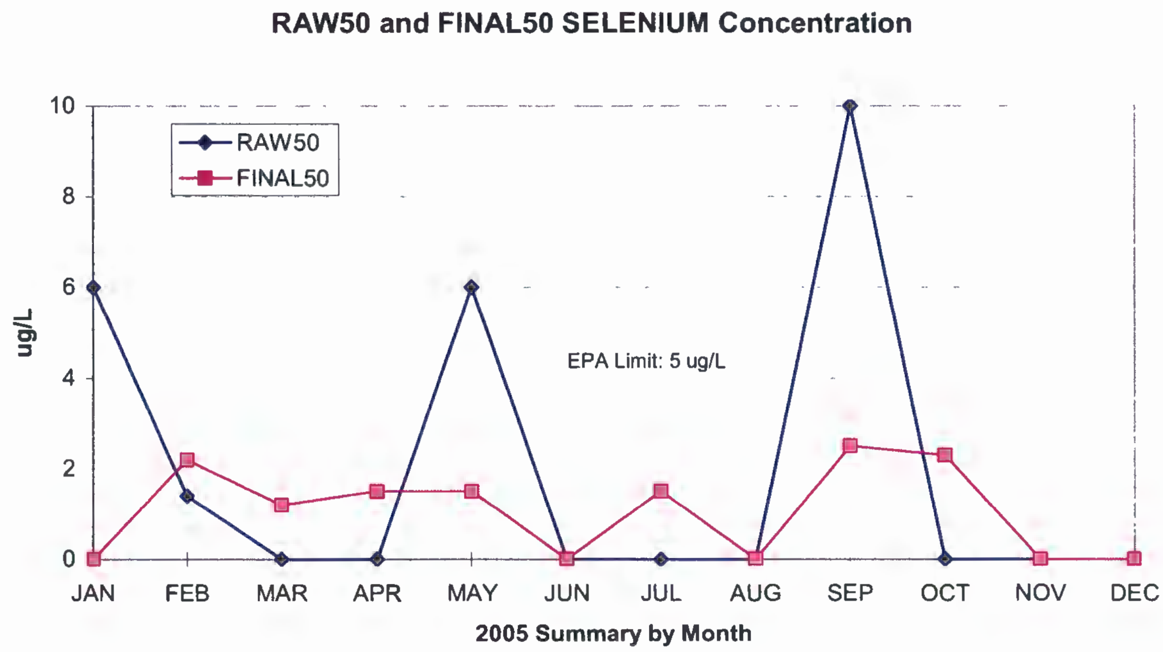


Figure 4-5
Selenium and Cadmium in RLWTF Waters During 2005



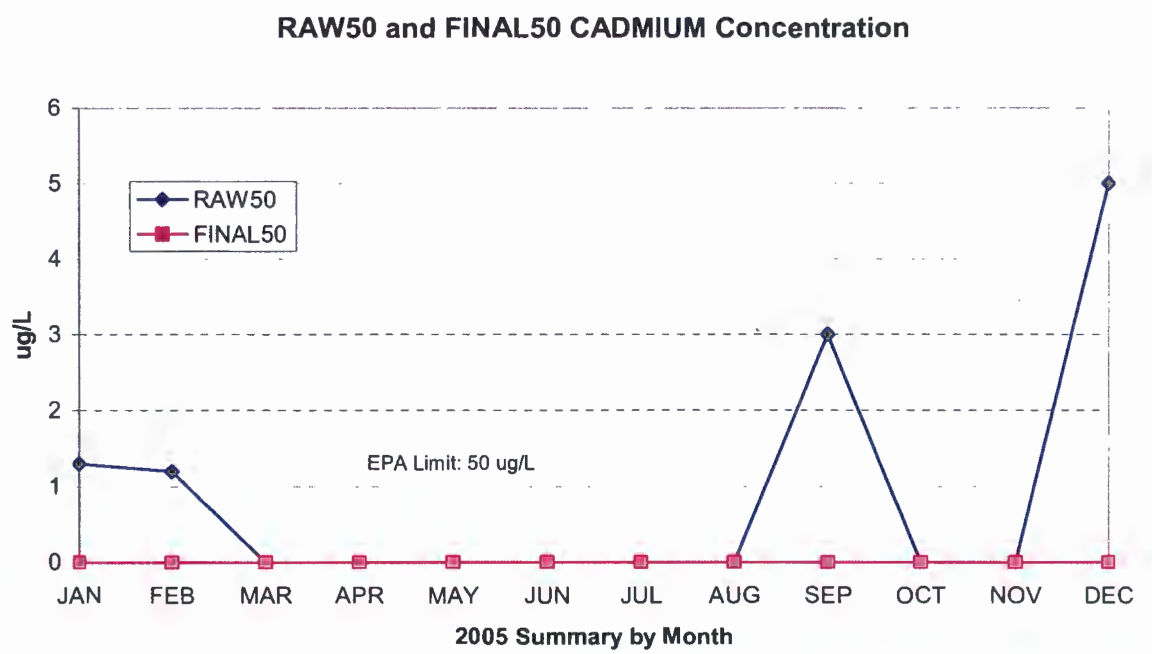
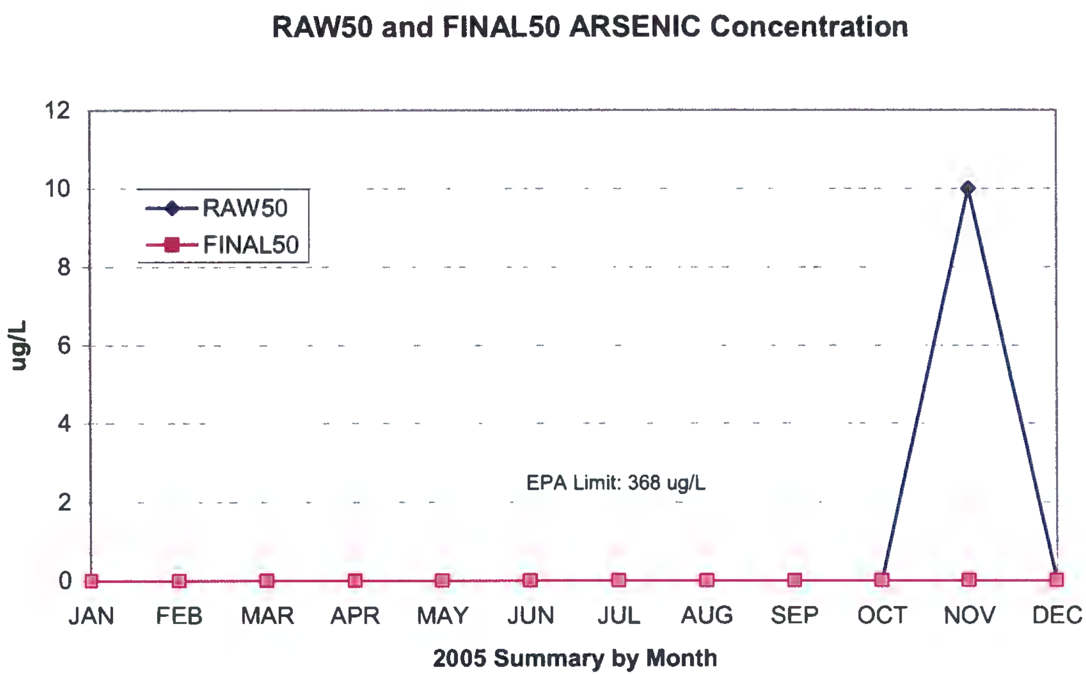


Figure 4-6
Arsenic and Copper in RLWTF Waters During 2005



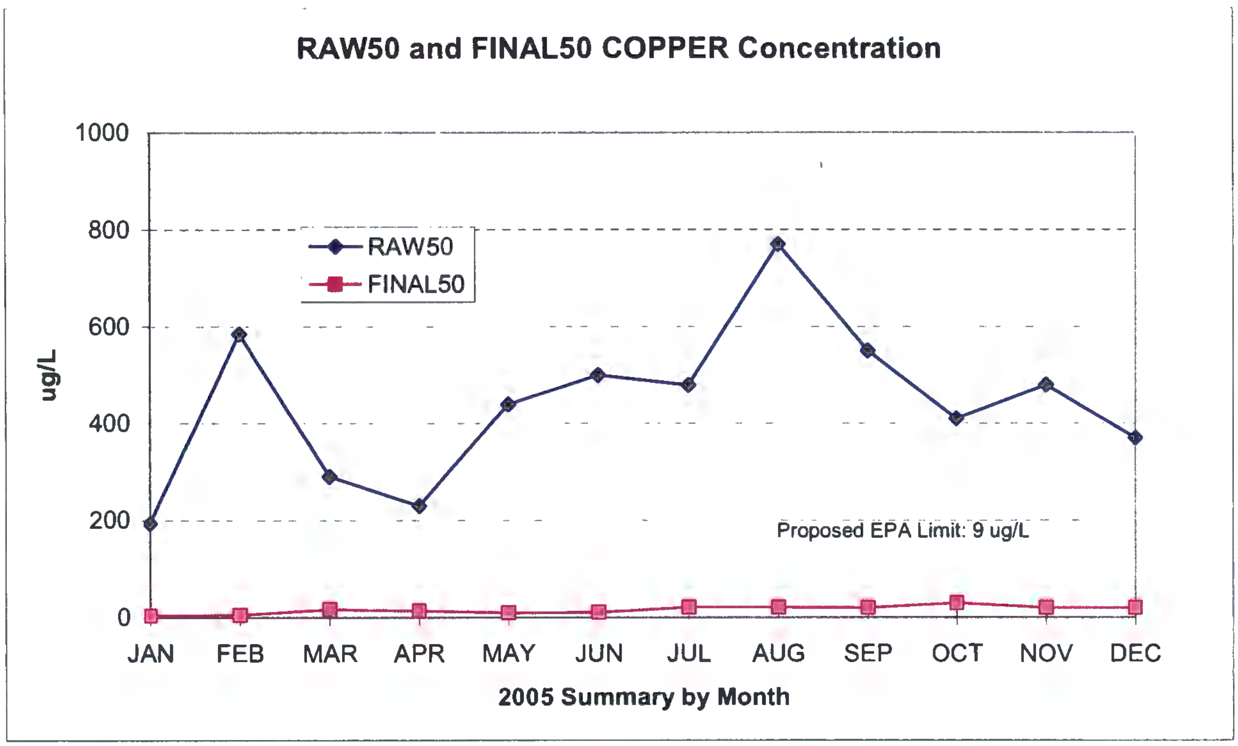
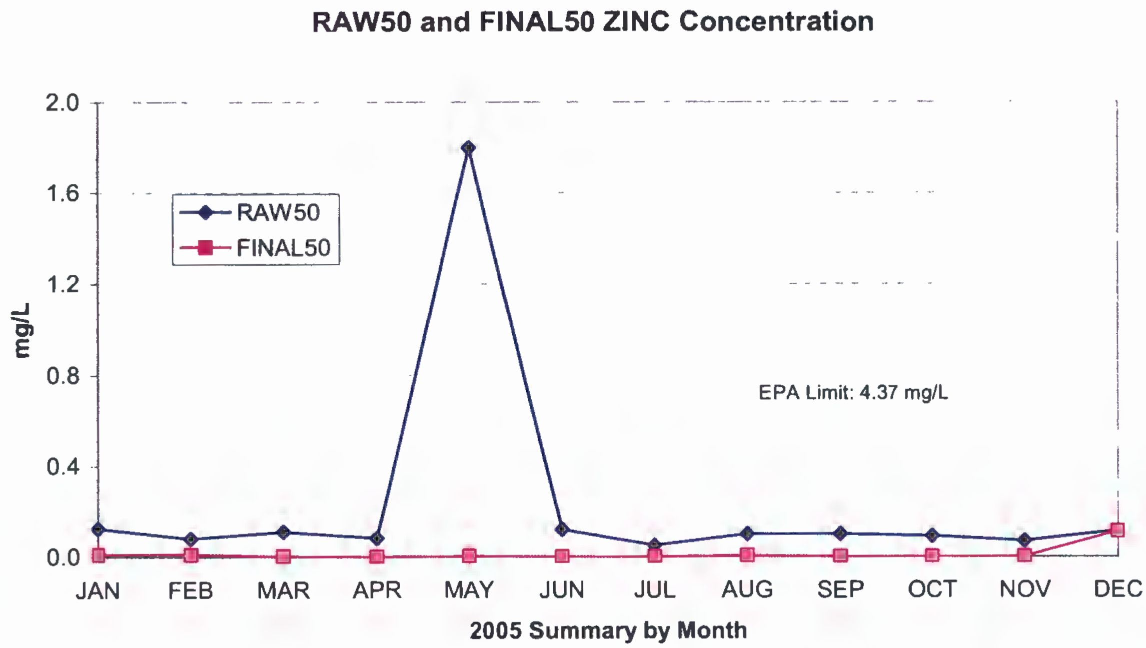


Figure 4-7
Zinc and Fluoride in RLWTF Waters During 2005



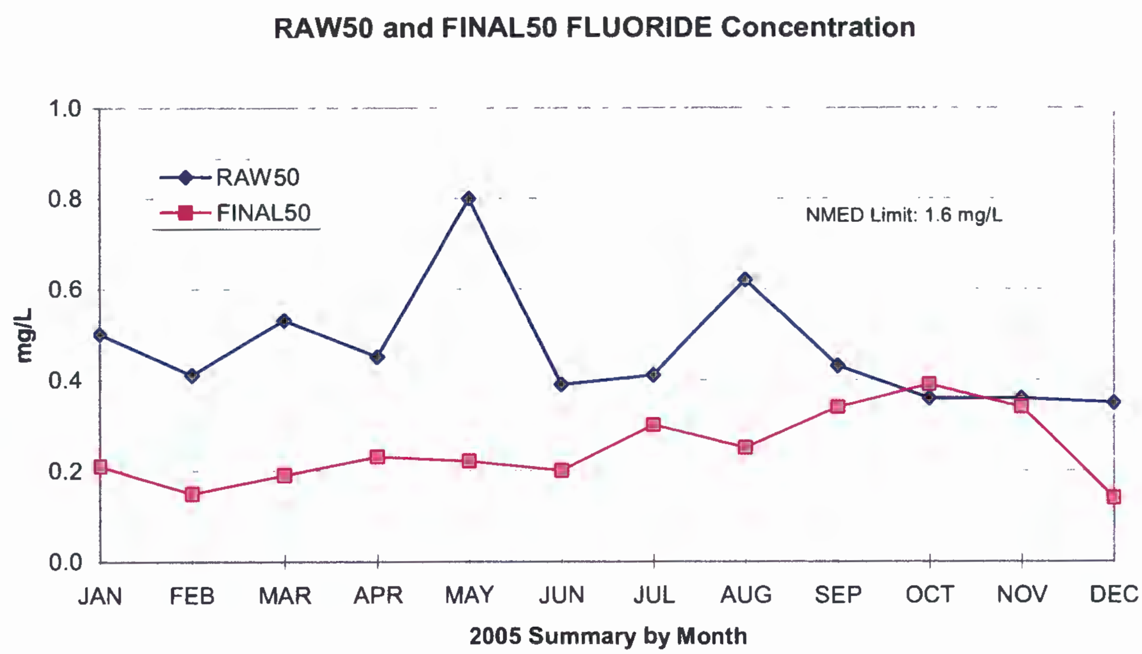
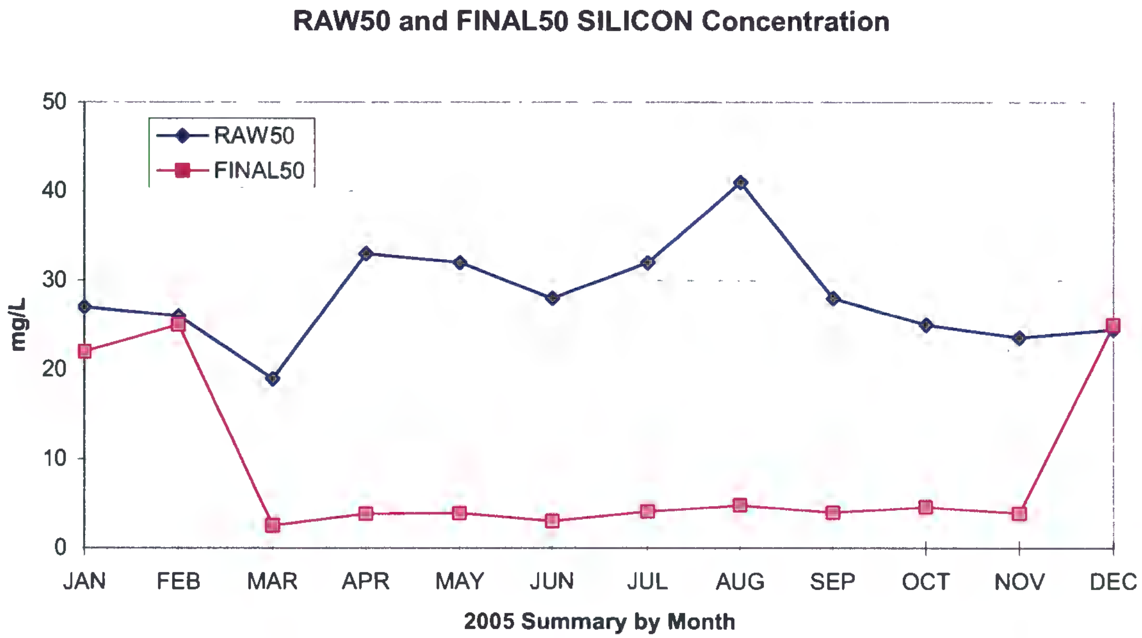
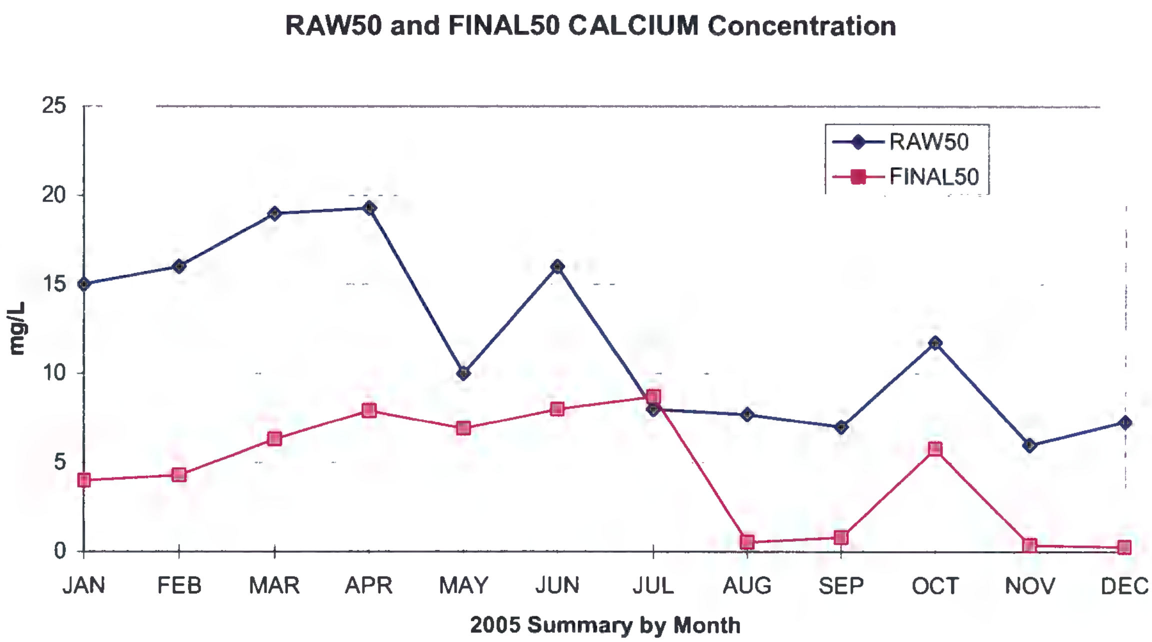


Figure 4-8 charts concentrations for two minerals of processing concern, silicon and calcium. These presented significant problems and downtime when the membrane processes were first installed, and remain processing concerns six years later. The top graph shows influent silicon concentrations of 20-40 mg/L, typical of waters in northern New Mexico, but high compared to concentrations in other parts of the country. There is no ready explanation for the high silicon effluent concentrations in January, February, and December. The lower graph shows that calcium effluent concentrations were lower than influent concentrations for all but the month of July, indicative of excellent control of the rate of addition of lime to the clarifier.

Finally, Figure 4-9 shows influent and effluent concentrations for sodium and chloride. As shown in Table 4-2, sodium was by far the chief constituent in RLWTF during 2005, and accounted for half of the 1230 kilograms of minerals discharged to Mortandad Canyon. Both sodium and chloride are soluble, and hence are not removed prior to treatment by reverse osmosis.

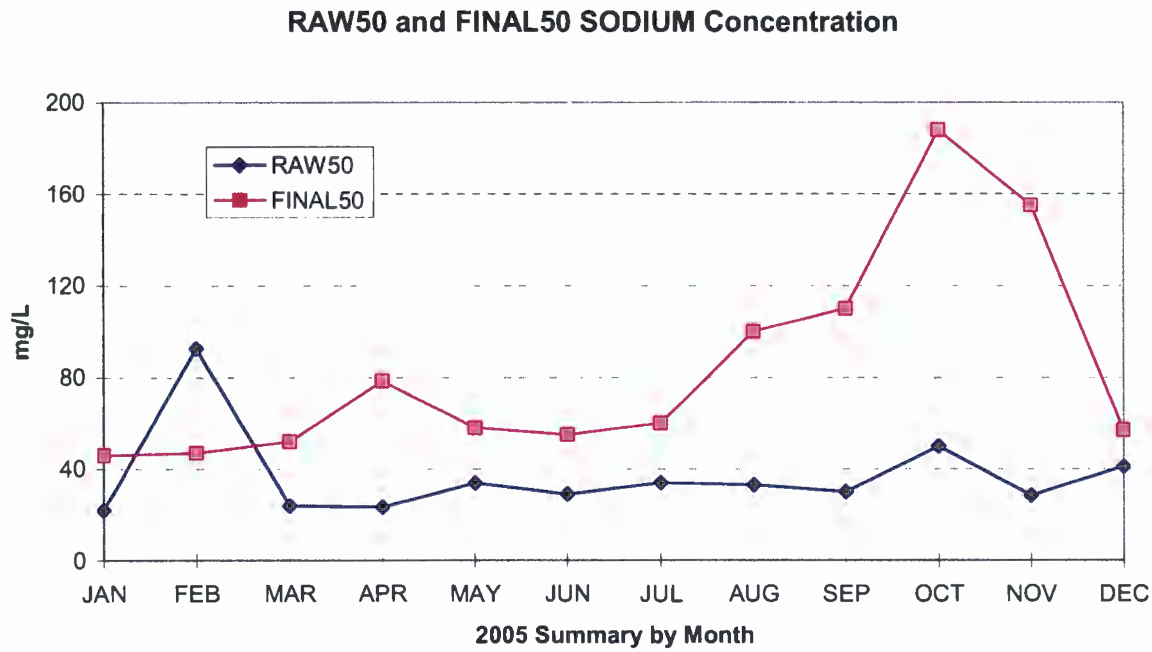
Figure 4-8
Silicon and Calcium in RLWTF Waters During 2005

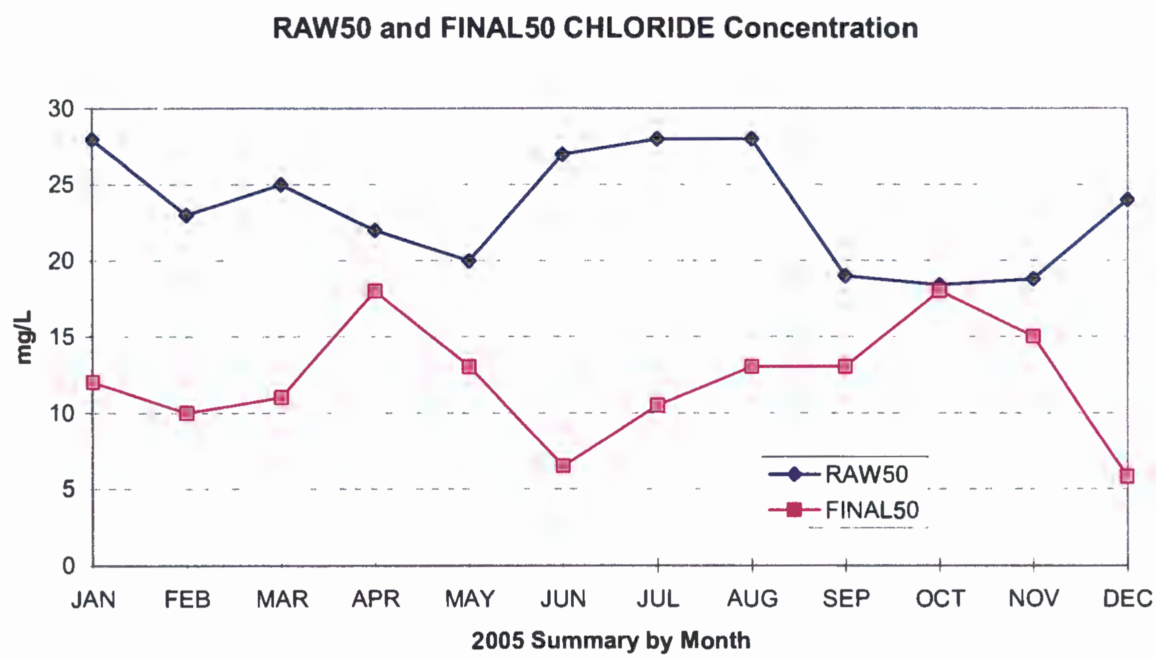




May 2005 RAW50 concentration plotted at MDL of 10 mg/L.

Figure 4-9
Sodium and Chloride in RLWTF Waters During 2005





4.5 Organic Chemicals

Grab samples of influent and effluent waters are analyzed for volatile organic chemicals (VOC) and semi-volatile organic chemicals (SVOC) on a weekly and monthly basis, respectively. Additionally, individual batches of sludge are also analyzed for VOC and SVOC. Analyses are performed by an external EPA-certified laboratory according to EPA approved methods 624 for VOC, and 625A and 625B for SVOC.

Tables 4-5 and 4-6 summarize the VOC and SVOC detected in the RLWTF effluent during 2005 and the concentration range of these chemicals. The "months" column in these tables indicates the number of monthly samples in which a particular chemical was detected. As the tables show, neither volatile organic nor semi-volatile organic compounds were detected in effluent.

Tables 4-7 and 4-8 show the VOC and SVOC, respectively, detected in the RLWTF influent during 2005, and the number of weeks in which that chemical was detected. More information pertaining to VOC and SVOC in the RLWTF influent is given in Appendix E.

Finally, Tables 4-9 and 4-10 summarize the VOC and SVOC detected in RLWTF sludge samples during 2005.

Table 4-5
VOC Detected in Monthly Samples of 2005 RLWTF Effluent

VOC (Method 624)	Months	Low (ug/L)	High (ug/L)
None Detected			

Table 4-6
SVOC Detected in Monthly Samples of 2005 RLWTF Effluent

SVOC (Methods 625A and 625B)	Months	Low (ug/L)	High (ug/L)
None Detected			

Table 4-7
VOC Detected in Weekly Samples of 2005 RLWTF Influent

VOC (Method 624)	Weeks	Low (mg/L)	High (mg/L)
1,1,1-TRICHLOROETHANE	1	190. E-6	190. E-6
1,1,2-TRICHLOROETHANE	1	710. E-6	710. E-6
1,1-DICHLOROPROPENE	1	6.8 E-3	6.8 E-3
1,2,4-TRIMETHYLBENZENE	2	160. E-6	790. E-6
1,2-DICHLOROBENZENE	4	530. E-6	960. E-6
1,3,5-TRIMETHYLBENZENE	1	650. E-6	650. E-6
1,3-DICHLOROBENZENE	2	700. E-6	920. E-6
1,4-DICHLOROBENZENE	4	570. E-6	1.1 E-3
2,2-DICHLOROPROPANE	1	6.6 E-3	6.6 E-3
2-BUTANONE	4	6. E-3	19. E-3
2-HEXANONE	1	8.9 E-3	8.9 E-3
4-ISOPROPYLTOLUENE	3	420. E-6	980. E-6
4-METHYL-2-PENTANONE	24	5.1 E-3	180. E-3
ACETONE	35	30. E-3	1.1 E0
BENZENE	3	80. E-6	1.1 E-3
BROMOMETHANE	12	370. E-6	10. E-3
CARBON DISULFIDE	1	7.9 E-3	7.9 E-3
CARBON TETRACHLORIDE	1	1.8 E-3	1.8 E-3
CHLOROBENZENE	2	570. E-6	1.3 E-3
CHLORODIBROMOMETHANE	1	1.3 E-3	1.3 E-3
CHLOROFORM	6	84. E-6	770. E-6
CHLOROMETHANE	12	490. E-6	6.6 E-3
CIS-1,3-DICHLOROPROPENE	1	3.4 E-3	3.4 E-3
CIS/TRANS-1,2-DICHLOROETHENE	1	20. E-3	20. E-3
IODOMETHANE	4	690. E-6	4.4 E-3
METHYLENE CHLORIDE	29	1.7 E-3	29. E-3
N-BUTYLBENZENE	1	1.5 E-3	1.5 E-3
TERT-BUTYLBENZENE	1	130. E-6	130. E-6
TETRACHLOROETHENE	1	2.6 E-3	2.6 E-3
TOLUENE	4	180. E-6	1.6 E-3
TRICHLOROETHENE	1	12. E-3	12. E-3
XYLENE (TOTAL)	1	260. E-6	260. E-6

Table 4-8
SVOC Detected in Weekly Samples of 2005 RLWTF Influent

SVOC (Methods 625A and 625B)	Weeks	Low (mg/L)	High (mg/L)
BENZOIC ACID	5	3.7 E-3	41. E-3
BENZYL ALCOHOL	3	2.8 E-3	25. E-3
BIS(2-ETHYLHEXYL)PHTHALATE	35	3.9 E-3	91. E-3
DI-N-BUTYLPHTHALATE	2	3.2 E-3	4.5 E-3
DIETHYLPHTHALATE	9	2.4 E-3	8.6 E-3
HEXACHLOROETHANE	1	2.8 E-3	2.8 E-3
N-NITROSODIMETHYLAMINE	3	4.1 E-3	34. E-3
PYRIDINE	4	9.5 E-3	54. E-3

Table 4-9
VOC Detected in 2005 RLWTF Sludge Samples

VOC (Method 624)	Low (mg/L)	High (mg/L)
(No Sludge Processed in 2005)		

Table 4-10
SVOC Detected in 2005 RLWTF Sludge Samples

SVOC (Methods 625A and 625B)	Low (mg/L)	High (mg/L)
(No Sludge Processed in 2005)		

5. TA-50 Wastes

During the treatment of wastes, other (secondary) waste streams are generated. These secondary wastes can be grouped under two headings – secondary liquid waste streams, and solid wastes.

5.1 Secondary Liquid Wastes

Secondary liquid wastes include a wide variety of waste streams from each of the treatment operations. For example, clarifier and gravity filter operations result in both backwash waters and a liquid, sludge-containing stream. Similarly, operating the reverse osmosis unit creates a concentrate stream and membrane cleaning solutions. Each of these secondary liquid waste streams are re-treated within the TA-50 RLWTF. Clarifier sludge, for example, is processed through the rotary vacuum filter in Room 116; gravity filter backwash waters are returned to the headworks to be re-processed through the clarifier; and RO concentrate is processed through the interim evaporator.

The volume of these secondary liquid waste streams during 2005 was an estimated 4.5 million liters, more than 90% of which are generated via operation of the tubular ultrafilter and the reverse osmosis units. Appendix A provides additional information about the numbers and volumes of these liquid streams.

This secondary liquid waste volume, sadly, also totaled 64% of the raw influent volume for the year. This was not good performance, and resulted primarily from two factors. The first was the operation of the tubular ultrafilter itself; daily purging of influent tanks and recycle of spongeball waters unnecessarily generate large volumes of liquids that must be re-treated. The second factor was the shutdown, since July 2004, of the rotary vacuum filter. The inability to process sludge through the RVF has degraded clarifier performance (Del Signore and McClenahan, March 2006, p.41). Sludge now overflows the clarifier and is present in feed to the ultrafilter, which reinforces the practice of draining feed tanks and recycling spongeball waters.

5.2 Solid Wastes

Influent to the TA-50 RLWTF contained 1,450 kilograms of dissolved and suspended solids. Treatment of this influent to achieve compliance with DOE, EPA, and NMED discharge standards resulted in the generation of 32,000 kilograms of solid wastes. These solid wastes can be broadly grouped into three waste sources:

- operations wastes generated while conducting day-to-day activities (3,500 kilograms),
- process sludges that result from chemical precipitation (7,560 kilograms), and

- dried salts from evaporator bottoms (21,000 kilograms).

In addition to solid wastes generated by treating RLW, solid wastes in the form of soils and debris were generated during the construction of the new pump house and influent storage tank building that is part of the Cerro Grande Rehabilitation Project. This non-routine waste totaled 58 cubic meters and 64,800 kilograms of radioactive low-level waste that was disposed at Area G. (The two-year total for construction wastes from this project: 162 cubic meters, 196,000 kilograms.)

Table 5-1 provides details of solid waste containers, volumes, and weights.

Table 5-1
Solid Wastes Shipped From the TA-50 RLWTF During 2005

	Chemical	LLW	MLLW	TRU	Totals
No. Items:					
Operations	3	271	1	0	275
Salts from Bear Creek	0	38	0	0	38
Sludge	0	40	0	0	40
Subtotal, Ops. solids	3	349	1	0	353
Construction debris	0	9	0	0	9
Construction soils	0	9	0	0	9
Subtotal, Constr. solids	0	18	0	0	18
Totals	3	367	1	0	371
Volume (m^3):					
Operations	0.011	22.8	0.004	0	22.8
Salts from Bear Creek	0	19.6	0	0	19.6
Sludge	0	8.3	0	0	8.3
Subtotal, Ops. solids	0.011	50.8	0.004	0	50.8
Construction debris	0	23.1	0	0	23.1
Construction soils	0	34.4	0	0	34.4
Subtotal, Constr. solids	0	57.5	0	0	57.5
Totals	0.011	108.3	0.004	0	108.3
Weight (Kg):					
Operations	7.20	3,481	4.08	0	3,493
Salts from Bear Creek	0	21,052	0	0	21,052
Sludge	0	7,557	0	0	7,557
Subtotal, Ops. solids	7.20	32,090	4.08	0	32,102
Construction debris	0	3,574	0	0	3,574
Construction soils	0	61,235	0	0	61,235
Subtotal, Constr. solids	0	64,809	0	0	64,809
Totals	7.20	96,900	4.08	0	96,911

5.2.1 Operations Wastes

Operations wastes result from both day-to-day water treatment activities and from facility and equipment repairs and modifications. A total of 3,493 kilograms of operations wastes (110 drum equivalents) were generated at the TA-50 RLWTF during 2005. Operations wastes consisted largely (269 of 275 items, 2,638 kilograms) of compactible trash generated in radiation control areas at the RLWTF. Compactible trash includes paper, discarded plastic sampling vials and bottles, protective gloves, and similar materials needed for day-to-day activities. Other operations waste included empty containers, process consumables such as spent filter cartridges, and waste from repairs and modifications such as piping and worn pumps and motors.

5.2.2 Salts From Bear Creek

Bottoms from the interim evaporator are shipped to a subcontractor in Bear Creek, TN, where the bottoms are dried. The resultant dried salts are returned for disposal at Area G as LLW. During 2005, eight shipments containing 37,500 gallons of evaporator bottoms were made to Bear Creek, and 38 drums of dried salts weighing 21,050 kilograms were returned.

5.2.3 Process Sludge

MTP clarifier sludge, after being processed through the rotary vacuum filter, are drummed and then shipped to Area G for disposal (LLW). During 2005, 40 drums containing 7,560 kilograms of process sludge were shipped for disposal as LLW at Area G[4]. (See Table 5-2 for details.) Clarifier sludge from Room 60 is drummed, then solidified, prior to disposal as transuranic waste at the Waste Isolation Pilot Plant. No drums of solidified transuranic sludge were shipped from TA-50 during 2005.

Table 5-2
Vacuum Filter Sludge Shipped for Disposal During 2005

Month	No. of Drums	Total Volume (Liters)	Gross Weight (Kg)
24-March	10	2,082	1,868
29-March	8	1,665	1,506
04-April	12	2,496	2,269
12-April	10	2,082	1,913
TOTAL	40	8,327	7,557

[4] The sludge quantity represents 40 drums of sludge shipped from TA-50 to Area G. These wastes were actually generated in 2004.

6. Operations in 2005 at the Other RLW Facilities

The preceding chapters of this annual report discussed the TA-50 RLWTF for low-level radioactive liquid wastes. This chapter discusses the remaining three Radioactive Liquid Waste treatment facilities.

6.1 TA-53 Facility

The TA-53 RLWTF treats radioactive liquid waste from accelerator research at the Los Alamos Neutron Science Center. The treatment process includes wastewater storage to allow short-lived radioisotope decay, followed by solar evaporation. Three flows are of importance.

- Water flows by gravity into lift stations adjacent to Experimental Area A and the Lujan Center. The RLW is pumped from the lift stations through double-walled underground piping to one of three 30,000-gallon tanks inside Building 53-945. A total of 355,000 liters of RLW were transferred from the lift stations to the RLWTF during 2005.

- Tritiated waters are occasionally trucked directly to the TA-53 basins for evaporation. During 2005, 12,900 liters were trucked to the basins from TA-16. These trucked wastewaters met the waste acceptance criteria for the TA-53 RLWTF. This additional trucked quantity raised total influent volume for 2005 to 368,000 liters.

- After aging in the RLWTF tanks, the RLW is pumped to the evaporator basins. During 2005, four pump-outs occurred: March 3, March 8, May 4, and October 13. The volume of RLW pumped to the basins totaled 299,000 liters.

The quantity of water sent to the basins during 2005 is far below the evaporative capacity (1.4 millions liters per year) of the basins at TA-53.

6.2 Transuranic RLW Facility

Several events have combined to limit operations over the past two years in Room 60, which treats transuranic RLW generated by TA-55. It was discovered in September 2003 that the influent storage tank for caustic wastes was leaking. This limited operations while preparations were being made to replace the tank. The Room 60 facility was then shut down in July 2004 as part of the LANL-wide work suspension. During that shutdown, Room 60 was identified to both LANL management and the DOE as significant safety risk due to deteriorating equipment and vessels. These conditions were subsequently confirmed in a detailed equipment condition assessment by an outside engineering firm (ARES Corporation, January 2005), followed by recommendations and priorities for necessary repairs and replacement equipment (ARES Corporation, March 2005). The first maintenance effort to address these safety concerns, replacement of the leaking caustic tank, then experienced a contamination incident. Even though the incident did not result in personnel overexposures, it led to an interruption of the replacement effort while management practices such as work control and task planning were reviewed.

As a result of these events, the Room 60 Facility operated only once during 2005. Special permission was given to receive and process 193 liters of caustic wastes that had accumulated at TA-55. Acid wastes were neither transferred from TA-55 to the acid storage tank at TA-50, nor processed through Room 60.

6.3 TA-21 Facility

The facility at TA-21 treats RLW from tritium research at TA-21 using a clarifier and a gravity filter. Effluent from the TA-21 Facility is transferred to either the TA-50 low-level RLWTF or the TA-53 Facility for further treatment. From 1966 through 2000, effluent from this facility was transferred via underground piping to TA-50. Beginning in 2001, treated TA-21 waters have been transferred to TA-50 by truck.

Volumes and concentrations of tritiated RLW have declined as tritium activities have been scaled back at TA-21. Although influent volumes historically exceeded one million liters, they declined to just 30,000 liters in 2002 and 32,000 liters in 2003, and nearly zero since. The TA-21 RLWTF was last operated in 2003. During 2005, influent approximated zero, and the facility was again not operated.

The TA-21 facility has an inventory of waters in tanks and process equipment, estimated to be about 250,000 liters, that remains to be processed. Condition of the equipment for this processing is of concern, however, due to age and intermittent use. A return to operation will require major efforts, including procedure reviews and walkdowns, equipment checks and tests, processing trials using non-radioactive waters, a Management Self Assessment, and a LANL Readiness Assessment.

After the existing inventory of waters have been processed, the TA-21 facility will be placed in cold shutdown status to await decommissioning.

7. References

Much of the information presented in this Annual Report come from the RLWTF process control system, RS View, which automatically records temperatures, flow rates, flow totals, pressures, tank levels, and similar readings of process conditions. Another large segment of the information presented in graphs and tables in this Annual Report comes from analytical data results for process control samples. The below list of references points to the third major data source used in compiling the Annual Report – published reports that are cited within the text of the Annual Report.

ARES Corporation, January 2005. "Los Alamos National Laboratory TA-50 Room 60 Equipment Condition Engineering Assessment", Report No. 000157956-003, Revision 0, Richland, WA.

ARES Corporation, March 2005. "Los Alamos National Laboratory TA-50 Room 60 TRU Wastewater Treatment Process Engineering Study", Report No. 000157959-002, Revision 0, Richland, WA.

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Worland, V.P., 10/01/01. "Rapid Deployment of Ion Exchange Technology to Remove Perchlorate from the RLWTF Effluent".

Appendix A
TA-50 RLWTF Unit Operations During 2005

Text:

List of Tables:

List of Figures:

Appendix A
Low-Level RLW Unit Operations During 2005

One method to measure and report plant operations is to look at the unit operations that comprise the Low-Level RLW processes. These operations, defined in Table A-1, represent all Low-Level RLW operations. The first five unit operations embody the Main Treatment Process, while the final two are secondary treatment processes. Operations of each of these unit operations during 2005 are discussed in the following seven sections; they are then summarized in Section A.8.

Table A-1
TA-50 Low-Level RLW Unit Operations

Unit Operation	Includes	#Vessels	Capacity (gals.)
1. Influent Storage	17K, 75K, 100K	3	192,000
2. Clarifier/ Gravity Filter	CL2, GF	2	33,000
3. Ultrafilter	TUF, TK-71, 72, 73	3	23,700
4. Ion Exchange	IX	0	0
5. Reverse Osmosis	RO, TK-9, FRAC-N, FRAC-S, CL1	4	74,000
6. Evaporator	Evap, 3K, Tank Farm, EFF-S, EFF-N	7	126,600
7. Rotary Vacuum filter	RVF, TK-8	1	8,000
Total Low-Level RLW		20	457,300

A.1 Influent Tanks

Description: The influent tanks collect (a) raw influent from LANL waste generators, (b) secondary waste waters generated by the Main Treatment Process, and (c) tertiary waste waters generated by the two secondary treatment processes, the RVF and evaporator.

Boundaries: The MTP influent tank unit operation consists of the 17K, 75K, and 100K tanks. Unit capacity is 192,000 gallons.

RLW Streams Collected:

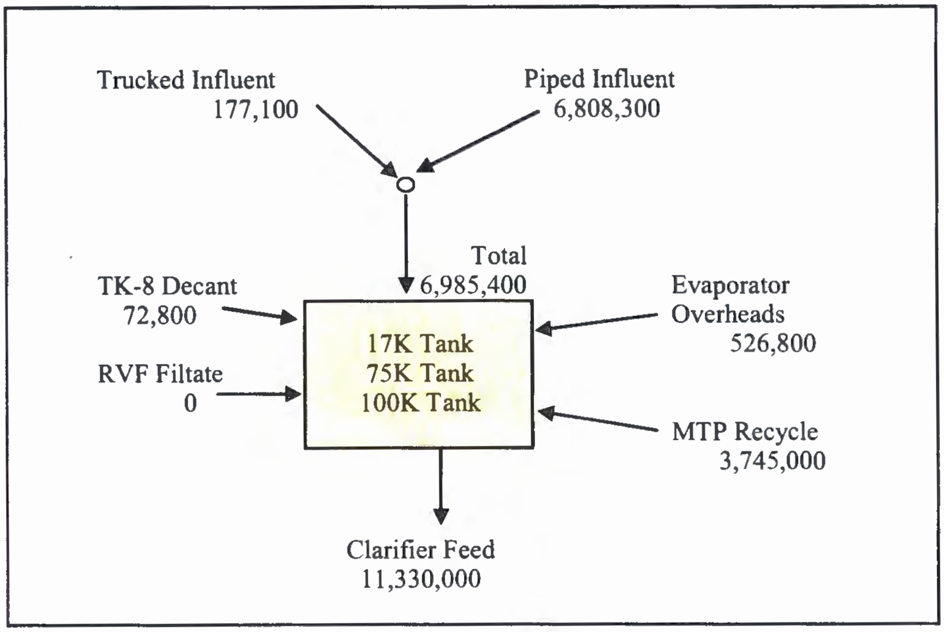
- Raw influent from LANL generators (piped and trucked)
- Secondary waste waters from the TA-50 Main Treatment Process
- Tertiary waste waters from the two secondary treatment processes

RLW Stream Generated, and Disposition:

- Raw daily feed: sent to MTP Clarifier #2

2005 Operations: Inflow to the influent tanks consisted of nearly seven million liters of raw influent from other LANL facilities, and approximately 4.3 million liters of secondary and tertiary waste waters. A flow diagram for 2005 is shown in Figure A-1.

Figure A-1
Influent Tank Flows During 2005



A.2 Clarifier and Gravity Filter

Description: The clarifier and gravity filter (CGF) remain the workhorse of the Main Treatment Process, removing more than 95% of the radioactivity and minerals from influent waters. In addition to raw influent from other LANL generators, the units are fed internal recycle streams such as the daily purge of ultrafilter feed tanks, decant and filtrate from sludge treatment, and membrane cleaning solutions. Clarifier treatment consists of chemical addition to precipitate impurities, settling to remove the majority of these precipitates, and gravity filtration of overflow waters through a mixed bed of sand and graphite to remove more solids. The gravity filter removes particles down to 6-10 microns in size. (Del Signore, August 2005, p. 34)

Boundaries: The CGF unit operation consists of the clarifier and gravity filter. Unit capacity is 33,000 gallons.

RLW Streams Treated: Influent tank waters

RLW Streams Generated, and Disposition:

- Gravity filter backwash: sent to MTP influent tanks
- Clarifier sludge: sent to TK-8, for processing through the RVF

2005 Operations: The clarifier and gravity filter operated on 162 days, processing a total of 11,300,000 liters during 668 hours of operation. This calculates to an average flow rate of 75 gallons per minute, well within the design capacity of 120 gallons per minute. More than 90,000 liters were processed on five different days, with a maximum throughput of 109,100 liters on December 15, 2005.

As for secondary waste streams from this unit operation during 2005, 83,800 liters of sludge were removed from the clarifier (26 transfers from the clarifier to TK-8), and 111,500 liters of gravity filter backwash were generated from backwashing on seven occasions. This total secondary waste volume of 195,000 liters amounts to 1.7% of the volume of water treated [5].

A total of 5920 kilograms of lime and 265 kilograms of iron were used for clarifier operations during the year. These equate to average feed concentrations of 520 mg/L lime and 23 mg/L ferric sulfate. Backwash details are presented below in Table A-2, and a flow diagram for 2005 is shown in Figure A-2.

Table A-2
Gravity Filter Backwash During 2005

Date	Liters	Origin_of_Water
11/28/2005	7,665	North Effluent tank
11/28/2005	4,991	South Effluent tank
11/23/2005	10,873	South Effluent tank
9/27/2005	15,707	North Effluent tank
7/7/2005	18,452	South Effluent tank
5/16/2005	20,345	South Effluent tank
4/26/2005	15,519	North Effluent tank
3/11/2005	17,979	North Effluent tank

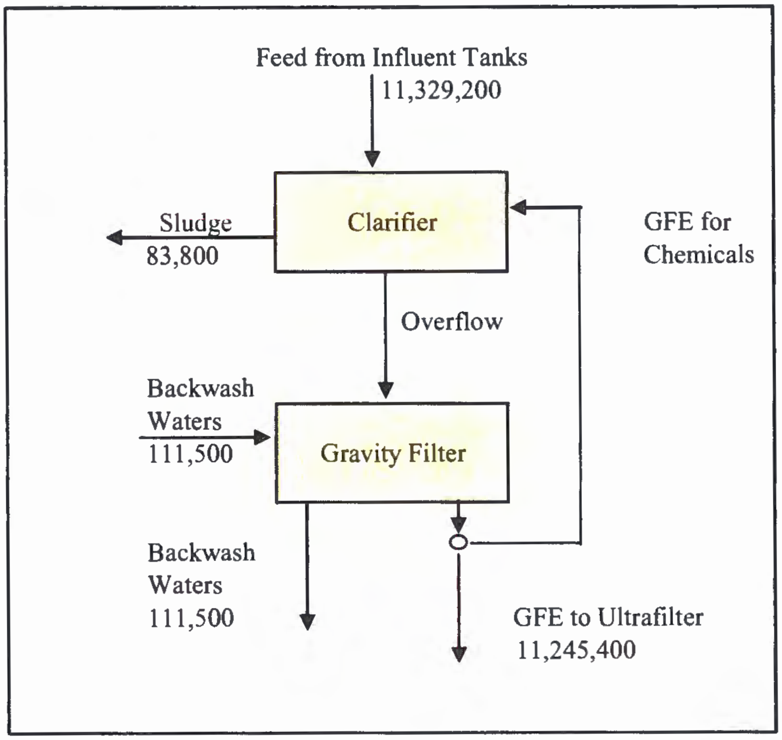
Totals: 7 backwashes, 111,500 liters.
An average of 15,930 liters per backwash.

A.3 Ultrafilter

Description: Discharge from the gravity filter is fed to the tubular ultrafilter (TUF), which removes essentially all remaining solids. The TUF is also sometimes fed (a) distillate from evaporator operations and (b) RLWTF effluent that does not meet NPDES, NMED, or DOE discharge limits. Chemicals are not used in the treatment process, but acid and caustic solutions may be used to clean the membranes. The TUF removes particles down to 0.08 micron in size.

[5] The volume of sludge withdrawn from the clarifier should be higher in order to attain optimal clarifier efficiency, and more sludge *would* have been withdrawn had the rotary vacuum filter operated during 2005. CGF performance suffered as a result.

Figure A-2
Clarifier / Gravity Filter Flows During 2005



Boundaries: The TUF unit operation consists of the ultrafilter itself, the feed tanks (TK-71 and TK-72), and associated TK-73. Unit capacity is 23,700 gallons.

RLW Streams Treated:

- Gravity filter effluent
- Off-specification effluent

RLW Streams Generated, and Disposition:

- Daily purge of TK-71 and TK-72: sent to MTP influent tanks
- Monthly drain of TK-71 and TK-72: sent to MTP influent tanks
- Spongeball waters: sent to MTP influent tanks
- Daily membrane soak, flush, or cleaning: sent to MTP influent tanks

2005 Operations: The TUF operated on 159 days, receiving 11,245,000 liters of feed and generating a total of 8,415,400 liters of permeate during 792 hours of operation. This calculates to an average feed rate of 63 gallons per minute, near its design capacity of 60 gallons per minute. More than 70,000 liters of permeate were generated on 15 different days, with a maximum output of 95,400 liters on December 22, 2005.

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Four secondary waste streams are generated from this unit operation, including a daily purge of TK-71 and TK-72 (estimated 602,000 liters), a monthly tank drain (estimated total of 303,000 liters), spongeball waters (estimated 2,250,000 liters), and membrane cleaning solutions (estimated 160,000 liters). This total secondary waste volume of 3,315,000 liters amounts to 29% of the permeate volume. (Del Signore, 04/10/06)

Membrane cleaning was performed 120 times. This included 118 flushes (8 with caustic, one with acid, and the remainder with water) and two occasions using the clean-in-place system (once with acid) Membranes were changed on February 22nd.

TUF operational details are provided below in Table A-3, and operating status for 2005 is presented in Table A-4. A flow diagram for 2005 is shown in Figure A-3.

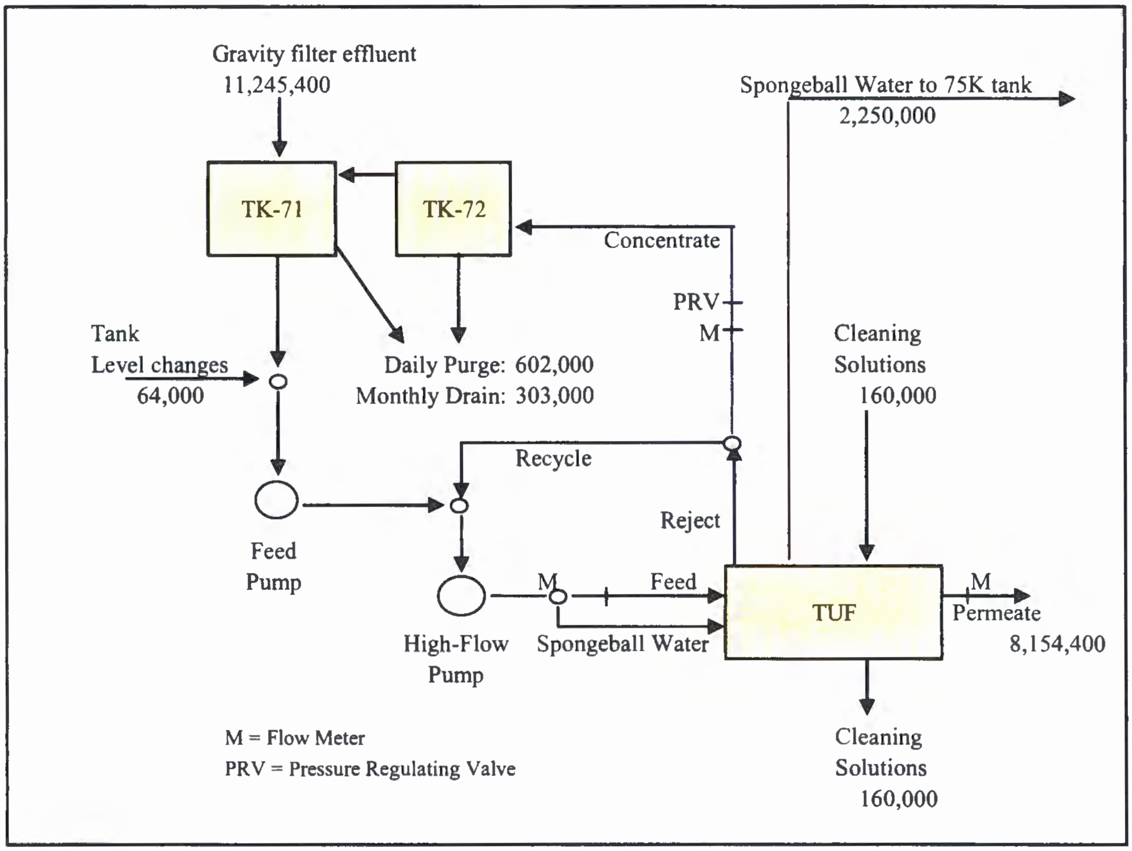
Table A-3
Ultrafilter Flow Data for 2005

Permeate:			
8,154,400	liters	161	= Days w/ non-zero flow
2,154,400	gallons	161	= Days w/ flow > 1,000
45	gpm	159	= Days w/ flow > 10,000
		124	= Days w/ flow > 40,000
		15	= Days w/ flow > 70,000
		792	= Hours of Operation

Table A-4
Ultrafilter Operating Status Report for 2005

Run Status:		No. Times	Hours
1 =	Concentrate	228	787
2 =	Purge	166	12
4 =	Clean	5	1
8 =	Flush	338	13
16 =	Stopped	1,027	7,586
33 =	Auto Concentrate	1	5
34 =	Auto Purge	3	0
36 =	Auto Clean	0	0
40 =	Auto Flush	2	1
48 =	Auto Stopped	12	393
	Totals	**2,782**	**8,797**

Figure A-3
Ultrafilter Flows During 2005



A.4 Ion Exchange

Description: Ion exchange columns were installed during 2002 for the removal of perchlorate. Six columns operate in parallel, receiving TUF permeate and sending it on to reverse osmosis for final treatment. The six columns, 22" diameter x 65" high, hold 54 total cubic feet of SR-7 resin. Processing capacity is 70 gallons per minute, or just under 12 gpm for each column. No chemicals are used in the ion exchange process. (Worland, 10/01/01)

Boundaries: The ion exchange unit operation consists of just the IX unit itself. since there are no feed or effluent tanks, unit capacity is defined to be zero.

RLW Stream Treated: Ultrafilter permeate

RLW Stream Generated, and Disposition:

- Ion exchange effluent: sent to reverse osmosis feed tank, TK-9
- Resin backwash waters: sent to MTP influent tanks

2005 Operations: During 2005, the ion exchange columns operated on 159 days, processing a total of 8,154,400 liters of water during 740 hours. This calculates to an average flow rate of 49 gallons per minute, within the design capacity of 70 gallons per minute. More than 80,000 liters were processed on four different days, with a maximum throughput of 83,400 liters on June 7, 2005. Table A-5 provides additional operational detail.

Two secondary waste streams are generated from this unit operation: spent ion exchange resin, which is disposed as a low-radioactive solid waste at Area G, and resin backwash solutions. Resins were not backwashed during 2005, but were changed out on February 28th. The cartridge filter on the feed line was changed on 15 occasions.

Table A-5
Ion Exchange Flow Data for 2005

Total Days =	159	Total:		
Days w/ non-zero flow =	159		8,154,400	Liters
Days w/ flow > 1000 =	159		2,154,400	Gals
Days w/ flow > 10,000 =	155		49	gpm
Days w/ flow > 40,000 =	119			
Days w/ flow > 80,000 =	4			
Hours of Operation =	740			

A.5 Reverse Osmosis

Description: The reverse osmosis (RO) unit removes any suspended solids that escape the TUF, and up to 99% of dissolved solids. While it is not always necessary to use the RO to achieve waters that meet discharge limits, a policy decision made in April 2002 requires that all effluent shall have been processed through the RO unit in order to yield the highest-quality discharge waters. Carbon dioxide gas bubbled into the feed tank is the only chemical used in the treatment process. Acid and caustic solutions are used to clean the membranes.

Boundaries: The reverse osmosis unit operation consists of the RO unit itself, the feed tank (TK-9), the settler for RO concentrate (Clarifier #1), and the two FRAC tanks used to receive permeate. Unit capacity is 74,000 gallons.

RLW Streams Treated: Ion exchange discharge

RLW Streams Generated, and Disposition:

- Daily purge of TK-9: sent to MTP influent tanks
- Daily membrane soak, flush, or cleaning: sent to MTP influent tanks
- RO concentrate: sent to MTP influent tanks (~70%) and to the evaporator (~30%)
- RO permeate: used for membrane cleaning, or discharged

2005 Operations: The RO operated on 157 days, treating a total of 8,150,000 liters of feed, and generating a total of 7,130,000 liters of permeate during 740 hours of operation (Del Signore, 04/12/06). This calculates to an average feed rate of 48 gallons per minute, less than the design capacity of 70 gallons per minute. More than 70,000 liters of permeate were generated on five different days, with a maximum of 75,400 liters on June 7, 2005.

Membrane cleaning was performed 119 times, using either RO permeate (101 times), acid solutions (twice), or caustic solutions (16 times). Membranes were soaked the remaining nights with acid on seven occasions, with caustic (45 times), or with RO permeate. Membranes were changed twice during 2005, on February 24th, and again on December 5th.

Operational details for the reverse osmosis unit are provided below in Table A-6, and operating status for 2005 is presented in Table A-7. A flow diagram for 2005 is shown in Figure A-4

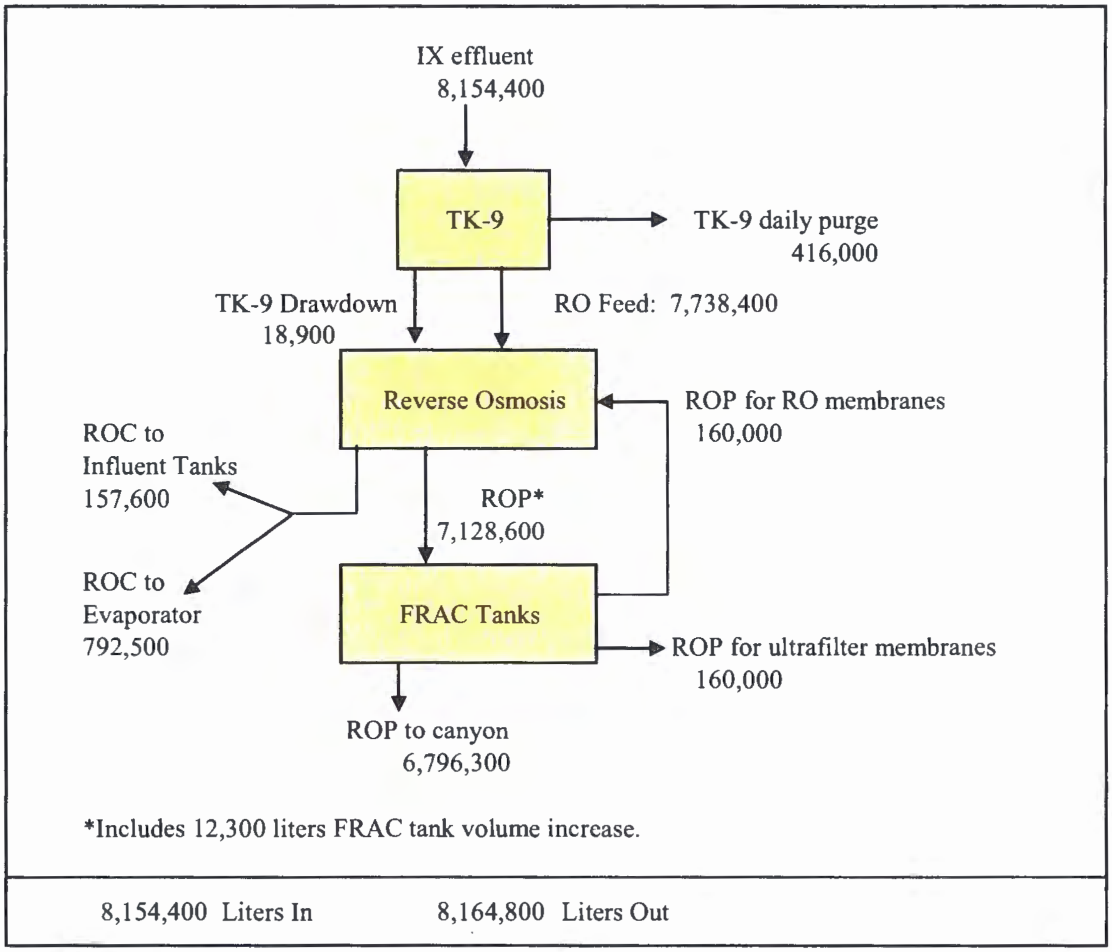
Table A-6
Reverse Osmosis Flow Data for 2005

		Liters	gpm	
Days w/ non-zero permeate =	157			
Days w/ permeate > 1,000 =	157	8,154,400	48	= Total ROF
Days w/ perm. > 10,000 =	156	7,128,600	42	= Total ROP
Days w/ perm.> 40,000 =	85	950,100	6	= Total ROC
Days w/ perm.> 60,000 =	17			
Hours of Operation =	740			

Table A-7
Reverse Osmosis Operating Status Report for 2005

Run Status:		No. Times	Hours
1 =	Concentrate	42	173
2 =	Purge	0	0
4 =	Clean	5	0
8 =	Flush	119	13
16 =	Stopped	521	6,280
33 =	Auto Concentrate	176	567
34 =	Auto Purge	0	0
36 =	Auto Clean	6	0
40 =	Auto Flush	223	21
48 =	Auto Stopped	402	1,674
	Totals	**1,494**	**8,729**

Figure A-4
Reverse Osmosis Flows During 2005



A.6 Rotary Vacuum Filter

Description: The rotary vacuum filter (RVF) treats sludge that precipitates in the clarifier. Sludge is transferred from the clarifier to TK-8, allowed to settle in TK-8, and is then pumped to the rotary vacuum filter. At the RVF itself, sludge collects on the filter surface, is removed and placed into 55-gallon drums, and is shipped to Area G for disposal as low-level radioactive solid waste. Perlite™ is added to the process to aid filtration, and can account for half of the solids volume in the drums shipped to Area G.

Boundaries: The RVF unit operation consists of the vacuum filter itself and TK-8. Unit capacity is 8,000 gallons.

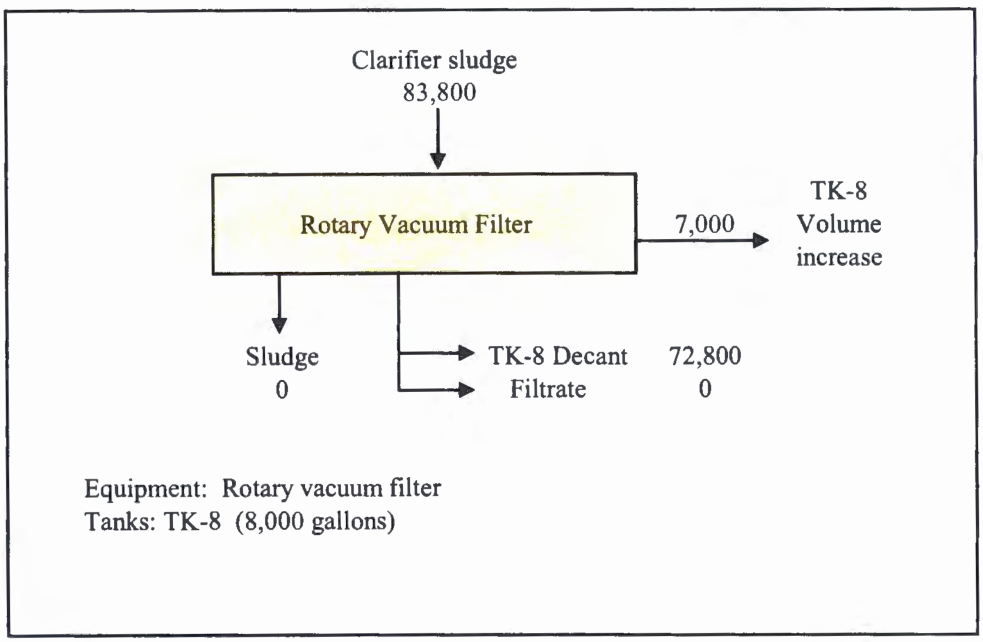
RLW Stream Treated: MTP sludge

RLW Streams Generated, and Disposition:

- Decant from TK-8: sent to MTP influent tanks
- Sludge: drummed and disposed at TA-54
- Filtrate: sent to MTP influent tanks

2005 Operations: The rotary vacuum filter did not operate during 2005. Operations were suspended during the July 2004 LANL-wide work suspension, and have yet to be resumed [6]. Sludge was decanted from the clarifier to TK-8, however, on 26 occasions, and TK-8 was decanted sixteen times. The volume of sludge in TK-8 gradually increased during the year from 76% to 99%. A flow diagram for 2005 is shown in Figure A-5.

Figure A-5
Rotary Vacuum Filter Flows During 2005



A.7 Evaporator

Description: The evaporator reduces the volume of RLW that must be shipped off-site for solidification. It is a mobile, forced-circulation unit enclosed within a transport trailer, complete with its own boiler (in a second trailer), a condenser, and two small cooling towers. Acids are periodically flushed through the system to remove solids from heat exchangers, pumps, piping, and other components.

[6] This lack of sludge processing has affected clarifier and gravity filter processing efficiency, and has placed a greater burden on the ultrafilter and RO units.

Boundaries: The evaporator unit operation consists of the evaporator itself, the 3K tank, the four tank farm tanks in Building 50-248, and the two below-grade effluent tanks. Unit capacity is 126,600 gallons.

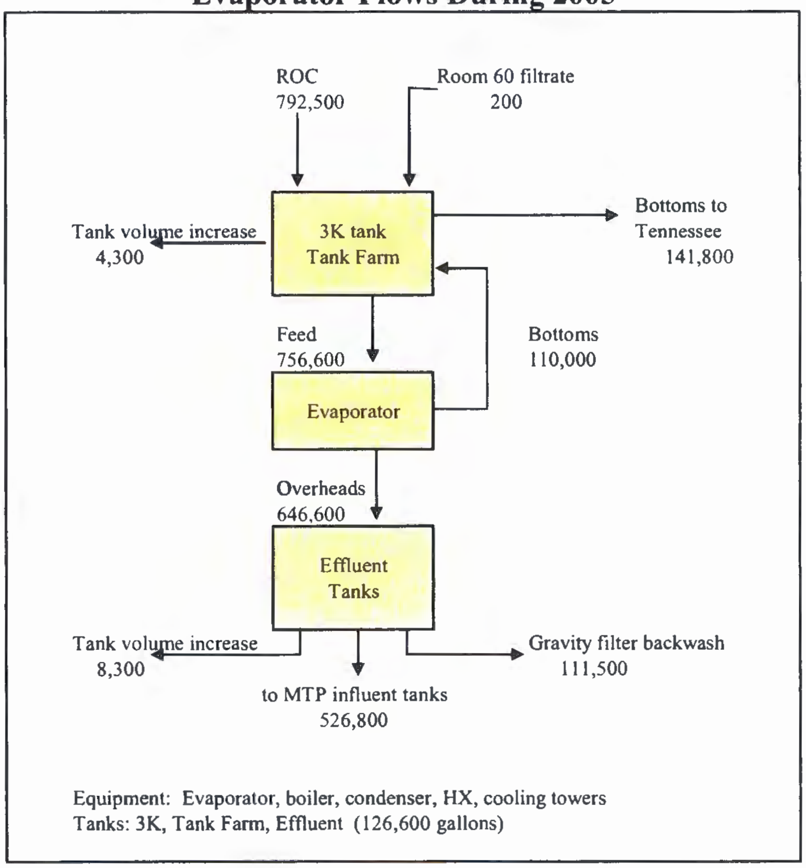
RLW Streams Treated: Reverse osmosis concentrate, Room 60 filtrate

RLW Streams Generated, and Disposition:

- Overheads: used for gravity filter backwash, or reprocessed through TUF and RO
- Bottoms: shipped to Bear Creek, TN to be dried
- Cleaning solutions: Added to bottoms stream
- Off-Spec overheads and bottoms: Recycled through the evaporator

2005 Operations: One evaporator campaign was conducted during 2005. It lasted four weeks, from 05/13/05 through 06/10/05. During 468 hours of operation, a total of 756,600 liters of Room 60 filtrate (9,000 gallons estimated), dilute bottoms (10,900 gallons estimated), and RO concentrate, were processed, achieving an average throughput of 7.1 gallons per minute. The unit experienced 141 hours (23%) of downtime, higher than in recent years. Average volume reduction factor was 6.8. A flow diagram for 2005 is shown in Figure A-6.

Figure A-6
Evaporator Flows During 2005



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A.8 Unit Operations Summary

The above sections can be pieced together to create an overall water balance for the treatment of low-level RLW during 2005. In doing so, two different values are obtained for MTP secondary waste volume:

- 3,745,000 liters, obtained from analysis of the influent tank unit operation
- 3,584,100 liters, obtained by summing secondary wastes from individual unit operations

The two figures agree within 4.5%, however, which is quite good.

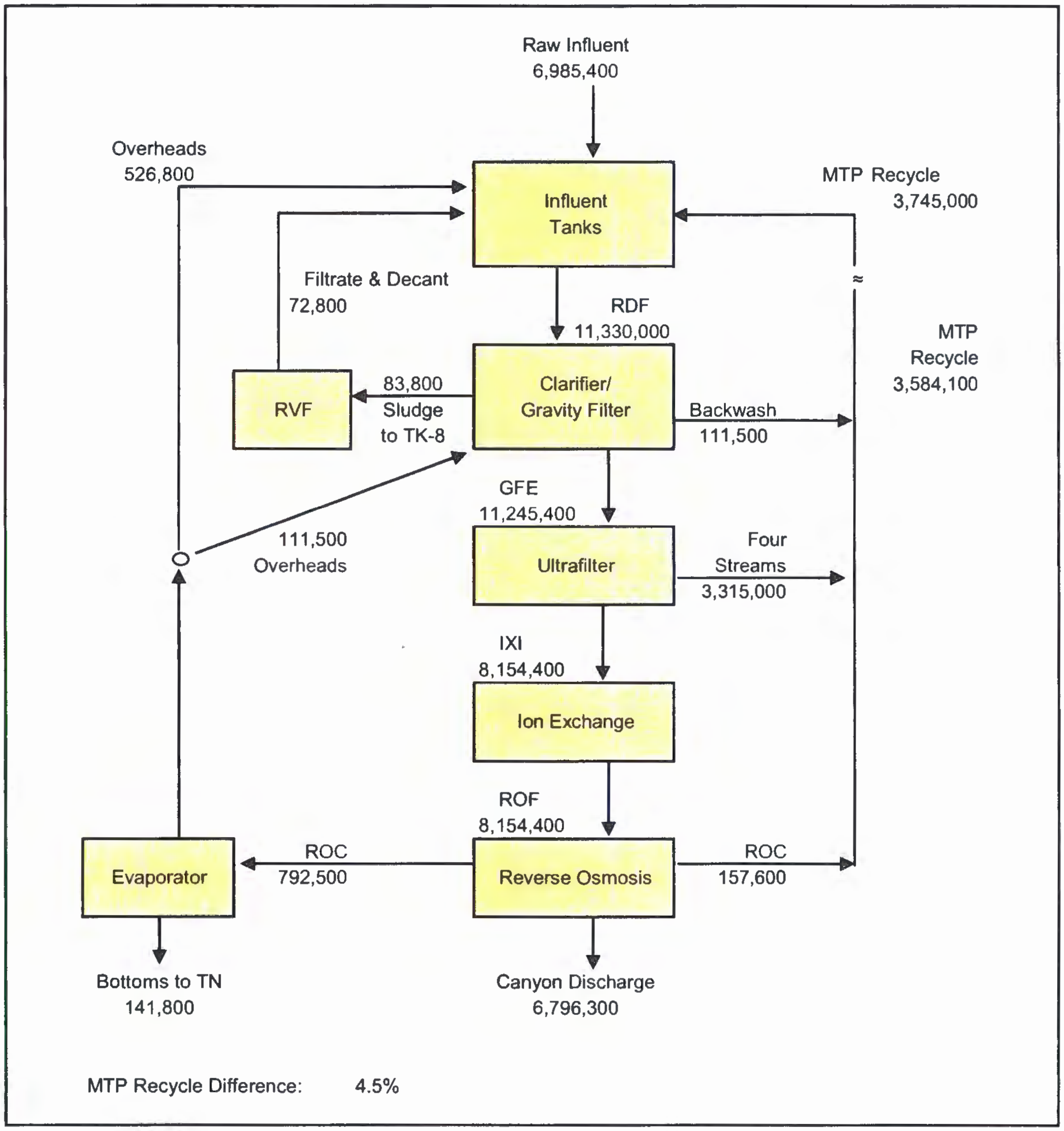
Table A-8 summarizes 2005 operating data for each of the unit operations, and a flow diagram for 2005 is shown in Figure A-7.

Table A-8
Unit Operations Data for 2005

Unit Operation	Operation (days)	Operation (hours)	Treated (liters)	Rate (gpm)	Waste (liters)	Waste (%)
Main:						
Influent Tanks	365	--	11,330,000	--	0	0%
Clarifier/ Gravity Filter	162	668	11,330,000	75	195,000	2%
Tubular Ultrafilter [A]	161	792	11,245,000	63	3,315,000	29%
Ion Exchange	159	740	8,154,000	49	0	0%
Reverse Osmosis	157	740	8,154,000	48	950,100	12%
Secondary:						
Rotary Vacuum Filter [B]	0	--	--	--	72,800	--
Evaporator	28	468	757,000	7.1	780,000	--

A: Treated is feed volume.
B: Waste volume represents TK-8 decant.

Figure A-7
TA-50 Low-Level RLW Water Balance For 2005



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Appendix B
TA-50 RLWTF Radioisotope Data for 2005

This appendix consists of twelve tables, one for each month of 2005. Each table displays influent and effluent concentrations for 38 radioisotopes, as analyzed in monthly composites. As you will note, most individual radioisotope analyses are below the method detection limit of the analytical procedure (i.e., cells marked with an asterisk).

The tables also include a row for "total alpha" This row sums the quantities of the nine alpha-emitting radioisotopes: Am-241, Np-237, Pu-238, Pu-239, Ra-226, Th-232, U-234, U-235, and U-238. Concentrations reported for total alpha are mathematically calculated by dividing total quantity by volume.

TA50 RADIOISOTOPES / Summary for JAN-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	18. E0	9.8 E-3	7.1 E0	3.6 E-6
As-74	*	*	*	*
BETA	20. E0	10.9 E-3	*	*
Be-7	*	*	*	*
Ce-141	24. E-3	13. E-6	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	*	*	*	*
Eu-152	*	*	*	*
H-3	*	*	3.8 E3	1.9 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	4.7 E0	2.6 E-3	*	*
Pu-239	13. E0	7.1 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	*	*
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	*	*	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	37.5 E0	20.4 E-3	9.8 E0	5. E-6
U-234	1.8 E0	977.3 E-6	2.7 E0	1.4 E-6
U-235	1.3 E-3	705.8 E-9	2.5 E-3	1.3 E-9
U-238	29. E-3	15.7 E-6	3.8 E-3	1.9 E-9
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 542,938 liters Final = 506,100 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for FEB-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	14. E0	4.6 E-3	12. E0	4.4 E-6
As-74	*	*	*	*
BETA	*	*	*	*
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	150. E-3	49.2 E-6	13. E0	4.7 E-6
Eu-152	*	*	*	*
H-3	*	*	2.2 E3	799.5 E-6
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	8.6 E0	2.8 E-3	830. E-3	301.6 E-9
Pu-239	9.2 E0	3. E-3	620. E-3	225.3 E-9
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	*	*
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	220. E-3	72.1 E-6	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	32.3 E0	10.6 E-3	19.9 E0	7.2 E-6
U-234	500. E-3	163.8 E-6	6.4 E0	2.3 E-6
U-235	850. E-6	278.5 E-9	5. E-3	1.8 E-9
U-238	26. E-3	8.5 E-6	92. E-3	33.4 E-9
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 327,674 liters Final = 363,400 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for MAR-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	8.1 E0	5.1 E-3	1.6 E0	1.1 E-6
As-74	*	*	16. E0	10.6 E-6
BETA	4.2 E0	2.6 E-3	31. E0	20.5 E-6
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	110. E-3	68.9 E-6	*	*
Eu-152	*	*	*	*
H-3	*		2. E3	1.3 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	4.6 E0	2.9 E-3	2.3 E0	1.5 E-6
Pu-239	4.9 E0	3.1 E-3	1.6 E0	1.1 E-6
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	6. E0	3.8 E-3	36. E0	23.8 E-6
Rb-84	6.8 E0	4.3 E-3	27. E0	17.8 E-6
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	2.1 E0	1.3 E-3	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	17.7 E0	11.1 E-3	5.5 E0	3.6 E-6
U-234	52. E-3	32.6 E-6	*	*
U-235	450. E-6	281.8 E-9	*	*
U-238	11. E-3	6.9 E-6	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 626,286 liters Final = 661,080 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for APR-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	23. E0	10.3 E-3	3.4 E0	1.5 E-6
As-74	*	*	23. E0	9.9 E-6
BETA	1.3 E0	579.8 E-6	140. E0	60.4 E-6
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	150. E-3	66.9 E-6	14. E0	6. E-6
Eu-152	*	*	*	*
H-3	*	*	3.1 E3	1.3 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	7.9 E0	3.5 E-3	*	*
Pu-239	6.1 E0	2.7 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	940. E-3	419.3 E-6	310. E0	133.7 E-6
Rb-84	700. E-3	312.2 E-6	220. E0	94.9 E-6
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	2.3 E-3	1. E-6	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	37.1 E0	16.5 E-3	3.4 E0	1.5 E-6
U-234	42. E-3	18.7 E-6	*	*
U-235	610. E-6	272.1 E-9	*	*
U-238	17. E-3	7.6 E-6	25. E-3	10.8 E-9
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 446,027 liters Final = 431,300 liters				
* Less than Detection Limit.				

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TA50 RADIOISOTOPES / Summary for MAY-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	14. E0	10.2 E-3	1.9 E0	1.4 E-6
As-74	*	*	34. E0	25. E-6
BETA	*	*	32. E0	23.5 E-6
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	140. E-3	102. E-6	*	*
Eu-152	*	*	*	*
H-3	*	*	1.9 E3	1.4 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	9. E0	6.6 E-3	1.2 E0	882.8 E-9
Pu-239	6.5 E0	4.7 E-3	1.3 E0	956.4 E-9
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	57. E-3	41.5 E-6	86. E0	63.3 E-6
Rb-84	*	*	45. E0	33.1 E-6
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	*	*	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	29.6 E0	21.6 E-3	4.4 E0	3.2 E-6
U-234	69. E-3	50.3 E-6	*	*
U-235	1.4 E-3	1. E-6	*	*
U-238	60. E-3	43.7 E-6	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 728,408 liters Final = 735,700 liters				
* Less than Detection Limit.				

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TA50 RADIOISOTOPES / Summary for JUN-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	30. E0	18.2 E-3	2.7 E0	1.7 E-6
As-74	*	*	*	*
BETA	*	*	*	*
Be-7	*	*	13. E0	8.1 E-6
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	*	*	*	*
Eu-152	*	*	*	*
H-3	*	*	5.2 E3	3.3 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	6.6 E0	4. E-3	*	*
Pu-239	15. E0	9.1 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	*	*
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	*	*	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	150. E-6	91.2 E-9	*	*
Total Alpha	51.9 E0	31.5 E-3	2.7 E0	1.7 E-6
U-234	260. E-3	158.1 E-6	*	*
U-235	960. E-6	583.7 E-9	*	*
U-238	30. E-3	18.2 E-6	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 607,995 liters Final = 626,900 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for JUL-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	30. E0	11.2 E-3	*	*
As-74	*	*	*	*
BETA	*	*	95. E0	35. E-6
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	*	*	*	*
Eu-152	*	*	*	*
H-3	*	*	7.2 E3	2.6 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	27. E0	10.1 E-3	*	*
Pu-239	28. E0	10.5 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	*	*
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	*	*	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	86. E0	32.2 E-3	*	*
U-234	1. E0	374.4 E-6	*	*
U-235	1.1 E-3	411.8 E-9	*	*
U-238	26. E-3	9.7 E-6	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 374,392 liters Final = 368,000 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for AUG-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	18. E0	11.7 E-3	9.8 E0	6.6 E-6
As-74	*	*	*	*
BETA	*	*	99. E0	66.3 E-6
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	130. E-3	84.3 E-6	*	*
Eu-152	*	*	*	*
H-3	*	*	4. E3	2.7 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	30. E0	19.5 E-3	*	*
Pu-239	15. E0	9.7 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	*	*
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	*	*	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	63.2 E0	41. E-3	9.8 E0	6.6 E-6
U-234	130. E-3	84.3 E-6	*	*
U-235	1.2 E-3	778.2 E-9	*	*
U-238	34. E-3	22. E-6	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 648,482 liters Final = 669,200 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for SEP-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	12. E0	9.4 E-3	8.3 E0	6.1 E-6
As-74	*	*	15. E0	11.1 E-6
BETA	*	*	86. E0	63.5 E-6
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	*	*	12. E0	8.9 E-6
Eu-152	*	*	*	*
H-3	*	*	2.5 E3	1.8 E-3
I-133	*	*	70. E0	51.6 E-6
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	20. E0	15.6 E-3	*	*
Pu-239	10. E0	7.8 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	*	*
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	*	*	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	440. E-6	343.4 E-9	*	*
Total Alpha	42.1 E0	32.9 E-3	8.3 E0	6.1 E-6
U-234	57. E-3	44.5 E-6	*	*
U-235	970. E-6	757.1 E-9	*	*
U-238	30. E-3	23.4 E-6	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 780,554 liters Final = 737,800 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for OCT-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	14. E0	9.6 E-3	3.6 E0	2.7 E-6
As-74	*	*	*	*
BETA	*	*	120. E0	88.9 E-6
Be-7	*	*	*	*
Ce-141	22. E-3	15.1 E-6	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	12. E-3	8.3 E-6	*	*
Cs-134	65. E-3	44.7 E-6	*	*
Cs-137	82. E-3	56.4 E-6	17. E0	12.6 E-6
Eu-152	*	*	*	*
H-3	*	*	1.7 E3	1.3 E-3
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	30. E0	20.6 E-3	*	*
Pu-239	11. E0	7.6 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	11. E0	8.1 E-6
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	25. E-3	17.2 E-6	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	55.1 E0	37.9 E-3	3.6 E0	2.7 E-6
U-234	76. E-3	52.3 E-6	*	*
U-235	1.2 E-3	825.9 E-9	*	*
U-238	39. E-3	26.8 E-6	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 688,267 liters Final = 740,800 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for NOV-2005				
	RAW nCi/L	RAW Total (Ci)	FINAL pCi/L	FINAL Total (Ci)
Am-241	8.3 E0	5. E-3	2.3 E0	1.2 E-6
As-74	*	*	*	*
BETA	*	*	92. E0	47.4 E-6
Be-7	*	*	*	*
Ce-141	*	*	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	125. E-3	74.9 E-6	13. E0	6.7 E-6
Eu-152	*	*	*	*
H-3	*	*	1.6 E3	824.2 E-6
I-133	*	*	*	*
Mn-52	*	*	*	*
Mn-54	*	*	*	*
Na-22	*	*	*	*
Np-237	*	*	*	*
Pu-238	33. E0	19.8 E-3	*	*
Pu-239	8.3 E0	5. E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	*	*	*	*
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	*	*	*	*
Sr-89	*	*	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	49.7 E0	29.7 E-3	2.3 E0	1.2 E-6
U-234	55. E-3	32.9 E-6	*	*
U-235	*	*	*	*
U-238	*	*	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 598,826 liters Final = 515,100 liters				
* Less than Detection Limit.				

TA50 RADIOISOTOPES / Summary for DEC-2005				
	RAW nCi/L	**RAW Total (Ci)**	**FINAL pCi/L**	**FINAL Total (Ci)**
Am-241	36. E0	20. E-3	*	*
As-74	*	*	18. E0	7.9 E-6
BETA	19. E0	10.5 E-3	42. E0	18.5 E-6
Be-7	720. E-3	399.4 E-6	*	*
Ce-141	100. E-3	55.5 E-6	*	*
Co-56	*	*	*	*
Co-57	*	*	*	*
Co-58	*	*	*	*
Co-60	*	*	*	*
Cs-134	*	*	*	*
Cs-137	*	*	*	*
Eu-152	*	*	*	*
H-3	*	*	4.9 E3	2.2 E-3
I-133	2.7 E0	1.5 E-3	*	*
Mn-52	240. E-3	133.1 E-6	*	*
Mn-54	*	*	*	*
Na-22	94. E-3	52.1 E-6	*	*
Np-237	*	*	*	*
Pu-238	16. E0	8.9 E-3	*	*
Pu-239	4.5 E0	2.5 E-3	*	*
Ra-226	*	*	*	*
Ra-228	*	*	*	*
Rb-83	17. E0	9.4 E-3	120. E0	52.9 E-6
Rb-84	*	*	*	*
Sc-46	*	*	*	*
Sc-48	*	*	*	*
Se-75	*	*	*	*
Sn-113	*	*	*	*
Sr-85	4. E0	2.2 E-3	*	*
Sr-89	1.7 E0	942.9 E-6	*	*
Sr-90	*	*	*	*
Th-232	*	*	*	*
Total Alpha	56.5 E0	31.3 E-3	*	*
U-234	*	*	*	*
U-235	*	*	*	*
U-238	*	*	*	*
V-48	*	*	*	*
Y-88	*	*	*	*
Zn-65	*	*	*	*
Volume of Flow: Influent = 554,655 liters Final = 440,900 liters				
* Less than Detection Limit.				

Appendix C
TA-50 RLWTF Non-Radiological Data for 2005

This appendix consists of twelve tables, one for each month of 2005. Each table displays influent and effluent concentrations, as analyzed in monthly composites, for 43 non-radiological water quality parameters. Non-radiological parameters are also termed "minerals". Only about half of these are regulated parameters.

The non-radiological analyses can be aggregated into five categories:

(f) eight traditional water quality measures – chemical oxygen demand, conductivity, hardness, pH, total dissolved solids, total suspended solids, and two measurements for alkalinity.
(g) a total of 25 cation (metals) measurements, including total cations.
(h) five anions: chloride, fluoride, cyanide, sulfate, and perchlorate
(i) four nitrogen measurements – nitrogen as nitrates, nitrogen as ammonia, nitrogen as nitrites, and total Kjedahl nitrogen
(j) total toxic organics

All RAW and FINAL concentrations in the tables in this appendix are in milligrams per liter (mg/L) except: Total Cations as meq/l; Toxic Organics as ug/L; Alkalinities and Hardness as mg $CaCO_3$/L; and Conductivity as µS/cm. Table cells marked with an asterisk (*) indicate analytical results below the method detection limit of the analytical procedure.

TA50 MINERALS / Summary for JAN-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	27. E0	14.7 E0	62. E0	31.4 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	130. E-3	71. E-3	10. E-3	5. E-3
AMMONIA-N	13. E0	7.1 E0	4.1 E0	2.1 E0
ARSENIC	*	*	*	*
BARIUM	26. E-3	14. E-3	*	*
BERYLLIUM	1.4 E-3	760.1 E-6	*	*
BORON	38. E-3	21. E-3	170. E-3	86. E-3
CADMIUM	1.3 E-3	705.8 E-6	*	*
CALCIUM	15. E0	8.1 E0	4. E0	2. E0
CHLORIDE	28. E0	15.2 E0	12. E0	6.1 E0
COBALT	2.9 E-3	2. E-3	*	*
COD	93. E0	50.5 E0	*	*
CONDUCTIVITY**	340. E0	--	288. E0	--
COPPER	194. E-3	105. E-3	4.5 E-3	2. E-3
CYANIDE	20. E-3	11. E-3	*	*
FLUORIDE	500. E-3	271. E-3	210. E-3	106. E-3
HARDNESS**	51.5 E0	27.9 E0	11.6 E0	5.8 E0
IRON	9.4 E0	5.1 E0	690. E-3	349. E-3
LEAD	85. E-3	46. E-3	*	*
MAGNESIUM	3.4 E0	1.8 E0	380. E-3	192. E-3
MERCURY	1.5 E-3	814.4 E-6	*	*
NICKEL	40. E-3	22. E-3	1.2 E-3	607.3 E-6
NITRATE-N	6.7 E0	3.6 E0	6.9 E0	3.5 E0
NITRITE-N	390. E-3	212. E-3	2. E0	1. E0
PERCHLORATE	176. E-3	96. E-3	*	*
PHOSPHORUS	2.8 E0	1.5 E0	*	*
POTASSIUM	10. E0	5.4 E0	5.2 E0	2.6 E0
SELENIUM	6. E-3	3. E-3	*	*
SILICON	27. E0	14.7 E0	22. E0	11.1 E0
SILVER	1.1 E-3	597.2 E-6	*	*
SODIUM	22. E0	11.9 E0	46. E0	23.3 E0
SULFATE	12. E0	6.5 E0	10. E0	5.1 E0
TDS	*	*	142. E0	71.9 E0
TKN	10.6 E0	5.8 E0	410. E-3	208. E-3
TOTAL CATIONS**	2.8 E0	--	2.4 E0	--
TOTAL CHROMIUM	32. E-3	17. E-3	10. E-3	5. E-3
TOXIC ORGANICS**	--	--	*	*
TSS	15. E0	8.1 E0	*	*
URANIUM	87. E-3	47. E-3	110. E-6	55.7 E-6
VANADIUM	*	*	70. E-3	35. E-3
ZINC	124. E-3	67. E-3	10. E-3	5. E-3
pH	6.2 E0	--	7.3 E0	--
Volume of Flow: Influent = 542,938 liters Final = 506,100 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for FEB-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	161. E0	52.8 E0	69. E0	25.1 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	1.1 E0	360. E-3	26. E-3	9. E-3
AMMONIA-N	7.2 E0	2.3 E0	5.6 E0	2. E0
ARSENIC	*	*	*	*
BARIUM	20. E-3	7. E-3	1. E-3	363.4 E-6
BERYLLIUM	1.5 E-3	491.5 E-6	*	*
BORON	220. E-3	72. E-3	126. E-3	46. E-3
CADMIUM	1.2 E-3	393.2 E-6	*	*
CALCIUM	16. E0	5.2 E0	4.3 E0	1.6 E0
CHLORIDE	23. E0	7.5 E0	10. E0	3.6 E0
COBALT	10. E-3	3. E-3	*	*
COD	141. E0	46.2 E0	9. E0	3.3 E0
CONDUCTIVITY**	585. E0	--	300. E0	--
COPPER	585. E-3	192. E-3	6. E-3	2. E-3
CYANIDE	20. E-3	7. E-3	*	*
FLUORIDE	410. E-3	134. E-3	150. E-3	55. E-3
HARDNESS**	53.1 E0	17.4 E0	*	*
IRON	7. E0	2.3 E0	824. E-3	299. E-3
LEAD	47. E-3	15. E-3	*	*
MAGNESIUM	3.2 E0	1. E0	*	*
MERCURY	1.5 E-3	491.5 E-6	*	*
NICKEL	1.5 E0	475. E-3	3.4 E-3	1. E-3
NITRATE-N	7.8 E0	2.6 E0	4.2 E0	1.5 E0
NITRITE-N	430. E-3	141. E-3	3.8 E0	1.4 E0
PERCHLORATE	150. E-3	49. E-3	*	*
PHOSPHORUS	5.9 E0	1.9 E0	60. E-3	22. E-3
POTASSIUM	6.3 E0	2.1 E0	1.7 E0	618. E-3
SELENIUM	1.4 E-3	458.7 E-6	2.2 E-3	799.5 E-6
SILICON	26. E0	8.5 E0	25. E0	9.1 E0
SILVER	1.5 E-3	491.5 E-6	*	*
SODIUM	92.5 E0	30.3 E0	47. E0	17.1 E0
SULFATE	35. E0	11.5 E0	13. E0	4.7 E0
TDS	288. E0	94.4 E0	*	*
TKN	10.4 E0	3.4 E0	1.3 E0	454. E-3
TOTAL CATIONS**	2.5 E0	--	2.3 E0	--
TOTAL CHROMIUM	37. E-3	12. E-3	13. E-3	5. E-3
TOXIC ORGANICS**	--	--	*	*
TSS	17. E0	5.6 E0	*	*
URANIUM	78. E-3	26. E-3	270. E-6	98.1 E-6
VANADIUM	*	*	*	*
ZINC	80. E-3	26. E-3	11. E-3	4. E-3
pH	8.1 E0	--	7.4 E0	--
Volume of Flow: Influent = 327,674 liters Final = 363,400 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for MAR-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	70. E0	43.8 E0	103. E0	68.1 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	600. E-3	376. E-3	23. E-3	15. E-3
AMMONIA-N	10.2 E0	6.4 E0	5.6 E0	3.7 E0
ARSENIC	*	*	*	*
BARIUM	30. E-3	19. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	59. E-3	37. E-3	130. E-3	86. E-3
CADMIUM	*	*	*	*
CALCIUM	19. E0	11.9 E0	6.3 E0	4.2 E0
CHLORIDE	25. E0	15.7 E0	11. E0	7.3 E0
COBALT	*	*	*	*
COD	171. E0	107.1 E0	21. E0	13.9 E0
CONDUCTIVITY**	337. E0	--	292. E0	--
COPPER	290. E-3	182. E-3	17. E-3	11. E-3
CYANIDE	20. E-3	13. E-3	*	*
FLUORIDE	530. E-3	332. E-3	190. E-3	126. E-3
HARDNESS**	61.4 E0	38.5 E0	*	*
IRON	500. E-3	313. E-3	*	*
LEAD	250. E-3	157. E-3	*	*
MAGNESIUM	3.4 E0	2.1 E0	*	*
MERCURY	200. E-6	125.3 E-6	*	*
NICKEL	160. E-3	100. E-3	20. E-3	13. E-3
NITRATE-N	3.1 E0	1.9 E0	400. E-3	264. E-3
NITRITE-N	140. E-3	88. E-3	1.5 E0	1. E0
PERCHLORATE	240. E-3	150. E-3	*	*
PHOSPHORUS	3. E0	1.8 E0	70. E-3	46. E-3
POTASSIUM	5. E0	3.1 E0	3.3 E0	2.2 E0
SELENIUM	*	*	1.2 E-3	793.3 E-6
SILICON	19. E0	11.9 E0	2.5 E0	1.7 E0
SILVER	10. E-3	6. E-3	*	*
SODIUM	24. E0	15. E0	52. E0	34.4 E0
SULFATE	15. E0	9.4 E0	9.2 E0	6.1 E0
TDS	166. E0	104. E0	118. E0	78. E0
TKN	12.5 E0	7.8 E0	2.1 E0	1.4 E0
TOTAL CATIONS**	2.6 E0	--	2.6 E0	--
TOTAL CHROMIUM	24. E-3	15. E-3	*	*
TOXIC ORGANICS**	--	--	*	*
TSS	8. E0	5. E0	*	*
URANIUM	33. E-3	21. E-3	*	*
VANADIUM	*	*	*	*
ZINC	110. E-3	69. E-3	2.4 E-3	2. E-3
pH	6.8 E0	--	7.5 E0	--
Volume of Flow: Influent = 626,286 liters Final = 661,080 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for APR-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	64. E0	28.5 E0	127. E0	54.8 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	510. E-3	227. E-3	24. E-3	10. E-3
AMMONIA-N	13.1 E0	5.8 E0	*	*
ARSENIC	*	*	*	*
BARIUM	79. E-3	35. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	110. E-3	49. E-3	84. E-3	36. E-3
CADMIUM	*	*	*	*
CALCIUM	19.3 E0	8.6 E0	7.9 E0	3.4 E0
CHLORIDE	22. E0	9.8 E0	18. E0	7.8 E0
COBALT	*	*	*	*
COD	131. E0	58.4 E0	17. E0	7.3 E0
CONDUCTIVITY**	335. E0	--	380. E0	--
COPPER	230. E-3	103. E-3	14. E-3	6. E-3
CYANIDE	20. E-3	9. E-3	*	*
FLUORIDE	450. E-3	201. E-3	230. E-3	99. E-3
HARDNESS**	59.3 E0	26.4 E0	*	*
IRON	*	*	*	*
LEAD	100. E-3	45. E-3	1.1 E-3	474.4 E-6
MAGNESIUM	2.7 E0	1.2 E0	*	*
MERCURY	1.6 E-3	713.6 E-6	*	*
NICKEL	190. E-3	85. E-3	12. E-3	5. E-3
NITRATE-N	7.3 E0	3.3 E0	930. E-3	401. E-3
NITRITE-N	300. E-3	134. E-3	3.1 E0	1.3 E0
PERCHLORATE	110. E-3	49. E-3	*	*
PHOSPHORUS	3. E0	1.3 E0	84. E-3	36. E-3
POTASSIUM	12. E0	5.4 E0	3.9 E0	1.7 E0
SELENIUM	*	*	1.5 E-3	647. E-6
SILICON	33. E0	14.7 E0	3.8 E0	1.6 E0
SILVER	*	*	*	*
SODIUM	23.4 E0	10.4 E0	78.4 E0	33.8 E0
SULFATE	9. E0	4. E0	6.2 E0	2.7 E0
TDS	222. E0	99. E0	184. E0	79.4 E0
TKN	13.1 E0	5.8 E0	2.6 E0	1.1 E0
TOTAL CATIONS**	2.7 E0	--	3.3 E0	--
TOTAL CHROMIUM	26. E-3	12. E-3	*	*
TOXIC ORGANICS**	--	--	*	*
TSS	*	*	*	*
URANIUM	67. E-3	30. E-3	74. E-6	31.9 E-6
VANADIUM	*	*	*	*
ZINC	82. E-3	37. E-3	*	*
pH	6.7 E0	--	7.5 E0	--
Volume of Flow: Influent = 446,027 liters Final = 431,300 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for MAY-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	50. E0	36.4 E0	120. E0	88.3 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	580. E-3	422. E-3	24. E-3	18. E-3
AMMONIA-N	8.4 E0	6.1 E0	4.3 E0	3.1 E0
ARSENIC	*	*	*	*
BARIUM	21. E-3	15. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	170. E-3	124. E-3	93. E-3	68. E-3
CADMIUM	*	*	*	*
CALCIUM	*	*	6.9 E0	5.1 E0
CHLORIDE	20. E0	14.6 E0	13. E0	9.6 E0
COBALT	*	*	*	*
COD	124. E0	90.3 E0	12. E0	8.8 E0
CONDUCTIVITY**	297. E0	--	287. E0	--
COPPER	440. E-3	320. E-3	10. E-3	7. E-3
CYANIDE	20. E-3	15. E-3	*	*
FLUORIDE	800. E-3	583. E-3	220. E-3	162. E-3
HARDNESS**	*	*	*	*
IRON	*	*	*	*
LEAD	85. E-3	62. E-3	1. E-3	735.7 E-6
MAGNESIUM	3.3 E0	2.4 E0	*	*
MERCURY	1. E-3	728.4 E-6	*	*
NICKEL	320. E-3	233. E-3	10. E-3	7. E-3
NITRATE-N	6. E0	4.4 E0	750. E-3	552. E-3
NITRITE-N	340. E-3	248. E-3	1.5 E0	1.1 E0
PERCHLORATE	180. E-3	131. E-3	*	*
PHOSPHORUS	2.9 E0	2.1 E0	100. E-3	74. E-3
POTASSIUM	5.3 E0	3.9 E0	2.5 E0	1.8 E0
SELENIUM	6. E-3	4. E-3	1.5 E-3	1. E-3
SILICON	32. E0	23.3 E0	3.9 E0	2.9 E0
SILVER	*	*	*	*
SODIUM	34. E0	24.8 E0	58. E0	42.7 E0
SULFATE	14. E0	10.2 E0	7. E0	5.2 E0
TDS	206. E0	150.1 E0	129. E0	94.9 E0
TKN	13.6 E0	9.9 E0	3.1 E0	2.3 E0
TOTAL CATIONS**	2.3 E0	--	2.9 E0	--
TOTAL CHROMIUM	590. E-3	430. E-3	1.5 E-3	1. E-3
TOXIC ORGANICS**	--	--	*	*
TSS	18. E0	13.1 E0	*	*
URANIUM	180. E-3	131. E-3	*	*
VANADIUM	*	*	*	*
ZINC	1.8 E0	1.3 E0	2.3 E-3	2. E-3
pH	6.2 E0	--	7.1 E0	--
Volume of Flow: Influent = 728,408 liters Final = 735,700 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for JUN-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	36. E0	21.9 E0	107. E0	67.1 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	430. E-3	261. E-3	29. E-3	18. E-3
AMMONIA-N	6.5 E0	4. E0	8.1 E0	5.1 E0
ARSENIC	*	*	*	*
BARIUM	31. E-3	19. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	51. E-3	31. E-3	64. E-3	40. E-3
CADMIUM	*	*	*	*
CALCIUM	16. E0	9.7 E0	8. E0	5. E0
CHLORIDE	27. E0	16.4 E0	6.5 E0	4.1 E0
COBALT	26. E-3	16. E-3	*	*
COD	114. E0	69.3 E0	9. E0	5.6 E0
CONDUCTIVITY**	335. E0	--	291. E0	--
COPPER	500. E-3	304. E-3	11. E-3	7. E-3
CYANIDE	20. E-3	12. E-3	*	*
FLUORIDE	390. E-3	237. E-3	200. E-3	125. E-3
HARDNESS**	50.7 E0	30.8 E0	*	*
IRON	*	*	*	*
LEAD	78. E-3	47. E-3	*	*
MAGNESIUM	2.6 E0	1.6 E0	*	*
MERCURY	400. E-6	243.2 E-6	*	*
NICKEL	120. E-3	73. E-3	9.2 E-3	6. E-3
NITRATE-N	11. E0	6.7 E0	1.1 E0	690. E-3
NITRITE-N	230. E-3	140. E-3	950. E-3	596. E-3
PERCHLORATE	360. E-3	219. E-3	*	*
PHOSPHORUS	2.5 E0	1.5 E0	32. E-3	20. E-3
POTASSIUM	4.2 E0	2.6 E0	1.9 E0	1.2 E0
SELENIUM	5.7 E-6	3.5 E-6	1.3 E-6	815. E-9
SILICON	28. E0	17. E0	3. E0	1.9 E0
SILVER	*	*	*	*
SODIUM	29. E0	17.6 E0	55. E0	34.5 E0
SULFATE	11. E0	6.7 E0	7.3 E0	4.6 E0
TDS	214. E0	130.1 E0	*	*
TKN	9.6 E0	5.8 E0	10. E0	6.3 E0
TOTAL CATIONS**	2.5 E0	--	*	--
TOTAL CHROMIUM	39. E-3	24. E-3	5.3 E-3	3. E-3
TOXIC ORGANICS**	--	--	*	*
TSS	24. E0	14.6 E0	*	*
URANIUM	90. E-3	55. E-3	*	*
VANADIUM	*	*	*	*
ZINC	120. E-3	73. E-3	*	*
pH	6.5 E0	--	7.4 E0	--
Volume of Flow: Influent = 607,995 liters Final = 626,900 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for JUL-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	74. E0	27.7 E0	139. E0	51.2 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	890. E-3	333. E-3	25. E-3	9. E-3
AMMONIA-N	8.1 E0	3. E0	4.7 E0	1.7 E0
ARSENIC	*	*	*	*
BARIUM	24. E-3	9. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	45. E-3	17. E-3	53. E-3	20. E-3
CADMIUM	*	*	*	*
CALCIUM	8. E0	3. E0	8.7 E0	3.2 E0
CHLORIDE	28. E0	10.5 E0	10.5 E0	3.9 E0
COBALT	*	*	1.7 E-3	625.6 E-6
COD	103. E0	38.6 E0	15. E0	5.5 E0
CONDUCTIVITY**	363. E0	--	391. E0	--
COPPER	480. E-3	180. E-3	21. E-3	8. E-3
CYANIDE	*	*	*	*
FLUORIDE	410. E-3	154. E-3	300. E-3	110. E-3
HARDNESS**	28.2 E0	10.6 E0	22. E0	8.1 E0
IRON	*	*	*	*
LEAD	110. E-3	41. E-3	1.8 E-3	662.4 E-6
MAGNESIUM	2. E0	749. E-3	70. E-3	26. E-3
MERCURY	1. E-3	374.4 E-6	*	*
NICKEL	43. E-3	16. E-3	12. E-3	4. E-3
NITRATE-N	5.6 E0	2.1 E0	1.7 E0	626. E-3
NITRITE-N	720. E-3	270. E-3	1.4 E0	512. E-3
PERCHLORATE	250. E-3	94. E-3	*	*
PHOSPHORUS	2.5 E0	936. E-3	90. E-3	33. E-3
POTASSIUM	310. E-3	116. E-3	150. E-3	55. E-3
SELENIUM	*	*	1.5 E-3	552. E-6
SILICON	32. E0	12. E0	4.1 E0	1.5 E0
SILVER	*	*	*	*
SODIUM	34. E0	12.7 E0	60. E0	22.1 E0
SULFATE	9.5 E0	3.6 E0	17. E0	6.3 E0
TDS	195. E0	73. E0	147. E0	54.1 E0
TKN	10.3 E0	3.9 E0	4.4 E0	1.6 E0
TOTAL CATIONS**	2.9 E0	--	3.6 E0	--
TOTAL CHROMIUM	31. E-3	12. E-3	2.6 E-3	956.8 E-6
TOXIC ORGANICS**	--	--	*	*
TSS	31. E0	11.6 E0	*	*
URANIUM	77. E-3	29. E-3	*	*
VANADIUM	*	*	*	*
ZINC	50. E-3	19. E-3	*	*
pH	6.7 E0	--	7.6 E0	--
Volume of Flow: Influent = 374,392 liters Final = 368,000 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for AUG-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	32. E0	20.8 E0	163. E0	109.1 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	1.2 E0	778. E-3	57. E-3	38. E-3
AMMONIA-N	6.4 E0	4.2 E0	4.8 E0	3.2 E0
ARSENIC	*	*	*	*
BARIUM	69. E-3	45. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	77. E-3	50. E-3	61. E-3	41. E-3
CADMIUM	*	*	*	*
CALCIUM	7.7 E0	5. E0	530. E-3	355. E-3
CHLORIDE	28. E0	18.2 E0	13. E0	8.7 E0
COBALT	55. E-3	36. E-3	1.8 E-3	1. E-3
COD	123. E0	79.8 E0	21. E0	14.1 E0
CONDUCTIVITY**	322. E0	--	447. E0	--
COPPER	770. E-3	499. E-3	21. E-3	14. E-3
CYANIDE	*	*	*	*
FLUORIDE	620. E-3	402. E-3	250. E-3	167. E-3
HARDNESS**	27.1 E0	17.6 E0	1.5 E0	996. E-3
IRON	*	*	*	*
LEAD	100. E-3	65. E-3	1.5 E-3	1. E-3
MAGNESIUM	1.9 E0	1.2 E0	40. E-3	27. E-3
MERCURY	200. E-6	129.7 E-6	*	*
NICKEL	1.5 E0	973. E-3	17. E-3	11. E-3
NITRATE-N	8.2 E0	5.3 E0	1.2 E0	803. E-3
NITRITE-N	530. E-3	344. E-3	820. E-3	549. E-3
PERCHLORATE	450. E-3	292. E-3	*	*
PHOSPHORUS	2.5 E0	1.6 E0	123. E-3	82. E-3
POTASSIUM	560. E-3	363. E-3	150. E-3	100. E-3
SELENIUM	*	*	1.3 E-6	870. E-9
SILICON	41. E0	26.6 E0	4.8 E0	3.2 E0
SILVER	*	*	*	*
SODIUM	33. E0	21.4 E0	100. E0	66.9 E0
SULFATE	15. E0	9.7 E0	19. E0	12.7 E0
TDS	216. E0	140.1 E0	224. E0	149.9 E0
TKN	10. E0	6.5 E0	9.7 E0	6.5 E0
TOTAL CATIONS**	2.3 E0	--	4.8 E0	--
TOTAL CHROMIUM	49. E-3	32. E-3	4.1 E-3	3. E-3
TOXIC ORGANICS**	--	--	*	*
TSS	44. E0	28.5 E0	*	*
URANIUM	100. E-3	65. E-3	*	*
VANADIUM	10. E-3	6. E-3	*	*
ZINC	100. E-3	65. E-3	5.3 E-3	4. E-3
pH	6. E0	--	7.5 E0	--
Volume of Flow: Influent = 648,482 liters Final = 669,200 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for SEP-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	50. E0	39. E0	212. E0	156.4 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	33. E-3	26. E-3	33. E-3	24. E-3
AMMONIA-N	7.9 E0	6.2 E0	6.2 E0	4.6 E0
ARSENIC	*	*	*	*
BARIUM	35. E-3	27. E-3	*	*
BERYLLIUM	2. E-3	2. E-3	*	*
BORON	50. E-3	39. E-3	130. E-3	96. E-3
CADMIUM	3. E-3	2. E-3	*	*
CALCIUM	7. E0	5.5 E0	800. E-3	590. E-3
CHLORIDE	19. E0	14.8 E0	13. E0	9.6 E0
COBALT	6. E-3	5. E-3	3. E-3	2. E-3
COD	157. E0	122.5 E0	24. E0	17.7 E0
CONDUCTIVITY**	300. E0	--	539. E0	--
COPPER	550. E-3	429. E-3	20. E-3	15. E-3
CYANIDE	*	*	*	*
FLUORIDE	430. E-3	336. E-3	340. E-3	251. E-3
HARDNESS**	24.9 E0	19.4 E0	*	*
IRON	1.4 E0	1.1 E0	14. E-3	10. E-3
LEAD	101. E-3	79. E-3	*	*
MAGNESIUM	1.8 E0	1.4 E0	*	*
MERCURY	600. E-6	468.3 E-6	*	*
NICKEL	80. E-3	62. E-3	37. E-3	27. E-3
NITRATE-N	5.3 E0	4.1 E0	1. E0	753. E-3
NITRITE-N	270. E-3	211. E-3	1.2 E0	871. E-3
PERCHLORATE	730. E-3	570. E-3	*	*
PHOSPHORUS	2.5 E0	1.9 E0	200. E-3	148. E-3
POTASSIUM	500. E-3	390. E-3	8.3 E0	6.1 E0
SELENIUM	10. E-3	8. E-3	2.5 E-3	2. E-3
SILICON	28. E0	21.9 E0	4. E0	3. E0
SILVER	3.. E-3	2. E-3	300. E-6	221.3 E-6
SODIUM	30. E0	23.4 E0	110. E0	81.2 E0
SULFATE	25. E0	19.5 E0	22. E0	16.2 E0
TDS	222. E0	173.3 E0	267. E0	197. E0
TKN	11.3 E0	8.8 E0	4.7 E0	3.5 E0
TOTAL CATIONS**	2.5 E0	--	5.2 E0	--
TOTAL CHROMIUM	40. E-3	31. E-3	*	*
TOXIC ORGANICS**	--	--	*	*
TSS	32. E0	25. E0	*	*
URANIUM	90. E-3	70. E-3	*	*
VANADIUM	21. E-3	16. E-3	10. E-3	7. E-3
ZINC	100. E-3	78. E-3	*	*
pH	6.2 E0	--	7.6 E0	--
Volume of Flow: Influent = 780,554 liters Final = 737800 liters				
* Less than Detection Limit				

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TA50 MINERALS / Summary for OCT-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	56. E0	38.5 E0	360. E0	266.7 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	860. E-3	592. E-3	10. E-3	7. E-3
AMMONIA-N	6.3 E0	4.3 E0	5.7 E0	4.2 E0
ARSENIC	*	*	*	*
BARIUM	35. E-3	24. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	60. E-3	41. E-3	180. E-3	133. E-3
CADMIUM	*	*	*	*
CALCIUM	11.8 E0	8.1 E0	5.8 E0	4.3 E0
CHLORIDE	18.4 E0	12.7 E0	18. E0	13.3 E0
COBALT	10. E-3	7. E-3	*	*
COD	97. E0	66.8 E0	14. E0	10.4 E0
CONDUCTIVITY**	383. E0	--	815. E0	--
COPPER	410. E-3	282. E-3	30. E-3	22. E-3
CYANIDE	*	*	*	*
FLUORIDE	360. E-3	248. E-3	390. E-3	289. E-3
HARDNESS**	85.8 E0	59. E0	63.1 E0	46.7 E0
IRON	1.3 E0	895. E-3	10. E-3	7. E-3
LEAD	115. E-3	79. E-3	*	*
MAGNESIUM	13.7 E0	9.4 E0	11.8 E0	8.7 E0
MERCURY	2. E-3	1. E-3	*	*
NICKEL	240. E-3	165. E-3	32. E-3	24. E-3
NITRATE-N	7.8 E0	5.3 E0	1. E0	748. E-3
NITRITE-N	150. E-3	103. E-3	1.9 E0	1.4 E0
PERCHLORATE	96. E-3	66. E-3	*	*
PHOSPHORUS	2.5 E0	1.7 E0	280. E-3	207. E-3
POTASSIUM	390. E-3	268. E-3	660. E-3	489. E-3
SELENIUM	*	*	2.3 E-3	2. E-3
SILICON	25. E0	17.2 E0	4.6 E0	3.4 E0
SILVER	4. E-3	3. E-3	*	*
SODIUM	50. E0	34.4 E0	188. E0	139.3 E0
SULFATE	46. E0	31.7 E0	26. E0	19.3 E0
TDS	203. E0	139.7 E0	375. E0	277.8 E0
TKN	2.1 E0	1.5 E0	6.8 E0	5. E0
TOTAL CATIONS**	3.1 E0	--	8.3 E0	
TOTAL CHROMIUM	82. E-3	56. E-3	*	*
TOXIC ORGANICS**	*	*	*	*
TSS	27. E0	18.6 E0	*	*
URANIUM	120. E-3	83. E-3	*	*
VANADIUM	20. E-3	14. E-3	10. E-3	7. E-3
ZINC	90. E-3	62. E-3	*	*
pH	6.4 E0	--	8.3 E0	--
Volume of Flow: Influent = 688,267 liters Final = 740,800 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for NOV-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	45. E0	26.9 E0	291. E0	149.9 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	202. E-3	121. E-3	13. E-3	7. E-3
AMMONIA-N	6.4 E0	3.9 E0	390. E-3	201. E-3
ARSENIC	10. E-3	6. E-3	*	*
BARIUM	23. E-3	14. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	85. E-3	51. E-3	110. E-3	57. E-3
CADMIUM	*	*	*	*
CALCIUM	6. E0	3.6 E0	370. E-3	191. E-3
CHLORIDE	18.8 E0	11.3 E0	15. E0	7.7 E0
COBALT	210. E-3	126. E-3	*	*
COD	116. E0	69.5 E0	13. E0	6.7 E0
CONDUCTIVITY**	273. E0	--	665. E0	--
COPPER	480. E-3	287. E-3	20. E-3	10. E-3
CYANIDE	*	*	*	*
FLUORIDE	360. E-3	216. E-3	340. E-3	175. E-3
HARDNESS**	21.6 E0	12.9 E0	1.2 E0	603. E-3
IRON	950. E-3	569. E-3	*	*
LEAD	85. E-3	51. E-3	*	*
MAGNESIUM	1.6 E0	958. E-3	60. E-3	31. E-3
MERCURY	1.3 E-3	778.5 E-6	*	*
NICKEL	400. E-3	240. E-3	23. E-3	12. E-3
NITRATE-N	4.3 E0	2.6 E0	1.2 E0	623. E-3
NITRITE-N	890. E-3	533. E-3	6.8 E0	3.5 E0
PERCHLORATE	96. E-3	57. E-3	*	*
PHOSPHORUS	3.8 E0	2.3 E0	200. E-3	103. E-3
POTASSIUM	270. E-3	162. E-3	500. E-3	258. E-3
SELENIUM	*	*	*	*
SILICON	23.6 E0	14.1 E0	3.9 E0	2. E0
SILVER	3. E-3	2. E-3	*	*
SODIUM	28.5 E0	17.1 E0	155. E0	79.8 E0
SULFATE	21. E0	12.6 E0	21. E0	10.8 E0
TDS	157. E0	94. E0	334. E0	172. E0
TKN	12.1 E0	7.2 E0	4.3 E0	2.2 E0
TOTAL CATIONS**	2. E0	--	6.7 E0	
TOTAL CHROMIUM	50. E-3	30. E-3	*	*
TOXIC ORGANICS**	--	--	*	*
TSS	10. E0	6. E0	*	*
URANIUM	71. E-3	43. E-3	*	*
VANADIUM	11. E-3	7. E-3	*	*
ZINC	70. E-3	42. E-3	*	*
pH	6.2 E0	--	7.5 E0	--
Volume of Flow: Influent = 598,826 liters Final = 515,100 liters				
* Less than Detection Limit				

TA50 MINERALS / Summary for DEC-2005				
	RAW Concentration	Total (Kg)	FINAL Concentration	Total (Kg)
ALKALINITY-MO**	50. E0	27.7 E0	112. E0	49.4 E0
ALKALINITY-P**	*	*	*	*
ALUMINUM	220. E-3	122. E-3	30. E-3	13. E-3
AMMONIA-N	*	*	*	*
ARSENIC	*	*	*	*
BARIUM	28. E-3	16. E-3	*	*
BERYLLIUM	*	*	*	*
BORON	92. E-3	51. E-3	240. E-3	106. E-3
CADMIUM	5. E-3	3. E-3	*	*
CALCIUM	7.3 E0	4. E0	290. E-3	128. E-3
CHLORIDE	24. E0	13.3 E0	5.8 E0	2.6 E0
COBALT	32. E-3	18. E-3	*	*
COD	128. E0	71. E0	15. E0	6.6 E0
CONDUCTIVITY**	322. E0	--	286. E0	--
COPPER	370. E-3	205. E-3	20. E-3	9. E-3
CYANIDE	*	*	*	*
FLUORIDE	350. E-3	194. E-3	10. E-3	4. E-3
HARDNESS**	25.9 E0	14.4 E0	930. E-3	410. E-3
IRON	1.1 E0	610. E-3	10. E-3	4. E-3
LEAD	120. E-3	67. E-3	*	*
MAGNESIUM	1.9 E0	1. E0	50. E-3	22. E-3
MERCURY	400. E-6	221.9 E-6	20. E-6	8.8 E-6
NICKEL	190. E-3	105. E-3	5. E-3	2. E-3
NITRATE-N	5.6 E0	3.1 E0	1. E0	445. E-3
NITRITE-N	290. E-3	161. E-3	2.2 E0	957. E-3
PERCHLORATE	73. E-3	40. E-3	*	*
PHOSPHORUS	2.3 E0	1.3 E0	94. E-3	41. E-3
POTASSIUM	360. E-3	200. E-3	130. E-3	57. E-3
SELENIUM	*	*	*	*
SILICON	24.5 E0	13.6 E0	25. E0	11. E0
SILVER	3. E-3	2. E-3	3. E-3	1. E-3
SODIUM	41. E0	22.7 E0	57. E0	25.1 E0
SULFATE	28.5 E0	15.8 E0	5.4 E0	2.4 E0
TDS	214. E0	118.7 E0	135. E0	59.5 E0
TKN	2.7 E0	1.5 E0	2. E0	882. E-3
TOTAL CATIONS**	2.4 E0	--	2.7 E0	--
TOTAL CHROMIUM	54. E-3	30. E-3	*	*
TOXIC ORGANICS**	--	--	*	*
TSS	19. E0	10.5 E0	*	*
URANIUM	110. E-3	61. E-3	*	*
VANADIUM	27. E-3	15. E-3	*	*
ZINC	114. E-3	63. E-3	110. E-3	48. E-3
pH	6.2 E0	--	7.7 E0	--
Volume of Flow: Influent = 554,655 liters Final = 440,900 liters				
* Less than Detection Limit				

Appendix D
TA-50 RLWTF VOC and SVOC Data for 2005

TA-50 RLWTF influent wastewaters, treated effluent waters, sludge are analyzed for volatile organic chemicals (VOC) and semi-volatile organic chemicals (SVOC). Specifically, a grab sample of influent is taken on a weekly basis; a grab sample of effluent is taken monthly; and individual batches of sludge are sampled and analyzed for VOC and SVOC. These analyses are performed according to EPA approved methods 624 for VOC, and 625A and 625B for SVOC by an external EPA certified laboratory.

Chapter 4 presented a summary of VOC and SVOC analytical results for 2005. This appendix provides details of sampling results, in four different tables:

Table D-1
VOC RESULTS BY SPECIES FOR TA50 PLANT FEED

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY				
JAN-2005 through DEC-2005				
Sample Date	Sample Number	Species	Concentration (mg/L)	Uncertainty (mg/L)
30-Aug-05	P0805.30	1,1,1-TRICHLOROETHANE	190. E-6	19. E-6
26-Sep-05	P0905.26	1,1,2-TRICHLOROETHANE	710. E-6	71. E-6
31-May-05	P0505.31	1,1-DICHLOROPROPENE	6.8 E-3	680. E-6
6-Jul-05	P0705.06	1,2,4-TRIMETHYLBENZENE	160. E-6	16. E-6
18-Jul-05	P0705.18	1,2,4-TRIMETHYLBENZENE	790. E-6	79. E-6
24-Jan-05	P0105.24	1,2-DICHLOROBENZENE	530. E-6	53. E-6
11-Apr-05	P0405.11	1,2-DICHLOROBENZENE	580. E-6	58. E-6
25-Apr-05	P0405.25	1,2-DICHLOROBENZENE	630. E-6	63. E-6
18-Jul-05	P0705.18	1,2-DICHLOROBENZENE	960. E-6	96. E-6
18-Jul-05	P0705.18	1,3,5-TRIMETHYLBENZENE	650. E-6	65. E-6
11-Apr-05	P0405.11	1,3-DICHLOROBENZENE	700. E-6	70. E-6
18-Jul-05	P0705.18	1,3-DICHLOROBENZENE	920. E-6	92. E-6
24-Jan-05	P0105.24	1,4-DICHLOROBENZENE	850. E-6	85. E-6
11-Apr-05	P0405.11	1,4-DICHLOROBENZENE	680. E-6	68. E-6
25-Apr-05	P0405.25	1,4-DICHLOROBENZENE	1.1 E-3	110. E-6
2-May-05	P0505.02	1,4-DICHLOROBENZENE	570. E-6	57. E-6
26-Sep-05	P0905.26	2,2-DICHLOROPROPANE	6.6 E-3	660. E-6
7-Mar-05	P0305.07	2-BUTANONE	6. E-3	600. E-6
12-May-05	P0505.12	2-BUTANONE	6. E-3	600. E-6
13-Sep-05	P0905.13	2-BUTANONE	19. E-3	1.9 E-3
26-Sep-05	P0905.26	2-BUTANONE	6.1 E-3	610. E-6
26-Sep-05	P0905.26	2-HEXANONE	8.9 E-3	890. E-6
24-Jan-05	P0105.24	4-ISOPROPYLTOLUENE	880. E-6	88. E-6
7-Feb-05	P0205.07	4-ISOPROPYLTOLUENE	420. E-6	42. E-6
18-Jul-05	P0705.18	4-ISOPROPYLTOLUENE	980. E-6	98. E-6
10-Jan-05	P0105.10	4-METHYL-2-PENTANONE	6.2 E-3	620. E-6
7-Mar-05	P0305.07	4-METHYL-2-PENTANONE	14. E-3	1.4 E-3
16-Mar-05	P0305.16	4-METHYL-2-PENTANONE	9.5 E-3	950. E-6
11-Apr-05	P0405.11	4-METHYL-2-PENTANONE	28. E-3	2.8 E-3
20-Apr-05	P0405.20	4-METHYL-2-PENTANONE	6.7 E-3	670. E-6
25-Apr-05	P0405.25	4-METHYL-2-PENTANONE	5.1 E-3	510. E-6
2-May-05	P0505.02	4-METHYL-2-PENTANONE	22. E-3	2.2 E-3
12-May-05	P0505.12	4-METHYL-2-PENTANONE	34. E-3	3.4 E-3
16-May-05	P0505.16	4-METHYL-2-PENTANONE	15. E-3	1.5 E-3
23-May-05	P0505.23	4-METHYL-2-PENTANONE	15. E-3	1.5 E-3
31-May-05	P0505.31	4-METHYL-2-PENTANONE	26. E-3	2.6 E-3
21-Jun-05	P0605.21	4-METHYL-2-PENTANONE	26. E-3	2.6 E-3
6-Jul-05	P0705.06	4-METHYL-2-PENTANONE	66. E-3	6.6 E-3
23-Aug-05	P0805.23	4-METHYL-2-PENTANONE	18. E-3	1.8 E-3

VOC Results by Species for TA50 Plant Feed				Page 2 of 4
Sample Date	**Sample Number**	**Species**	**Concentration (mg/L)**	**Uncertainty (mg/L)**
30-Aug-05	P0805.30	4-METHYL-2-PENTANONE	14. E-3	1.4 E-3
26-Sep-05	P0905.26	4-METHYL-2-PENTANONE	180. E-3	18. E-3
3-Oct-05	P1005.03	4-METHYL-2-PENTANONE	160. E-3	16. E-3
17-Oct-05	P1005.17	4-METHYL-2-PENTANONE	81. E-3	8.1 E-3
24-Oct-05	P1005.24	4-METHYL-2-PENTANONE	54. E-3	5.4 E-3
31-Oct-05	P1005.31	4-METHYL-2-PENTANONE	46. E-3	4.6 E-3
14-Nov-05	P1105.14	4-METHYL-2-PENTANONE	64. E-3	6.4 E-3
21-Nov-05	P1105.21	4-METHYL-2-PENTANONE	25. E-3	2.5 E-3
19-Dec-05	P1205.19	4-METHYL-2-PENTANONE	53. E-3	5.3 E-3
3-Jan-05	P0105.03	ACETONE	270. E-3	27. E-3
10-Jan-05	P0105.10	ACETONE	150. E-3	15. E-3
18-Jan-05	P0105.18	ACETONE	270. E-3	27. E-3
24-Jan-05	P0105.24	ACETONE	220. E-3	22. E-3
3-Feb-05	P0205.03	ACETONE	270. E-3	27. E-3
7-Feb-05	P0205.07	ACETONE	490. E-3	49. E-3
14-Feb-05	P0205.14	ACETONE	310. E-3	31. E-3
28-Feb-05	P0205.28	ACETONE	280. E-3	28. E-3
7-Mar-05	P0305.07	ACETONE	600. E-3	60. E-3
16-Mar-05	P0305.16	ACETONE	30. E-3	3. E-3
6-Apr-05	P0405.06	ACETONE	550. E-3	55. E-3
11-Apr-05	P0405.11	ACETONE	740. E-3	74. E-3
20-Apr-05	P0405.20	ACETONE	760. E-3	76. E-3
25-Apr-05	P0405.25	ACETONE	560. E-3	56. E-3
2-May-05	P0505.02	ACETONE	730. E-3	73. E-3
12-May-05	P0505.12	ACETONE	580. E-3	58. E-3
16-May-05	P0505.16	ACETONE	340. E-3	34. E-3
23-May-05	P0505.23	ACETONE	140. E-3	14. E-3
7-Jun-05	P0605.07	ACETONE	140. E-3	14. E-3
13-Jun-05	P0605.13	ACETONE	150. E-3	15. E-3
6-Jul-05	P0705.06	ACETONE	160. E-3	16. E-3
18-Jul-05	P0705.18	ACETONE	340. E-3	34. E-3
23-Aug-05	P0805.23	ACETONE	370. E-3	37. E-3
30-Aug-05	P0805.30	ACETONE	74. E-3	7.4 E-3
13-Sep-05	P0905.13	ACETONE	260. E-3	26. E-3
19-Sep-05	P0905.19	ACETONE	240. E-3	24. E-3
26-Sep-05	P0905.26	ACETONE	270. E-3	27. E-3
3-Oct-05	P1005.03	ACETONE	160. E-3	16. E-3
17-Oct-05	P1005.17	ACETONE	340. E-3	34. E-3
24-Oct-05	P1005.24	ACETONE	71. E-3	7.1 E-3
31-Oct-05	P1005.31	ACETONE	230. E-3	23. E-3
14-Nov-05	P1105.14	ACETONE	500. E-3	50. E-3
21-Nov-05	P1105.21	ACETONE	68. E-3	6.8 E-3
28-Nov-05	P1105.28	ACETONE	110. E-3	11. E-3

VOC Results by Species for TA50 Plant Feed				Page 3 of 4
Sample Date	Sample Number	Species	Concentration (mg/L)	Uncertainty (mg/L)
19-Dec-05	P1205.19	ACETONE	1.1 E0	110. E-3
25-Apr-05	P0405.25	BENZENE	480. E-6	48. E-6
31-May-05	P0505.31	BENZENE	1.1 E-3	110. E-6
30-Aug-05	P0805.30	BENZENE	80. E-6	8. E-6
3-Jan-05	P0105.03	BROMOMETHANE	10. E-3	1. E-3
10-Jan-05	P0105.10	BROMOMETHANE	3.3 E-3	330. E-6
18-Jan-05	P0105.18	BROMOMETHANE	1.2 E-3	120. E-6
24-Jan-05	P0105.24	BROMOMETHANE	3.8 E-3	380. E-6
7-Feb-05	P0205.07	BROMOMETHANE	4.8 E-3	480. E-6
14-Feb-05	P0205.14	BROMOMETHANE	4.1 E-3	410. E-6
12-May-05	P0505.12	BROMOMETHANE	1.2 E-3	120. E-6
6-Jul-05	P0705.06	BROMOMETHANE	1.2 E-3	120. E-6
23-Aug-05	P0805.23	BROMOMETHANE	5.1 E-3	510. E-6
30-Aug-05	P0805.30	BROMOMETHANE	370. E-6	37. E-6
3-Oct-05	P1005.03	BROMOMETHANE	6.9 E-3	690. E-6
14-Nov-05	P1105.14	BROMOMETHANE	5.8 E-3	580. E-6
31-Oct-05	P1005.31	CARBON DISULFIDE	7.9 E-3	790. E-6
24-Oct-05	P1005.24	CARBON TETRACHLORIDE	1.8 E-3	180. E-6
25-Apr-05	P0405.25	CHLOROBENZENE	1.3 E-3	130. E-6
18-Jul-05	P0705.18	CHLOROBENZENE	570. E-6	57. E-6
21-Mar-05	P0305.21	CHLORODIBROMOMETHANE	1.3 E-3	130. E-6
6-Apr-05	P0405.06	CHLOROFORM	700. E-6	70. E-6
11-Apr-05	P0405.11	CHLOROFORM	500. E-6	50. E-6
31-May-05	P0505.31	CHLOROFORM	140. E-6	14. E-6
6-Jul-05	P0705.06	CHLOROFORM	84. E-6	8.4 E-6
18-Jul-05	P0705.18	CHLOROFORM	770. E-6	77. E-6
30-Aug-05	P0805.30	CHLOROFORM	160. E-6	16. E-6
3-Jan-05	P0105.03	CHLOROMETHANE	6.6 E-3	660. E-6
24-Jan-05	P0105.24	CHLOROMETHANE	1.5 E-3	150. E-6
3-Feb-05	P0205.03	CHLOROMETHANE	3.1 E-3	310. E-6
7-Feb-05	P0205.07	CHLOROMETHANE	3.2 E-3	320. E-6
14-Feb-05	P0205.14	CHLOROMETHANE	3.4 E-3	340. E-6
2-May-05	P0505.02	CHLOROMETHANE	1.4 E-3	140. E-6
12-May-05	P0505.12	CHLOROMETHANE	1.3 E-3	130. E-6
6-Jul-05	P0705.06	CHLOROMETHANE	490. E-6	49. E-6
30-Aug-05	P0805.30	CHLOROMETHANE	1. E-3	100. E-6
3-Oct-05	P1005.03	CHLOROMETHANE	2.4 E-3	240. E-6
17-Oct-05	P1005.17	CHLOROMETHANE	3.5 E-3	350. E-6
14-Nov-05	P1105.14	CHLOROMETHANE	4.8 E-3	480. E-6
18-Jan-05	P0105.18	CIS-1,3-DICHLOROPROPENE	3.4 E-3	340. E-6
23-Aug-05	P0805.23	CIS/TRANS-1,2-DICHLOROETHENE	20. E-3	2. E-3
3-Feb-05	P0205.03	IODOMETHANE	4.4 E-3	440. E-6
7-Feb-05	P0205.07	IODOMETHANE	2.9 E-3	290. E-6

VOC Results by Species for TA50 Plant Feed				Page 4 of 4
Sample Date	Sample Number	Species	CONCENTRATION	Uncertainty (mg/L)
30-Aug-05	P0805.30	IODOMETHANE	690. E-6	69. E-6
31-Oct-05	P1005.31	IODOMETHANE	2.7 E-3	270. E-6
3-Jan-05	P0105.03	METHYLENE CHLORIDE	3.6 E-3	360. E-6
10-Jan-05	P0105.10	METHYLENE CHLORIDE	9.2 E-3	920. E-6
18-Jan-05	P0105.18	METHYLENE CHLORIDE	11. E-3	1.1 E-3
24-Jan-05	P0105.24	METHYLENE CHLORIDE	6.6 E-3	660. E-6
3-Feb-05	P0205.03	METHYLENE CHLORIDE	5.6 E-3	560. E-6
7-Feb-05	P0205.07	METHYLENE CHLORIDE	2.6 E-3	260. E-6
28-Feb-05	P0205.28	METHYLENE CHLORIDE	3.7 E-3	370. E-6
7-Mar-05	P0305.07	METHYLENE CHLORIDE	4.1 E-3	410. E-6
16-Mar-05	P0305.16	METHYLENE CHLORIDE	7.6 E-3	760. E-6
21-Mar-05	P0305.21	METHYLENE CHLORIDE	1.7 E-3	170. E-6
6-Apr-05	P0405.06	METHYLENE CHLORIDE	5.4 E-3	540. E-6
11-Apr-05	P0405.11	METHYLENE CHLORIDE	4.7 E-3	470. E-6
12-May-05	P0505.12	METHYLENE CHLORIDE	11. E-3	1.1 E-3
16-May-05	P0505.16	METHYLENE CHLORIDE	15. E-3	1.5 E-3
23-May-05	P0505.23	METHYLENE CHLORIDE	18. E-3	1.8 E-3
7-Jun-05	P0605.07	METHYLENE CHLORIDE	4.7 E-3	470. E-6
13-Jun-05	P0605.13	METHYLENE CHLORIDE	4.8 E-3	480. E-6
21-Jun-05	P0605.21	METHYLENE CHLORIDE	2.4 E-3	240. E-6
23-Aug-05	P0805.23	METHYLENE CHLORIDE	4. E-3	400. E-6
13-Sep-05	P0905.13	METHYLENE CHLORIDE	3.8 E-3	380. E-6
19-Sep-05	P0905.19	METHYLENE CHLORIDE	5.4 E-3	540. E-6
26-Sep-05	P0905.26	METHYLENE CHLORIDE	5. E-3	500. E-6
3-Oct-05	P1005.03	METHYLENE CHLORIDE	29. E-3	2.9 E-3
17-Oct-05	P1005.17	METHYLENE CHLORIDE	14. E-3	1.4 E-3
24-Oct-05	P1005.24	METHYLENE CHLORIDE	18. E-3	1.8 E-3
31-Oct-05	P1005.31	METHYLENE CHLORIDE	22. E-3	2.2 E-3
14-Nov-05	P1105.14	METHYLENE CHLORIDE	20. E-3	2. E-3
21-Nov-05	P1105.21	METHYLENE CHLORIDE	5.6 E-3	560. E-6
19-Dec-05	P1205.19	METHYLENE CHLORIDE	18. E-3	1.8 E-3
18-Jul-05	P0705.18	N-BUTYLBENZENE	1.5 E-3	150. E-6
31-May-05	P0505.31	TERT-BUTYLBENZENE	130. E-6	13. E-6
2-May-05	P0505.02	TETRACHLOROETHENE	2.6 E-3	260. E-6
6-Jul-05	P0705.06	TOLUENE	320. E-6	32. E-6
23-Aug-05	P0805.23	TOLUENE	1.6 E-3	160. E-6
30-Aug-05	P0805.30	TOLUENE	180. E-6	18. E-6
26-Sep-05	P0905.26	TOLUENE	1.3 E-3	130. E-6
3-Feb-05	P0205.03	TRICHLOROETHENE	12. E-3	1.2 E-3
30-Aug-05	P0805.30	XYLENE (TOTAL)	260. E-6	26. E-6

03511

Table D-2
SVOC RESULTS BY SPECIES FOR TA50 PLANT FEED

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY				
JAN-2005 through DEC-2005				
Sample Date	Sample Number	Species	Concentration (mg/L)	Uncertainty (mg/L)
16-Mar-05	P0305.16	BENZOIC ACID	12. E-3	1.2 E-3
6-Apr-05	P0405.06	BENZOIC ACID	25. E-3	2.5 E-3
18-Jul-05	P0705.18	BENZOIC ACID	3.7 E-3	370. E-6
6-Sep-05	P0905.06	BENZOIC ACID	41. E-3	4.1 E-3
13-Sep-05	P0905.13	BENZOIC ACID	32. E-3	3.2 E-3
25-Apr-05	P0405.25	BENZYL ALCOHOL	25. E-3	2.5 E-3
2-May-05	P0505.02	BENZYL ALCOHOL	2.8 E-3	280. E-6
31-May-05	P0505.31	BENZYL ALCOHOL	3.4 E-3	340. E-6
3-Jan-05	P0105.03	BIS(2-ETHYLHEXYL)PHTHALATE	15. E-3	1.5 E-3
10-Jan-05	P0105.10	BIS(2-ETHYLHEXYL)PHTHALATE	7.9 E-3	790. E-6
18-Jan-05	P0105.18	BIS(2-ETHYLHEXYL)PHTHALATE	23. E-3	2.3 E-3
7-Feb-05	P0205.07	BIS(2-ETHYLHEXYL)PHTHALATE	21. E-3	2.1 E-3
14-Feb-05	P0205.14	BIS(2-ETHYLHEXYL)PHTHALATE	14. E-3	1.4 E-3
28-Feb-05	P0205.28	BIS(2-ETHYLHEXYL)PHTHALATE	14. E-3	1.4 E-3
7-Mar-05	P0305.07	BIS(2-ETHYLHEXYL)PHTHALATE	9.4 E-3	940. E-6
16-Mar-05	P0305.16	BIS(2-ETHYLHEXYL)PHTHALATE	18. E-3	1.8 E-3
6-Apr-05	P0405.06	BIS(2-ETHYLHEXYL)PHTHALATE	4.3 E-3	430. E-6
11-Apr-05	P0405.11	BIS(2-ETHYLHEXYL)PHTHALATE	14. E-3	1.4 E-3
20-Apr-05	P0405.20	BIS(2-ETHYLHEXYL)PHTHALATE	10. E-3	1. E-3
25-Apr-05	P0405.25	BIS(2-ETHYLHEXYL)PHTHALATE	19. E-3	1.9 E-3
2-May-05	P0505.02	BIS(2-ETHYLHEXYL)PHTHALATE	36. E-3	3.6 E-3
12-May-05	P0505.12	BIS(2-ETHYLHEXYL)PHTHALATE	66. E-3	6.6 E-3
16-May-05	P0505.16	BIS(2-ETHYLHEXYL)PHTHALATE	28. E-3	2.8 E-3
23-May-05	P0505.23	BIS(2-ETHYLHEXYL)PHTHALATE	60. E-3	6. E-3
31-May-05	P0505.31	BIS(2-ETHYLHEXYL)PHTHALATE	28. E-3	2.8 E-3
7-Jun-05	P0605.07	BIS(2-ETHYLHEXYL)PHTHALATE	44. E-3	4.4 E-3
13-Jun-05	P0605.13	BIS(2-ETHYLHEXYL)PHTHALATE	31. E-3	3.1 E-3
21-Jun-05	P0605.21	BIS(2-ETHYLHEXYL)PHTHALATE	19. E-3	1.9 E-3
6-Jul-05	P0705.06	BIS(2-ETHYLHEXYL)PHTHALATE	24. E-3	2.4 E-3
18-Jul-05	P0705.18	BIS(2-ETHYLHEXYL)PHTHALATE	17. E-3	1.7 E-3
23-Aug-05	P0805.23	BIS(2-ETHYLHEXYL)PHTHALATE	21. E-3	2.1 E-3
30-Aug-05	P0805.30	BIS(2-ETHYLHEXYL)PHTHALATE	12. E-3	1.2 E-3
6-Sep-05	P0905.06	BIS(2-ETHYLHEXYL)PHTHALATE	3.9 E-3	390. E-6
19-Sep-05	P0905.19	BIS(2-ETHYLHEXYL)PHTHALATE	11. E-3	1.1 E-3
26-Sep-05	P0905.26	BIS(2-ETHYLHEXYL)PHTHALATE	80. E-3	8. E-3
3-Oct-05	P1005.03	BIS(2-ETHYLHEXYL)PHTHALATE	11. E-3	1.1 E-3
17-Oct-05	P1005.17	BIS(2-ETHYLHEXYL)PHTHALATE	11. E-3	1.1 E-3
24-Oct-05	P1005.24	BIS(2-ETHYLHEXYL)PHTHALATE	8. E-3	800. E-6

SVOC Results by Species for TA50 Plant Feed				Page 2 of 2
Sample Date	**Sample Number**	**Species**	**Concentration (mg/L)**	**Uncertainty (mg/L)**
31-Oct-05	P1005.31	BIS(2-ETHYLHEXYL)PHTHALATE	9. E-3	900. E-6
14-Nov-05	P1105.14	BIS(2-ETHYLHEXYL)PHTHALATE	28. E-3	2.8 E-3
21-Nov-05	P1105.21	BIS(2-ETHYLHEXYL)PHTHALATE	14. E-3	1.4 E-3
28-Nov-05	P1105.28	BIS(2-ETHYLHEXYL)PHTHALATE	91. E-3	9.1 E-3
19-Dec-05	P1205.19	BIS(2-ETHYLHEXYL)PHTHALATE	44. E-3	4.4 E-3
2-May-05	P0505.02	DI-N-BUTYLPHTHALATE	3.2 E-3	320. E-6
6-Sep-05	P0905.06	DI-N-BUTYLPHTHALATE	4.5 E-3	450. E-6
6-Apr-05	P0405.06	DIETHYLPHTHALATE	8.6 E-3	860. E-6
11-Apr-05	P0405.11	DIETHYLPHTHALATE	3.8 E-3	380. E-6
20-Apr-05	P0405.20	DIETHYLPHTHALATE	6.8 E-3	680. E-6
25-Apr-05	P0405.25	DIETHYLPHTHALATE	7.2 E-3	720. E-6
2-May-05	P0505.02	DIETHYLPHTHALATE	3.3 E-3	330. E-6
7-Jun-05	P0605.07	DIETHYLPHTHALATE	2.4 E-3	240. E-6
18-Jul-05	P0705.18	DIETHYLPHTHALATE	4.9 E-3	490. E-6
30-Aug-05	P0805.30	DIETHYLPHTHALATE	2.7 E-3	270. E-6
6-Sep-05	P0905.06	DIETHYLPHTHALATE	2.6 E-3	260. E-6
25-Apr-05	P0405.25	HEXACHLOROETHANE	2.8 E-3	280. E-6
16-Mar-05	P0305.16	N-NITROSODIMETHYLAMINE	4.1 E-3	410. E-6
6-Apr-05	P0405.06	N-NITROSODIMETHYLAMINE	5.1 E-3	510. E-6
2-May-05	P0505.02	N-NITROSODIMETHYLAMINE	34. E-3	3.4 E-3
18-Jan-05	P0105.18	PYRIDINE	20. E-3	2. E-3
6-Jul-05	P0705.06	PYRIDINE	21. E-3	2.1 E-3
21-Nov-05	P1105.21	PYRIDINE	54. E-3	5.4 E-3
28-Nov-05	P1105.28	PYRIDINE	9.5 E-3	950. E-6

Table D-3
VOC Results by Species for TA50 Plant Sludge

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY				
JAN-2005 through DEC-2005				
Sample Date	**Sample Number**	**Species**	**Concentration (mg/L)**	**Uncertainty (mg/L)**
		(No 2005 Sludge Samples)		

Table D-4
SVOC Results by Species for TA50 Plant Sludge

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY				
JAN-2005 through DEC-2005				
Sample Date	**Sample Number**	**Species**	**Concentration (mg/L)**	**Uncertainty (mg/L)**
		(No 2005 Sludge Samples)		

Appendix E
Historical Perspective for the TA-50 RLWTF

Text:

List of Tables:

List of Figures:

Appendix E
Historical Perspective for the TA-50 RLWTF

This appendix presents some indicators for recent operations performance, reaching as far back as 1990, the year in which DOE published Order 5400.5 with radiological discharge limits. This historical data adds perspective to the information presented in the body of the annual report.

E.1 Flows

Figures E-1 through E-4 present historical influent and effluent flows for the four Radioactive Liquid Waste Treatment Facilities at LANL.

- Figure E-1, Low-Level RLW Treatment Facility: As can be seen, flows during 2005 were the lowest ever for the TA-50 RLWTF. Decreases since 1998 are the result of LANL waste minimization efforts, such as the 2001 re-routing of non-radioactive cleanup waters from the TA-48 boiler to the TA-46 sewage plant.

- Figure E-2, TA-53 RLW Facility: Volumes at the TA-53 facility during 2005 were the highest since the facility went into operation in December 1999. They remain comfortably below the evaporative capacity (1.4 million liters per year) of the basins, however.

Figure E-1

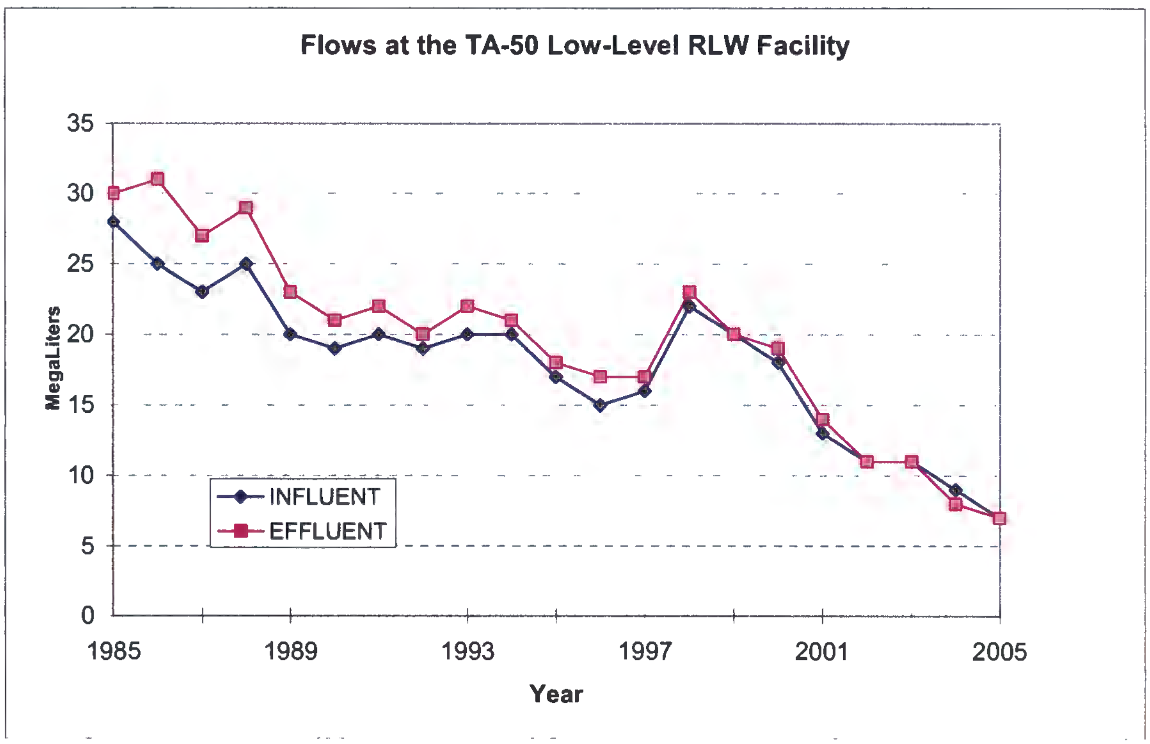


Figure E-2

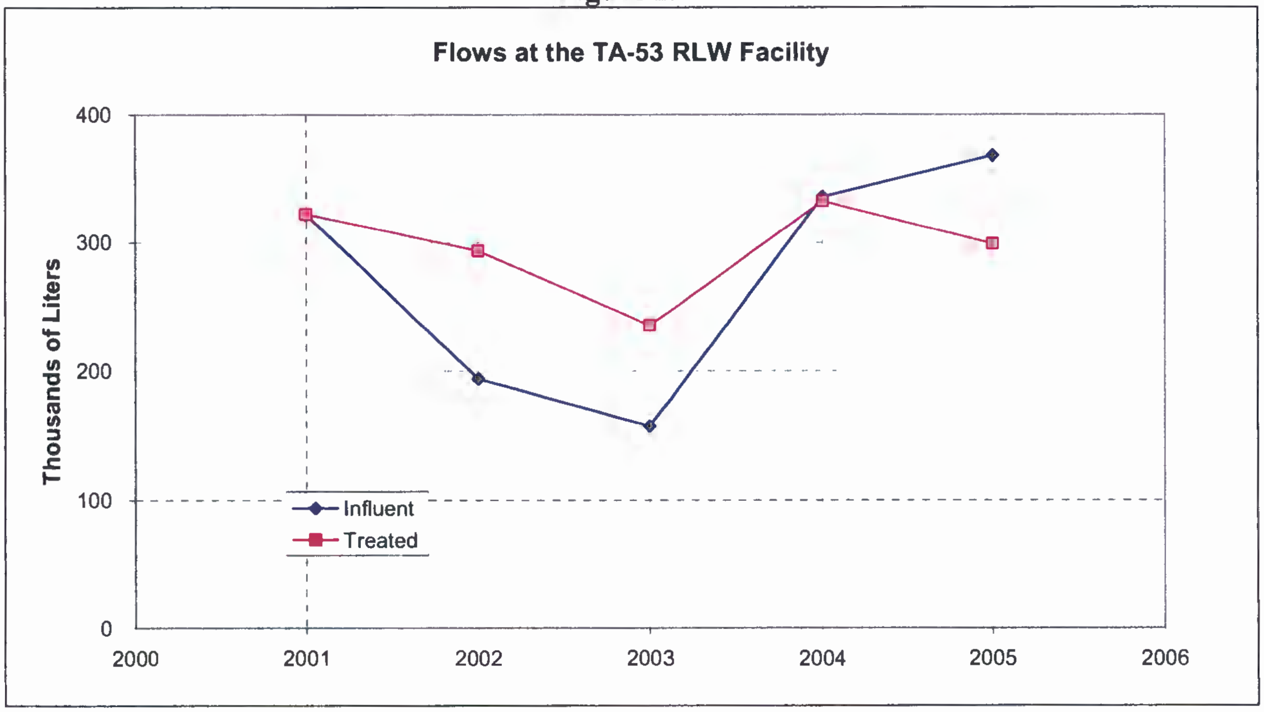
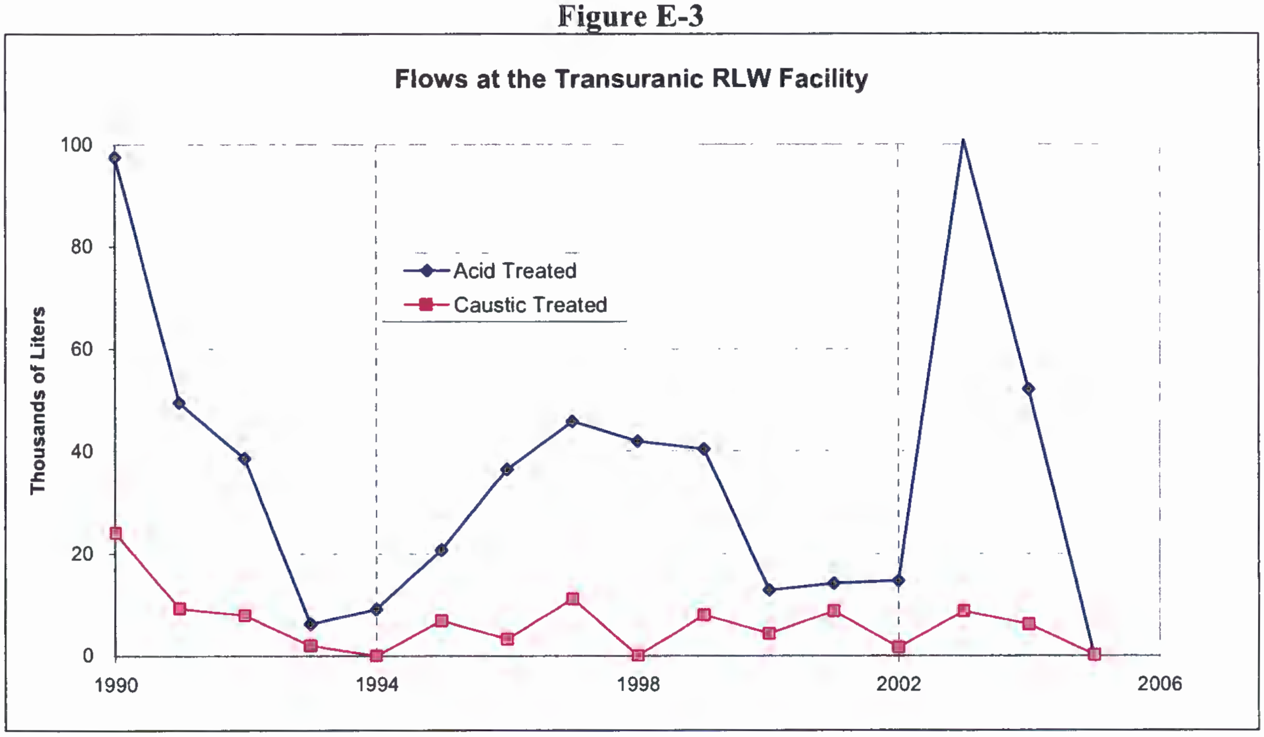


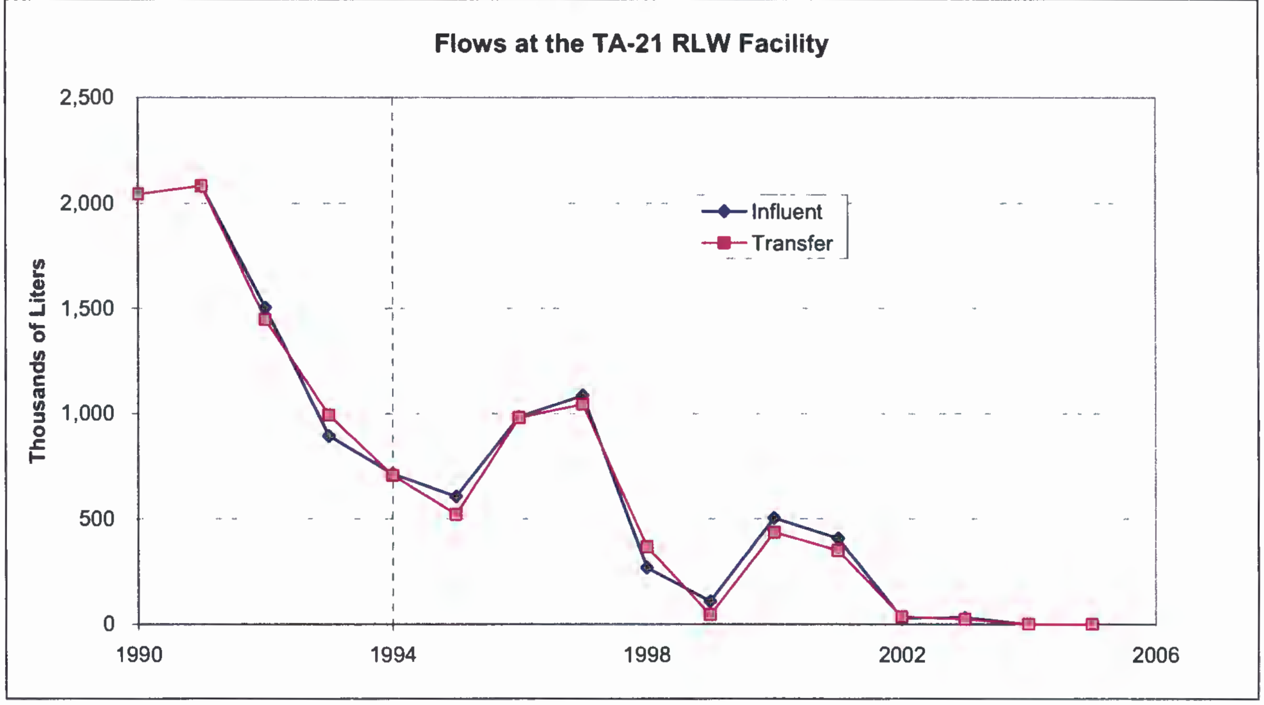
Figure E-3



- Figure A-3, Transuranic RLW Facility: The transuranic RLW processes have not been operated since June 2004 except for 193 liters of caustic waste processed in January 2005.

- Figure A-4, TA-21 RLW Facility: RLW volumes at the TA-21 facility were zero during both 2004 and 2005. It remains to treat the remaining water inventory of about 60,000 gallons, and then place the facility in cold standby until decommissioned.

Figure E-4



E.2 Effluent Quality

The TA-50 RLWTF discharges treated waters to Mortandad Canyon through Outfall #051; the TA-53, transuranic RLW, and TA-21 facilities have no discharges. For TA-50, treated waters must meet standards imposed by the DOE and the EPA, and has voluntarily committed to meeting three NMED groundwater standards.

As discussed and illustrated in the below sections, RLWTF effluent quality has improved markedly since 1999. For the past 72 months, there have been no violations of DOE or NPDES discharge standards. Additionally, TA-50 effluent has met NMED groundwater standards for all but two weeks during the last six years.

EPA Discharge Standards: Table E-1 lists the number of violations for Outfall #051 since 1991. For added perspective, data is also included for the entire Laboratory. This information is compiled by ENV-WQH, and is reported in the annual Environmental Surveillance Reports. The data illustrate that the TA-50 RLWTF has not had an NPDES violation for six consecutive years. Since 52 samples are taken annually of RLWTF, this means that no violations have occurred during the last 300 samples.

Table E-1
NPDES Violations 1991-2005

Year	LANL			RLWTF *	
	No. of Outfalls	No. of Samples	No. of Violations	No. of Samples	No. of Violations
1991	139	2,096	24	52	0
1992	139	2,294	21	52	0
1993	140	2,267	19	52	1
1994	124	2,199	28	52	0
1995	124	1,917	22	52	0
1996	97	1,724	34	52	2
1997	88	1,281	7	52	1
1998	88	1,164	8	52	2
1999	65	1,250	16	52	10
2000	21	1,323	0	52	0
2001	21	1,219	4	52	0
2002	21	1,213	3	52	0
2003	21	1,096	5	52	0
2004	21	1,283	2	52	0
2005	21	1,075	1	52	0

* More than 20 parameters (discharge standards) per sample

DOE Discharge Standards: DOE Order 5400.5 was published in February 1990 and established guidelines for permissible discharges to the environment. For discharges of more than a single isotope, as is the case for the TA-50 RLWTF, the discharge standard is actually expressed as "the sum of ratios must be less than or equal to 1.00" This requires the calculation of a ratio for each isotope (discharge concentration of an isotope divided by the discharge standard for that isotope), and then the summation of ratios for all isotopes. Figure E-5 shows that RLWTF discharges have met this standard for the past six years, or since membrane treatment was installed.

NMED Groundwater Standards: The NMED has proposed that TA-50 discharges meet standards for groundwater quality for fluoride, nitrates, and total dissolved solids. These standards have not been officially imposed because the NMED has not approved the RLWTF Groundwater Discharge Plan Application that was submitted in August 1996. Nevertheless, the RLWTF has operated since mid-1999 as those these standards were in force. Table E-2 compares discharge data for the past six years to the proposed discharge standards.

Figure E-5

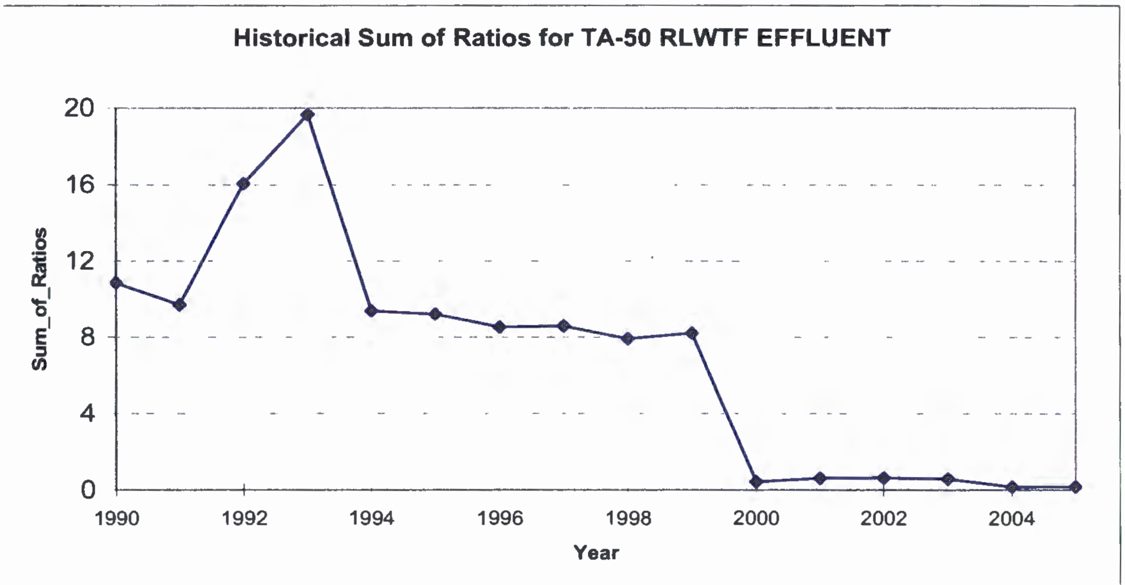


Table E-2
Discharges vs. Proposed NMED Standards

Year	Compliant Samples[A]	Fluoride (1.6 mg/L)		Nitrate (10 mg/L)		TDS (1000 mg/L)	
		Avg. (mg/L)	Max. (mg/L)	Avg. (mg/L)	Max. (mg/L)	Avg. (mg/L)	Max. (mg/L)
1999	--	1.1	3.0	24.3	92.3	528	880
2000	52	0.3	0.7	2.5	7.5	306	578
2001	52	0.7	1.1	3.9	6.6	410	576
2002	52	0.5	1.0	0.4	1.3	280	750
2003	50[B]	0.4	2.1	0.6	4.4	131	338
2004	52	0.2	0.4	3.0	7.2	75	200
2005	52	0.2	0.4	1.6	6.9	182	375

A. Numbers indicate weekly composite samples that meet proposed NMED standards.

B. Two weekly composite samples had values of 2.07 and 1.64 mg/L during 2003. (Watkins and Worland, March 2004, p.30.)

E.3 Wastes

Table E-3 shows solid waste generation at the TA-50 RLWTF since 1990. During the last two years, quantities of all types of solid wastes (LLW, mixed LLW, chemical, and transuranic waste) were all lower than typical annual quantities.

Table E-3
Solid Wastes Generated at the TA-50 RLWTF [A]

	Chemical (kg)	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
1990	2,241	124	68	11.0	0
1991	3,681	151	57	2.0	0
1992	1,017	126	41	0.0	0
1993	1,905	154	18	3.0	0
1994	4,372	140	8	0.0	0
1995	92	177	35	0.0	0
1996	347	196	1.2	0.0	0
1997	159	488	0.8	0.0	4.2
1998	747	120	0.0	1.0	1.0
1999	201	175	3.2	0.0	5.0
2000	384	132	2.5	16.1	0.0
2001	208[B]	158	2.6	0.4	4.4
2002	1,143	195	3.7	1.9	0.2
2003	70	390	2.7	0.0	2.7
2004	95	173	0.0	0.0	0.0
2005	7	108	0.0	0.0	0.0

A: Data sources: Site-Wide Environmental Impact Statement, Environmental Yearbooks, and TA-54 waste database.

B: Another 68,584 kilograms of chemical wastes, in addition to the 208 kilograms reported in the table, were generated during the installation of a security gate (four dump trucks of soil and asphalt).

E.4 Radioactive Parameters

As shown in Figure E-5, effluent did not meet DOE discharge standards before the year 2000. The sum-of-ratios for that year decreased to less than 0.7 from values of 8-9 during the latter half of the 1990s. The improvement resulted from installation of the membrane processes in March 1999, coupled with initiation of the practice of sampling every tank of effluent prior to discharge. Discharges of the three major alpha-emitting radionuclides (Pu-238, Pu-239, and Am-241), which account for more than 95% of alpha activity in the effluent, are presented in Figure E-6. Discharges of tritium, which have historically accounted for more than 90% of beta activity in the effluent, are shown in Figure E-7.

Figure E-6

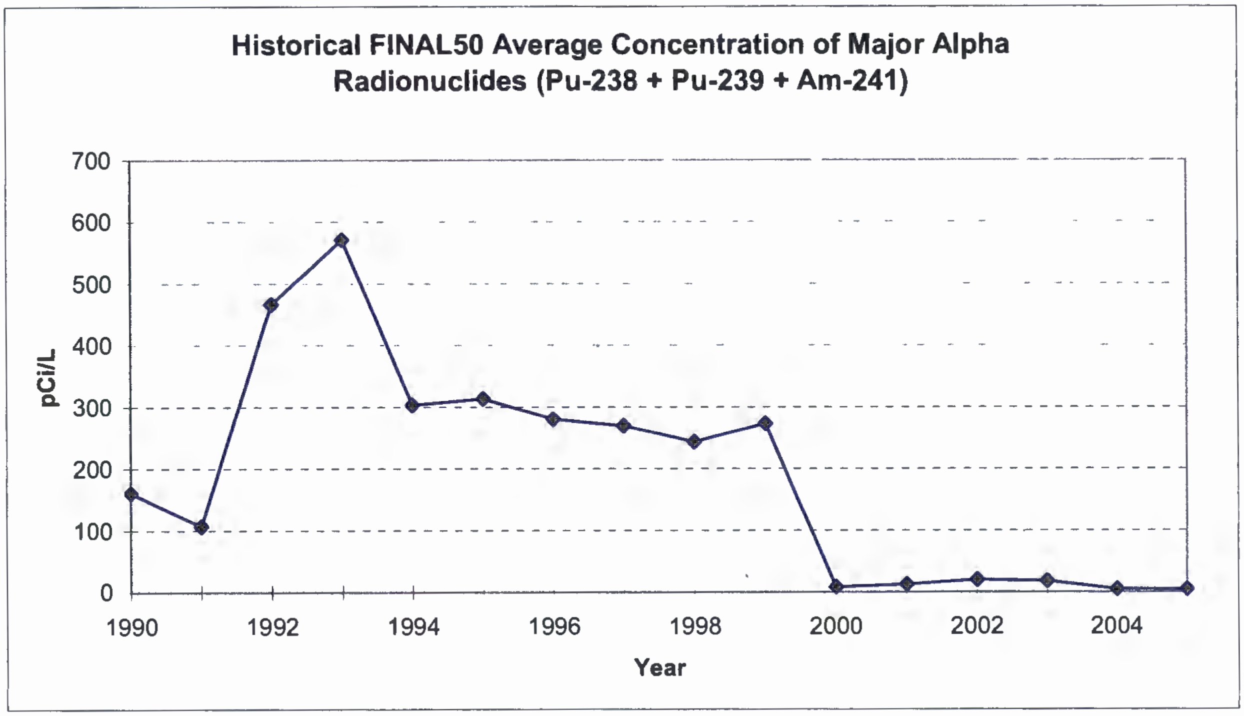
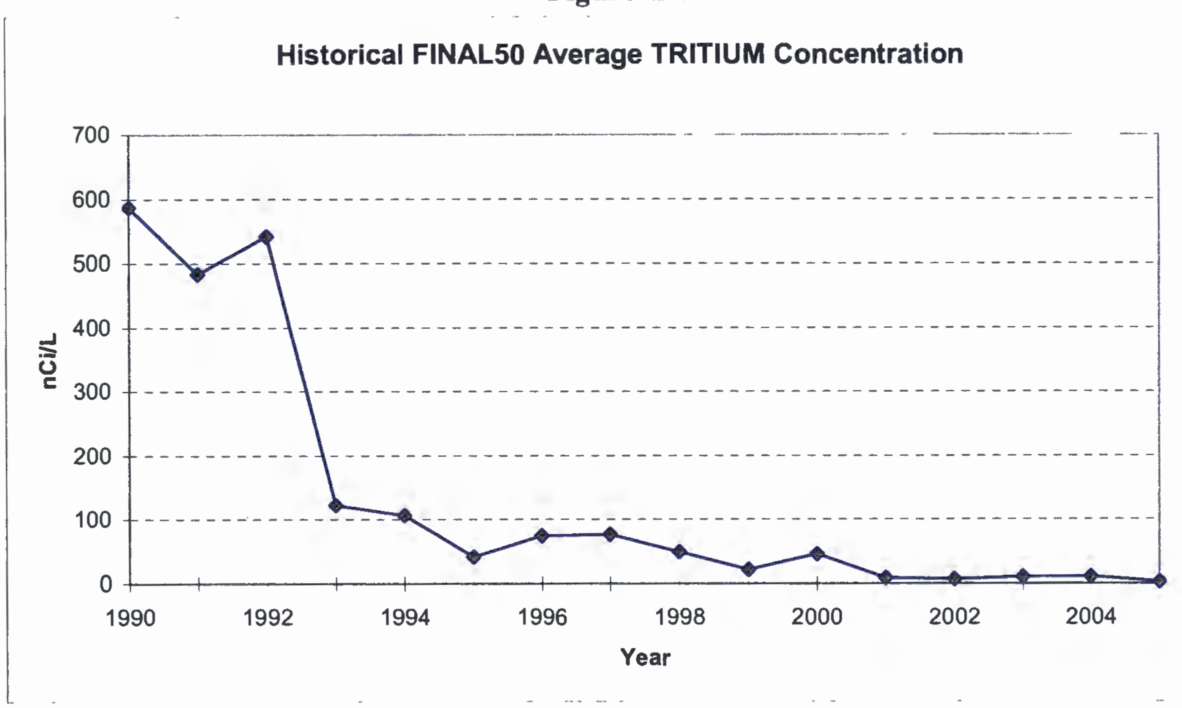


Figure E-7



E.5 Non-Radioactive Parameters

The following series of graphs provide historical concentrations and quantities of non-radiological components of the TA-50 RLWTF influent and effluent. Some of the minerals are of regulatory concern. Mercury, for example, has an extremely low NPDES discharge limit of 0.77 microgram per liter. Some of the minerals present processing challenges; silicon and calcium, for example, can precipitate and plug process piping and pumps. Each upper graph plots mineral *concentration* in RLWTF influent and effluent for the years 1990 through 2005. Each lower graph plots mineral *quantities* in RLWTF influent and effluent for the years 1990 through 2005.

The sequence of graphs is as follows:

- Dissolved and suspended solids
- nitrogen compounds (TKN, ammonia, nitrate, nitrite)
- parameters of regulatory concern (mercury, perchlorate, fluoride, copper)
- parameters of process concern (silicon, calcium, and COD)

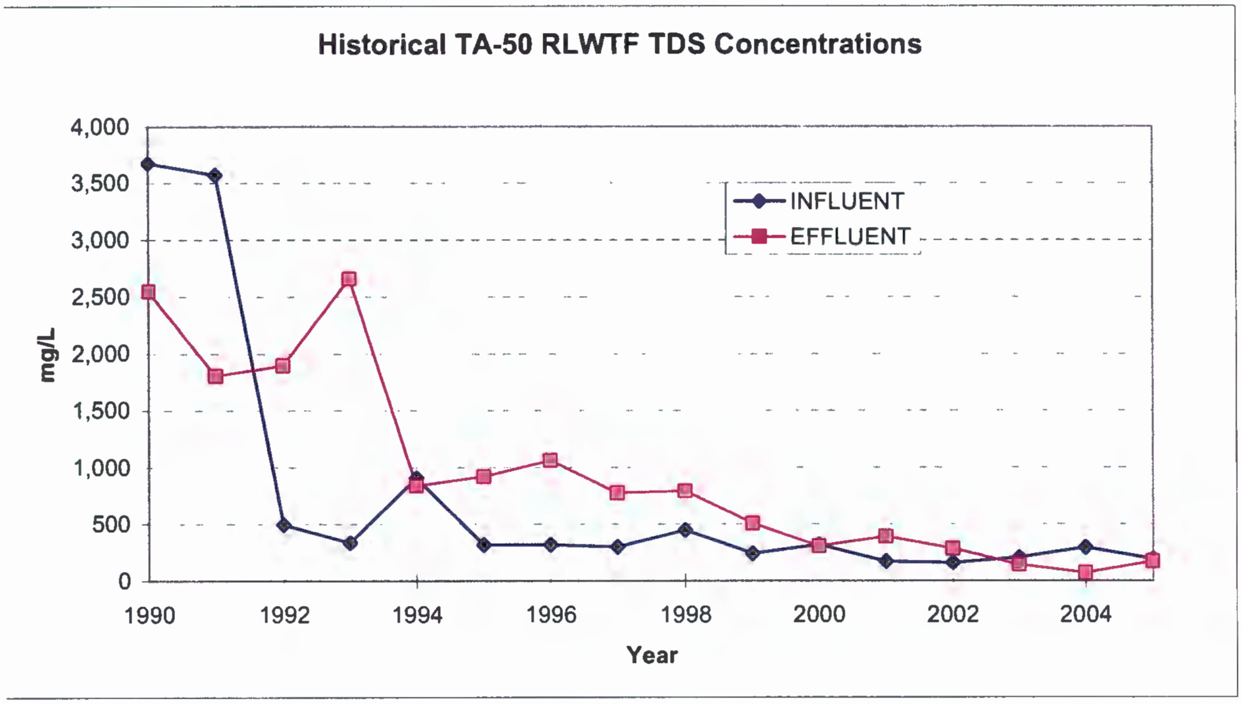
E.5.1 Dissolved and Suspended Solids

Figures E-8 through E-10 show concentrations and quantities of total dissolved and suspended solids in RLWTF influent and effluent since 1990.

- Figures E-8 and E-9, Total Dissolved Solids: Quantities have been declining, as would be expected since influent volumes have been declining. But so, too, have concentrations been declining. Note that TDS concentration of *influent* has been less than the proposed NMED groundwater standard of 1,000 mg/L since 1996. As a result of declining flows and concentrations, far fewer dissolved solids are now being discharged to Mortandad Canyon. For example, 18,430 kilograms of dissolved solids were discharged in 1998, while just 1200 kilograms, were discharged in 2005. Figure E-9 presents TDS data without the years 1990-1993, since TDS figures for the years 1990-1993 dwarf subsequent influent and effluent concentrations and quantities.

- Figure E-10, Total Suspended Solids: Influent concentrations illustrate a cyclic variation over the years, alternating between peaks and valleys. During the low years, in fact, influent concentrations are below the NPDES limit of 30 mg/L for discharges. RLWTF effluent has not historically carried appreciable concentrations or quantities of suspended solids, the peak being 150 kilograms in 1999. TSS levels in the effluent have been reduced to zero for the last three years.

Figure E-8


Historical TA-50 RLWTF TDS Concentrations
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
mg/L
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

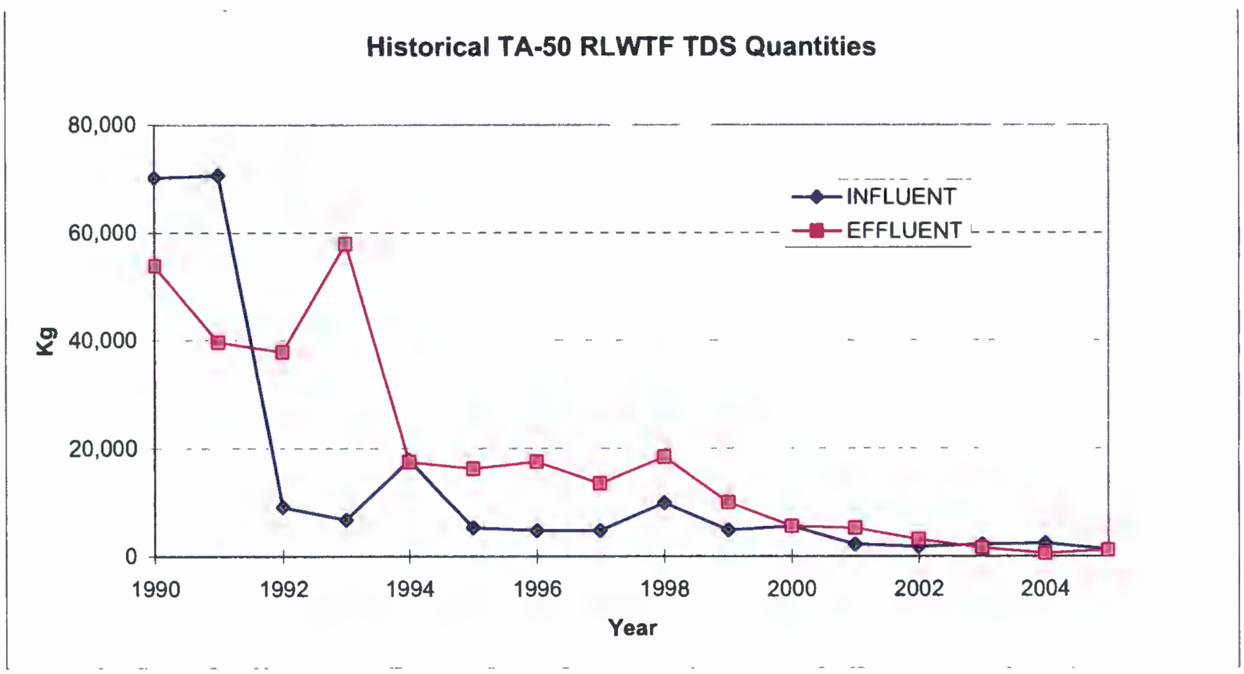
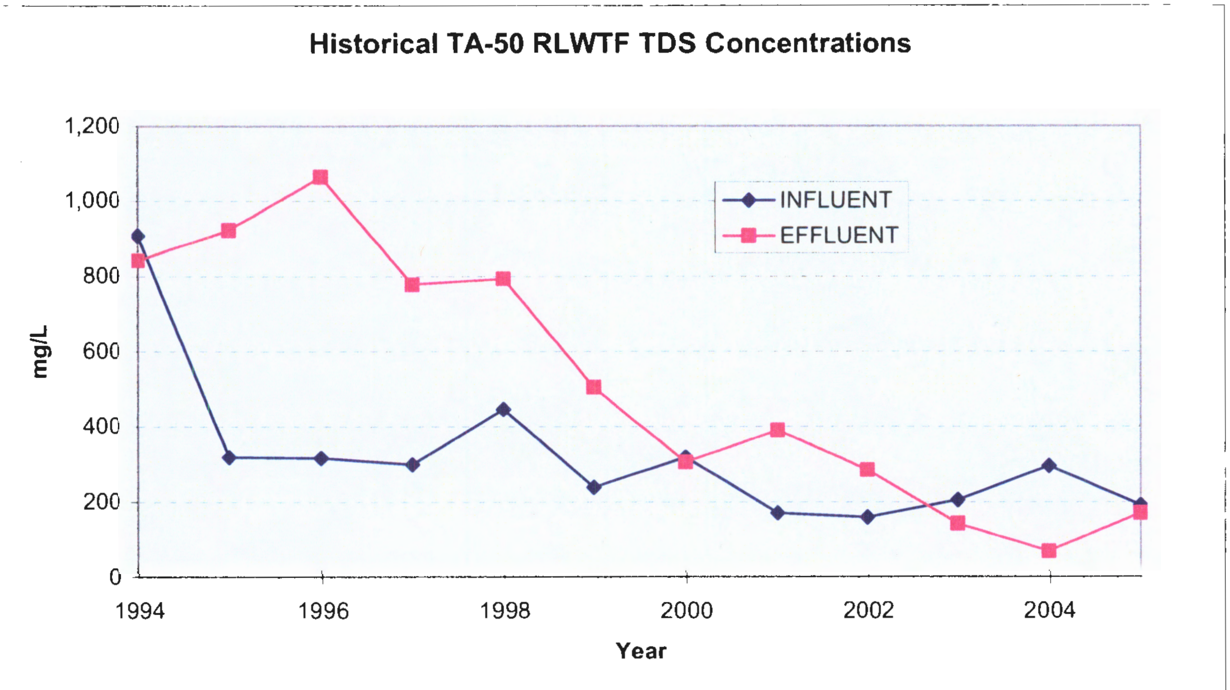

Historical TA-50 RLWTF TDS Quantities
80,000
60,000
40,000
20,000
0
Kg
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

Figure E-9


Historical TA-50 RLWTF TDS Concentrations
1,200
1,000
800
600
400
200
0
mg/L
INFLUENT
EFFLUENT
1994
1996
1998
2000
2002
2004
Year

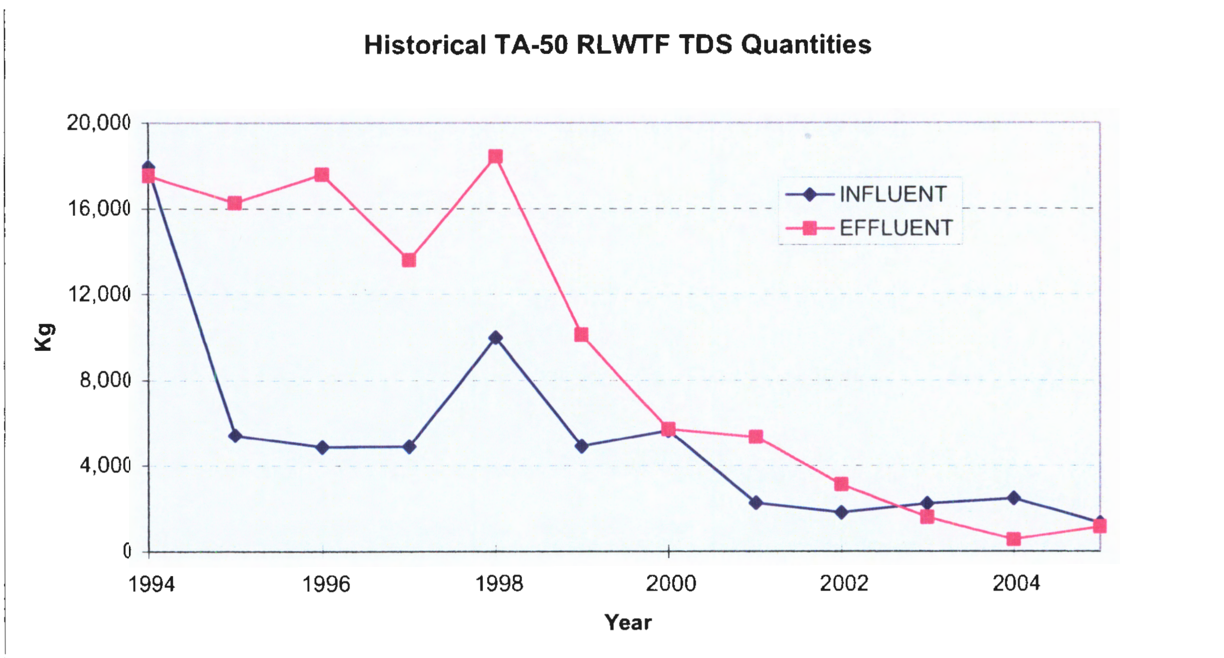
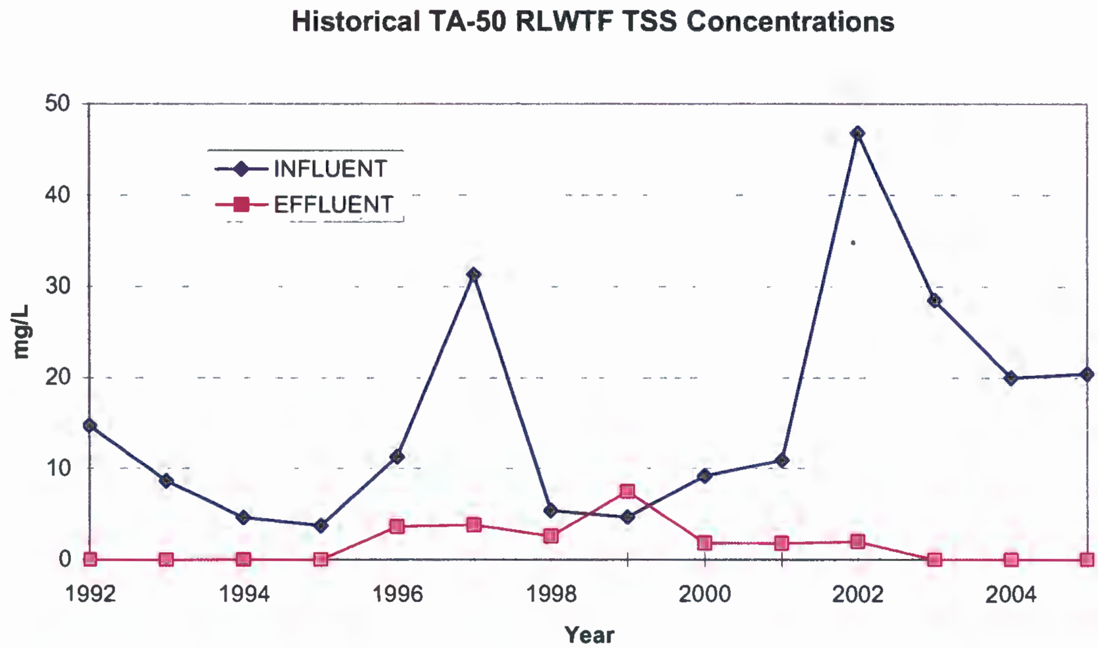
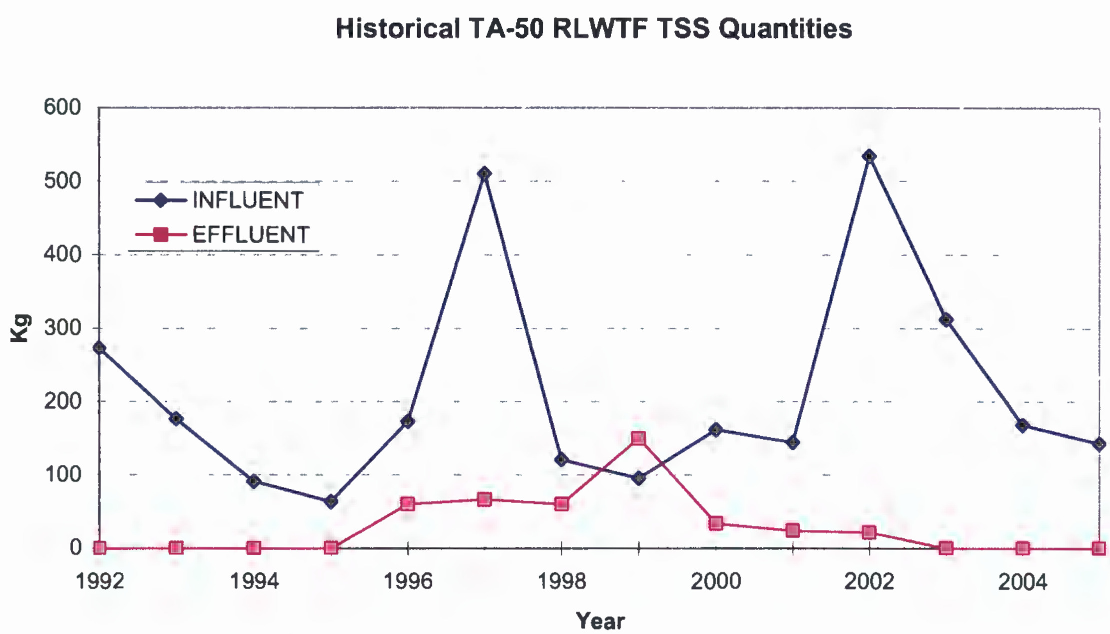

Historical TA-50 RLWTF TDS Quantities
20,000
16,000
12,000
8,000
4,000
0
Kg
INFLUENT
EFFLUENT
1994
1996
1998
2000
2002
2004
Year

Figure E-10





Note: Effluent samples were first analyzed for TSS in June 1996.

E.5.2 Nitrogen Compounds

The next five graphs, Figures E-11 through E-15, provide historical information about nitrogen compounds in RLWTF influent and effluent. Nitrogen discharges are of concern to the NMED Groundwater Bureau, which may impose limits for nitrates and/or total nitrogen.

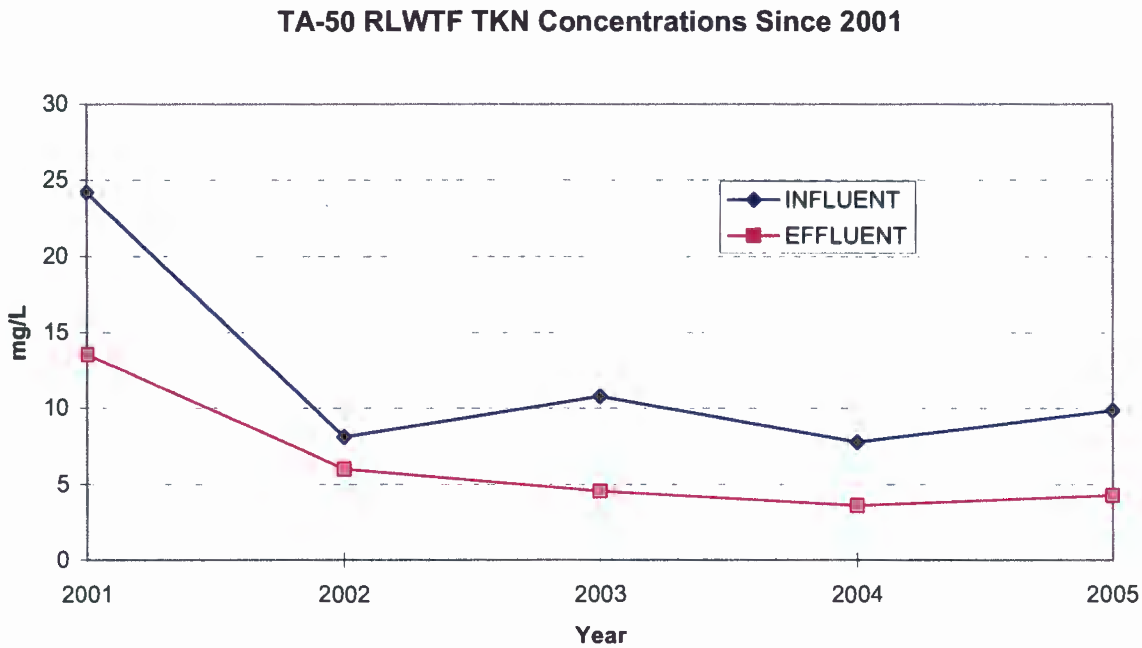
- Figure E-11, Total Kjedahl Nitrogen: TKN analyses began in 2001. The limited data show no trends toward increasing concentrations in influent or effluent from the RLWTF. Effluent concentrations are approximately half of influent concentrations. (There is currently no discharge standard for TKN.)

- Figure E-12, Nitrogen-as-Ammonia: Influent concentrations have been steady since 1990, hovering in the range of 3-8 mg/L. The Main Treatment Process does not remove ammonia, as evidenced in the fact that influent and effluent concentrations are the same. (There is currently no discharge standard for ammonia.)

- Figures E-13 and E-14, Nitrogen-as-Nitrate: Two significant changes have been made to reduce nitrate discharges: improved treatment (i.e., reverse osmosis) and the side-streaming of small-volume, high-nitrate waste solutions (i.e., administrative control). Tremendous reductions in nitrate discharges have resulted, from 1550 kilograms in 1995 to less than 30 kilograms per year for each of the last four years, a 98% reduction. These results have been reflected in environmental sampling as well: groundwater wells in Mortandad canyon have been compliant with the NMED standard of 10 mg/L since June 2000. Figure A-14 presents nitrate data without the years 1990-1993, since nitrate figures for the years 1990-1993 dwarf subsequent influent and effluent concentrations and quantities.

- Figure E-15, Nitrogen-as-Nitrite: Nitrite concentrations have historically been higher in effluent than in influent to the RLWTF. Effluent concentrations in 2004 and 2005 have been the highest in the past 16 years, but so have been influent concentrations. (There is currently no discharge standard for nitrite.)

Figure E-11


TA-50 RLWTF TKN Concentrations Since 2001
INFLUENT
EFFLUENT
mg/L
30
25
20
15
10
5
0
2001
2002
2003
2004
2005
Year

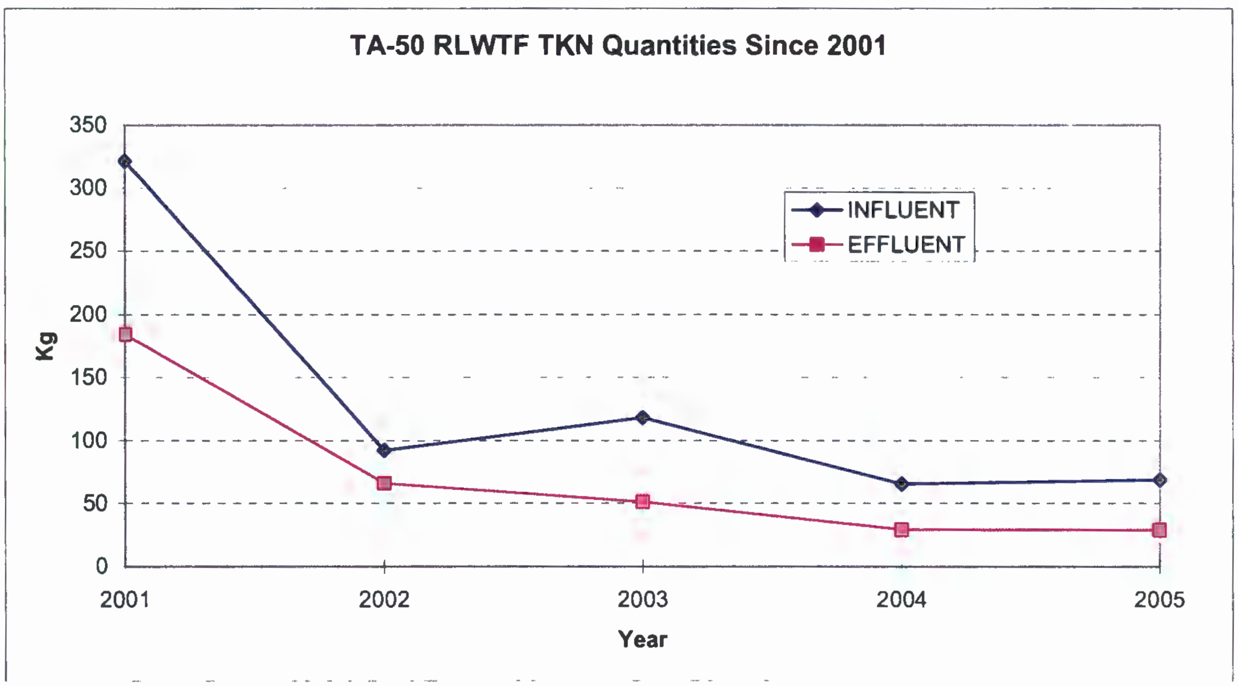
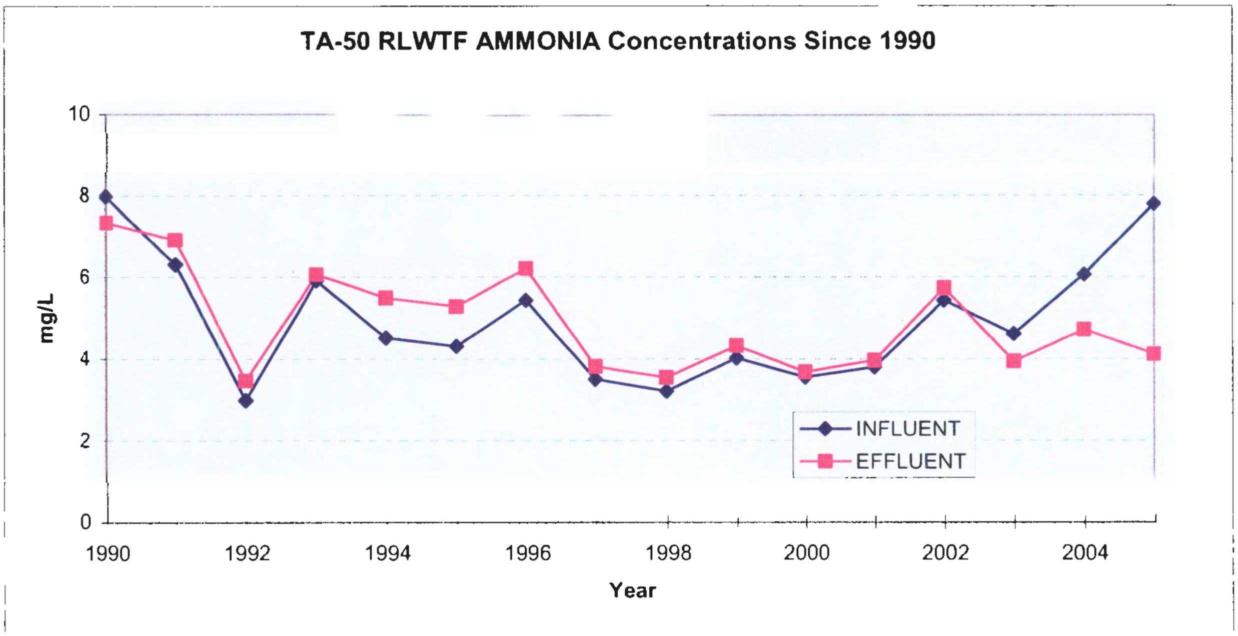

TA-50 RLWTF TKN Quantities Since 2001
INFLUENT
EFFLUENT
Kg
350
300
250
200
150
100
50
0
2001
2002
2003
2004
2005
Year

Figure E-12


TA-50 RLWTF AMMONIA Concentrations Since 1990
mg/L
10
8
6
4
2
0
1990
1992
1994
1996
1998
2000
2002
2004
Year
INFLUENT
EFFLUENT

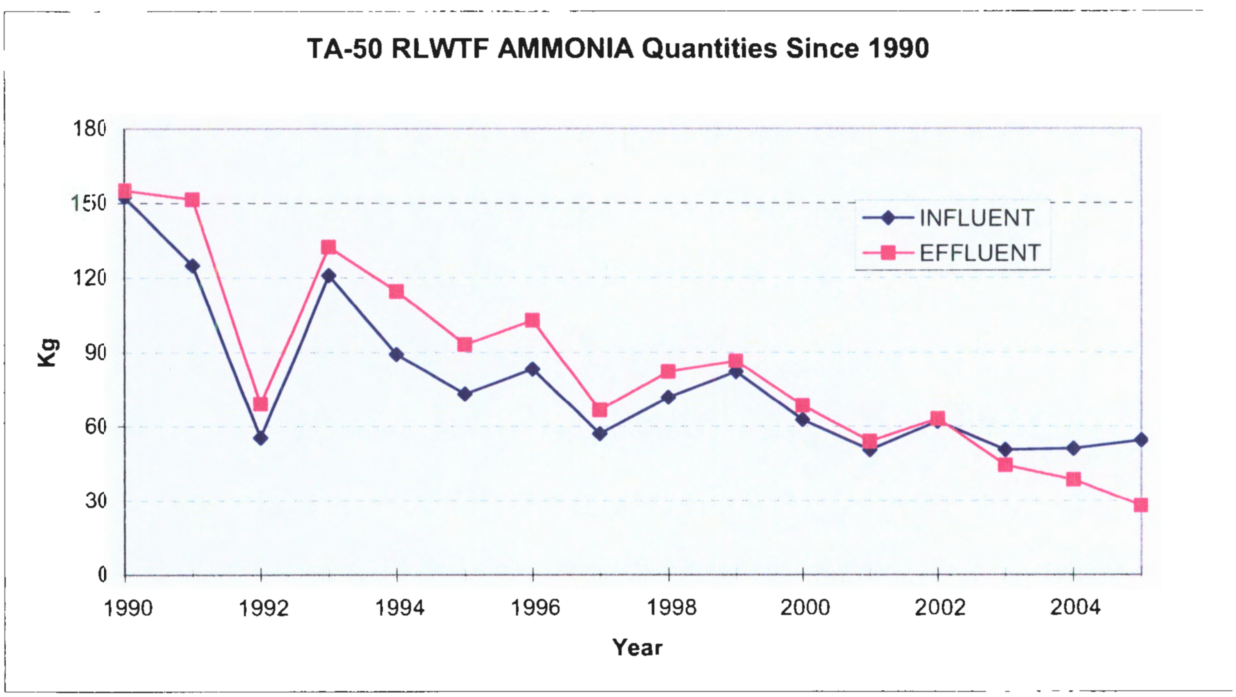
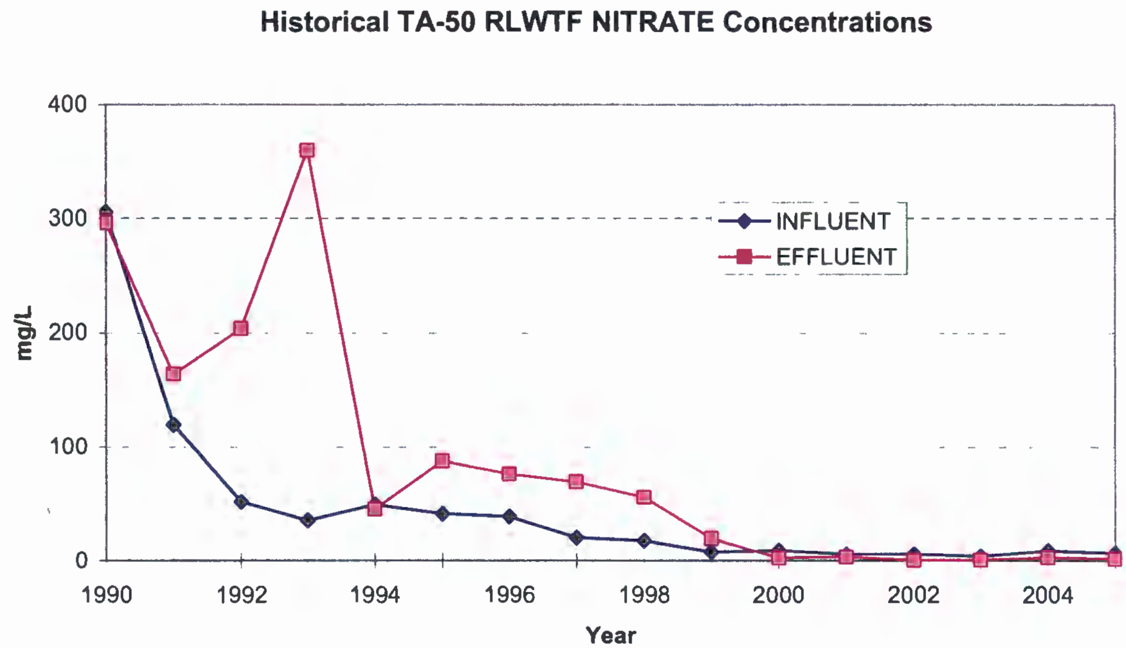

TA-50 RLWTF AMMONIA Quantities Since 1990
Kg
180
150
120
90
60
30
0
1990
1992
1994
1996
1998
2000
2002
2004
Year
INFLUENT
EFFLUENT

Figure E-13


Historical TA-50 RLWTF NITRATE Concentrations
400
300
200
100
0
mg/L
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

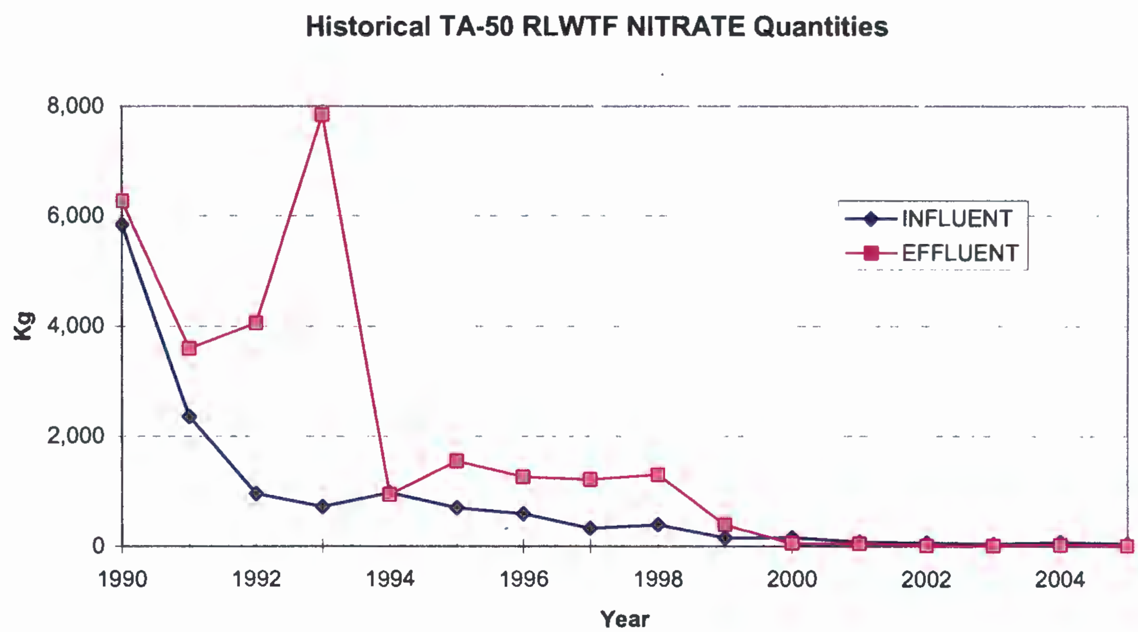
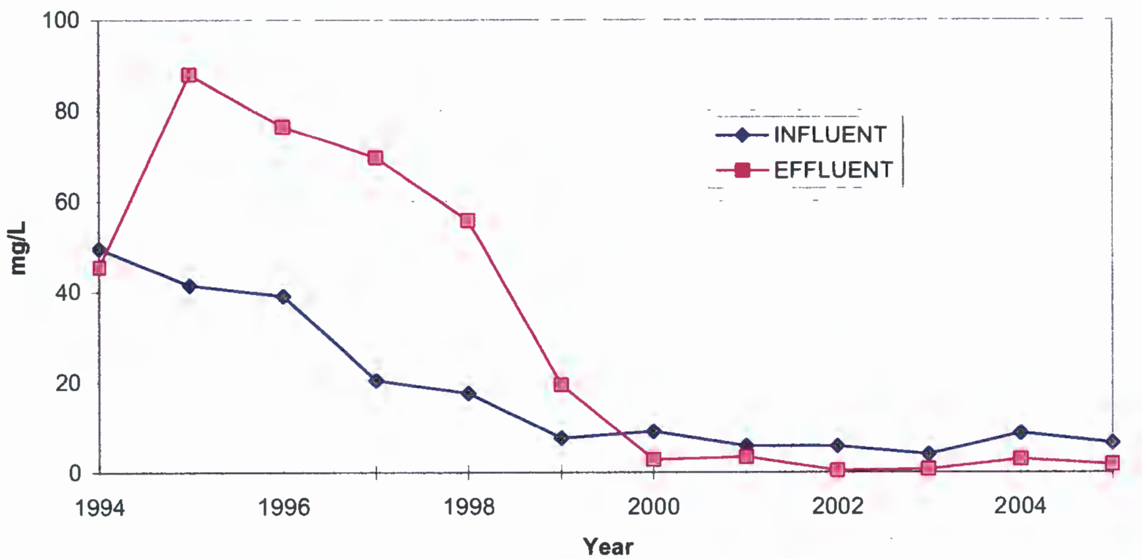

Historical TA-50 RLWTF NITRATE Quantities
8,000
6,000
4,000
2,000
0
Kg
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

Figure E-14

Historical TA-50 RLWTF NITRATE Concentrations



Historical TA-50 RLWTF NITRATE Quantities

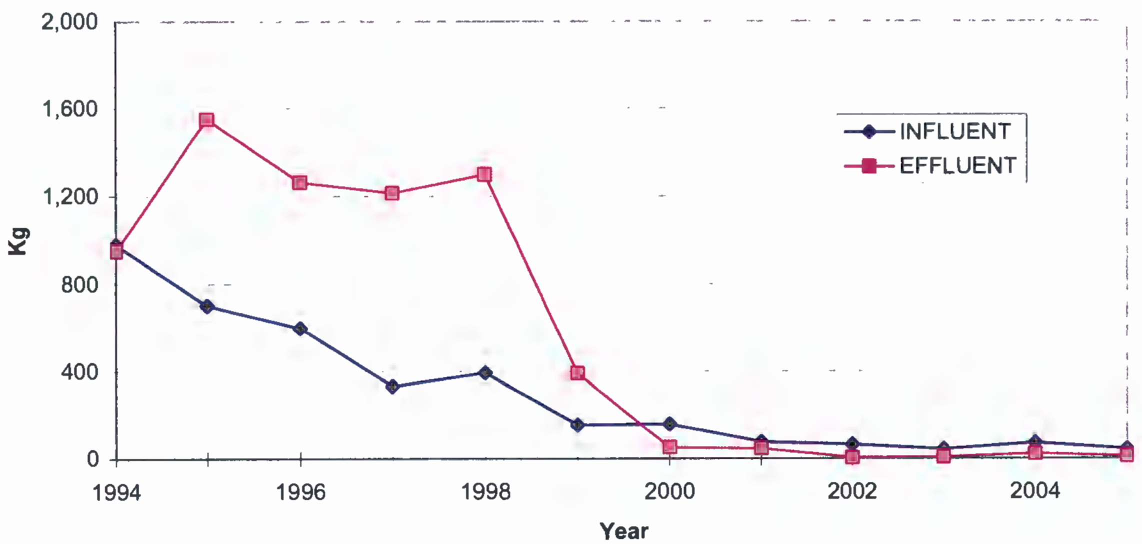
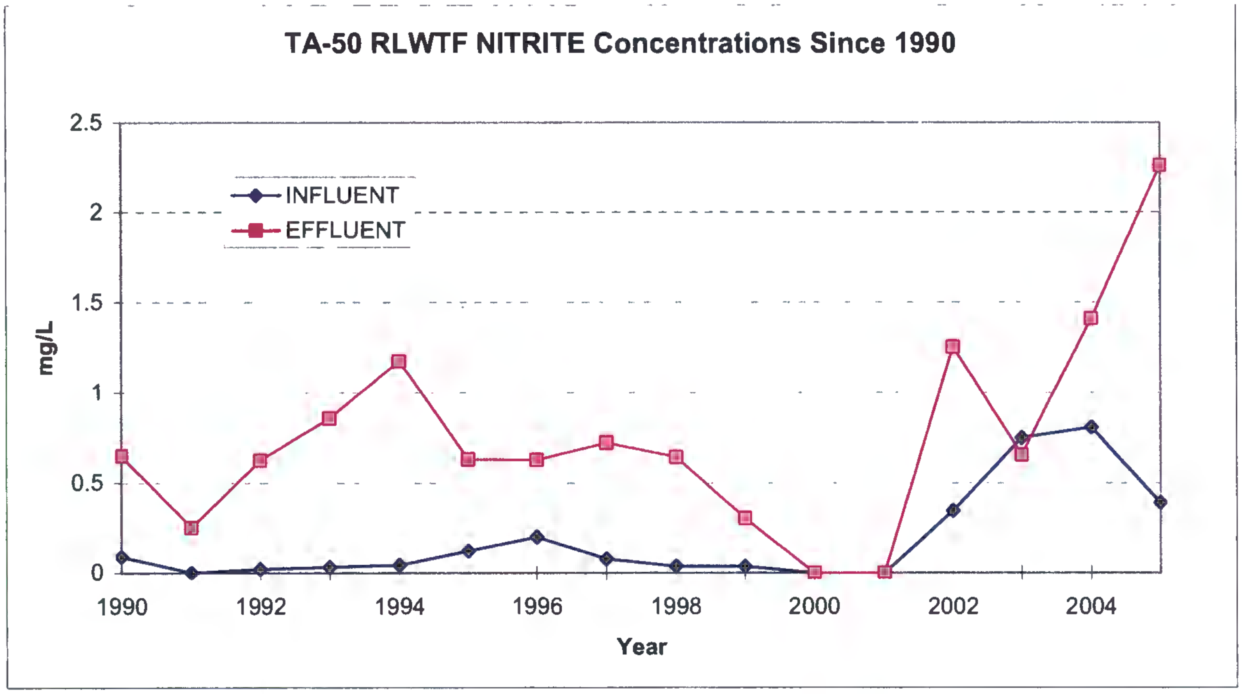
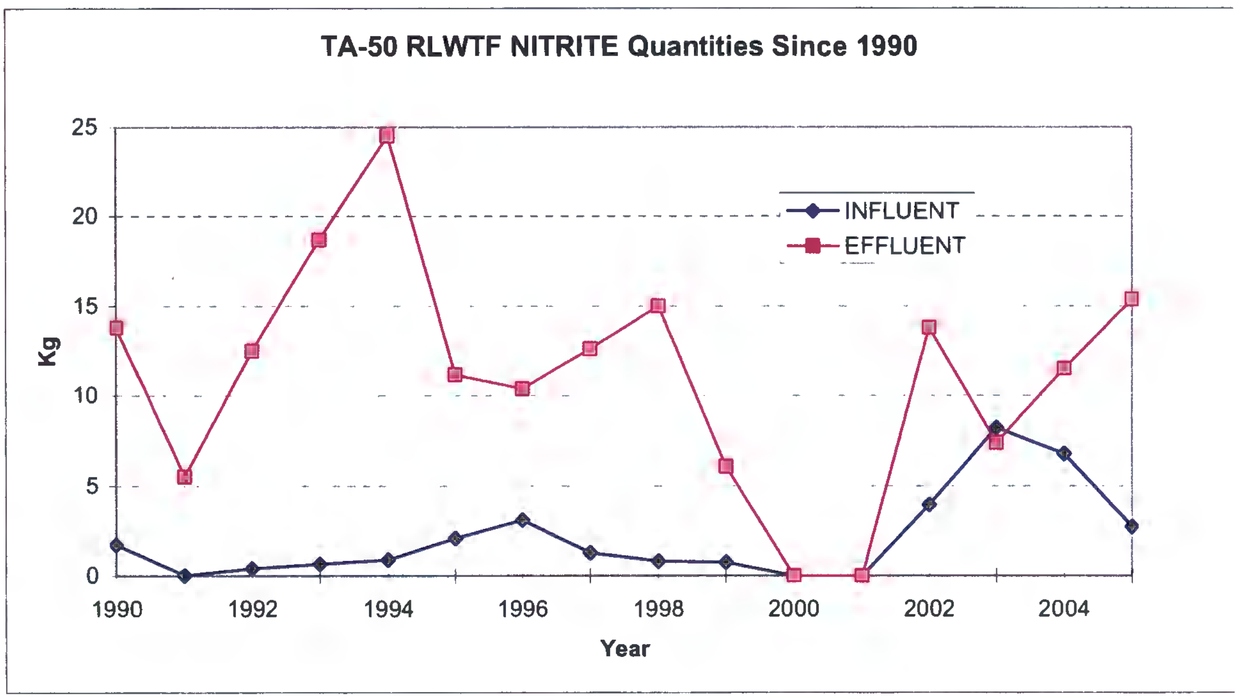


Figure E-15


TA-50 RLWTF NITRITE Concentrations Since 1990
INFLUENT
EFFLUENT
mg/L
2.5
2
1.5
1
0.5
0
1990
1992
1994
1996
1998
2000
2002
2004
Year


TA-50 RLWTF NITRITE Quantities Since 1990
INFLUENT
EFFLUENT
Kg
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
Year

E.5.3 Parameters of Regulatory Concern

The next four graphs provide historical information about influent and effluent concentrations and quantities for parameters of regulatory concern.

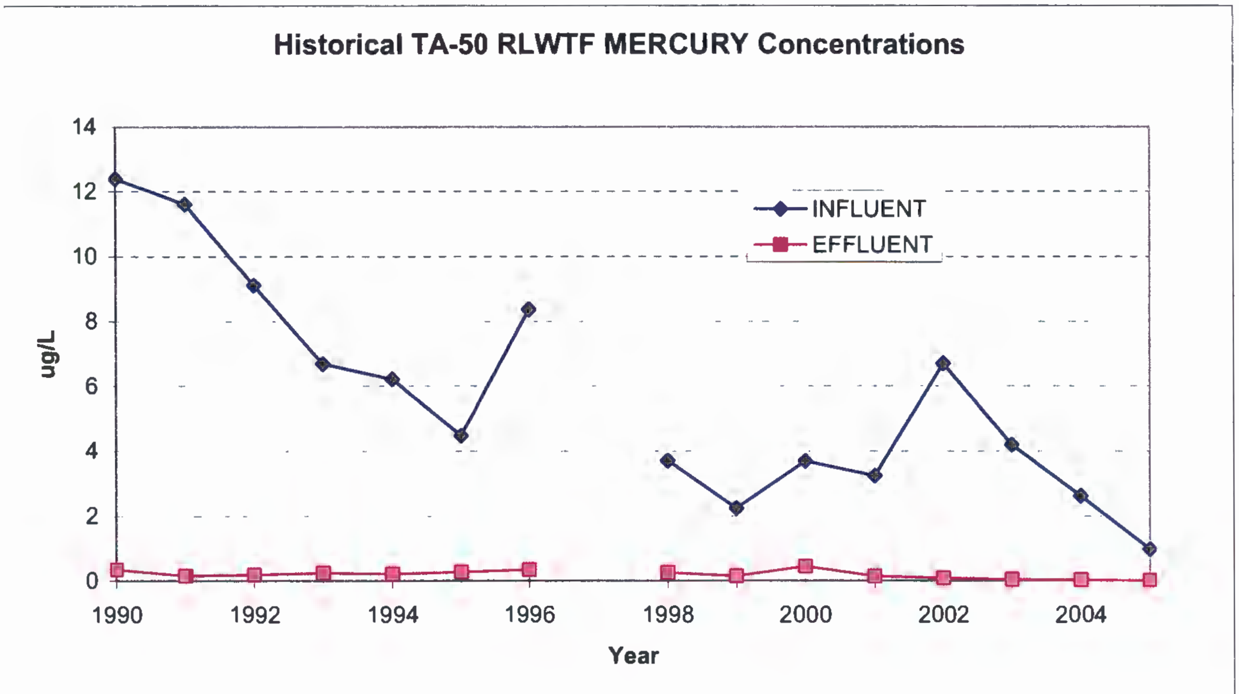
- Figure E-16, Mercury: At just 0.77 μg/L, or less than one part per billion, mercury has the most restrictive NPDES discharge standard. Influent concentrations have been decreasing for the past 15 years, which likely reflects declining use of mercury in research activities at LANL. Effluent concentrations have always been less than half the discharge standard, however, regardless of influent concentrations. Effluent concentrations have been less than 0.1 μg/L for the last four years. (Note: The chart does not include data for 1997 because that data is off the chart.)

- Figure E-17 charts perchlorate concentrations and quantities since 2001, the first year in which samples were analyzed for this parameter. The proposed EPA standard for perchlorates is just 4 μg/L, which gives perchlorate the second most restrictive discharge standard, after mercury. The disappearance of perchlorates from RLWTF effluent in 2002 mirrors the installation of ion exchange treatment columns, which were installed in anticipation of future regulation of this water contaminant.

- Figure E-18, Fluoride: The proposed NMED groundwater standard is 1.6 mg/L. While influent concentrations have held steady in the range of 0.6 – 2.6 mg/L since 1992, effluent concentrations have been declining for the past 15 years. Coupled with declining RLW volumes, this has resulted in reductions in fluoride in the effluent, from 72 kilograms in 1991 to just less than 10 kilograms in any of the last four years.

- Figure E-19, Copper: The existing discharge standard for copper is 1.4 milligrams per liter, but the standard proposed in the draft NPDES permit is just 8.6 μg/L, lower by a factor of 160. Effluent concentrations since the membranes were installed have averaged 9 – 47 μg/L, which shows the need to install additional treatment. The draft NPDES Permit allows three years to achieve compliance with the lower discharge standard.

Figure E-16


Historical TA-50 RLWTF MERCURY Concentrations
14
12
10
8
6
4
2
0
ug/L
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

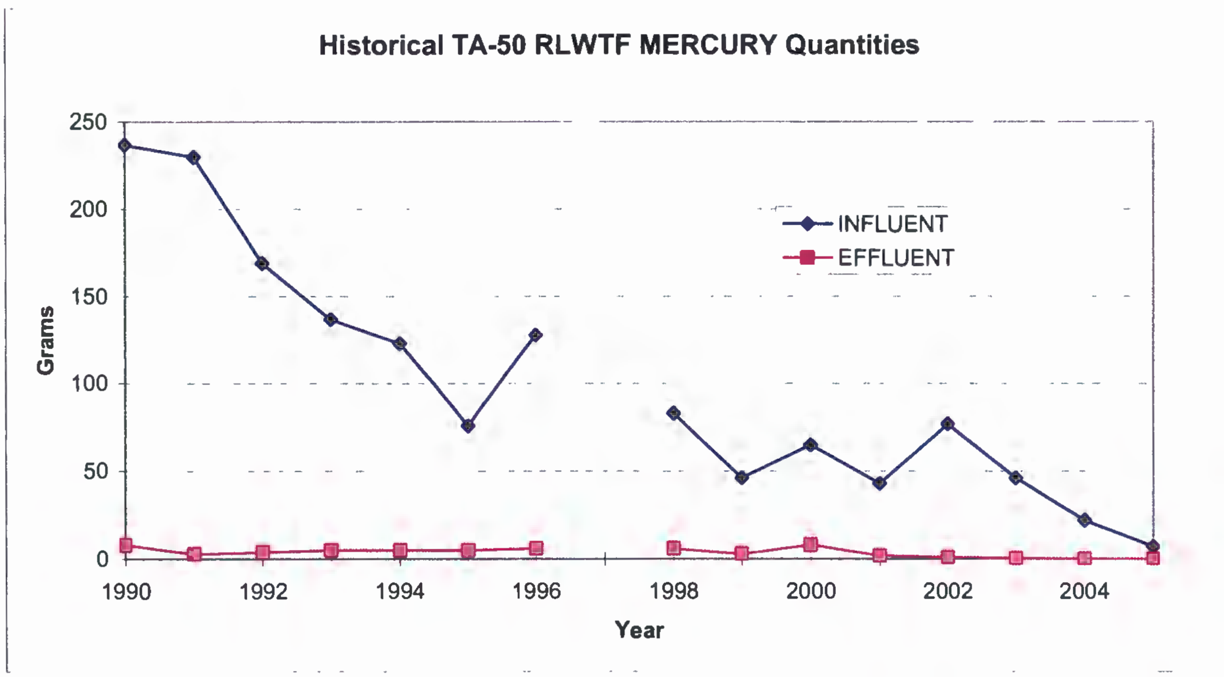
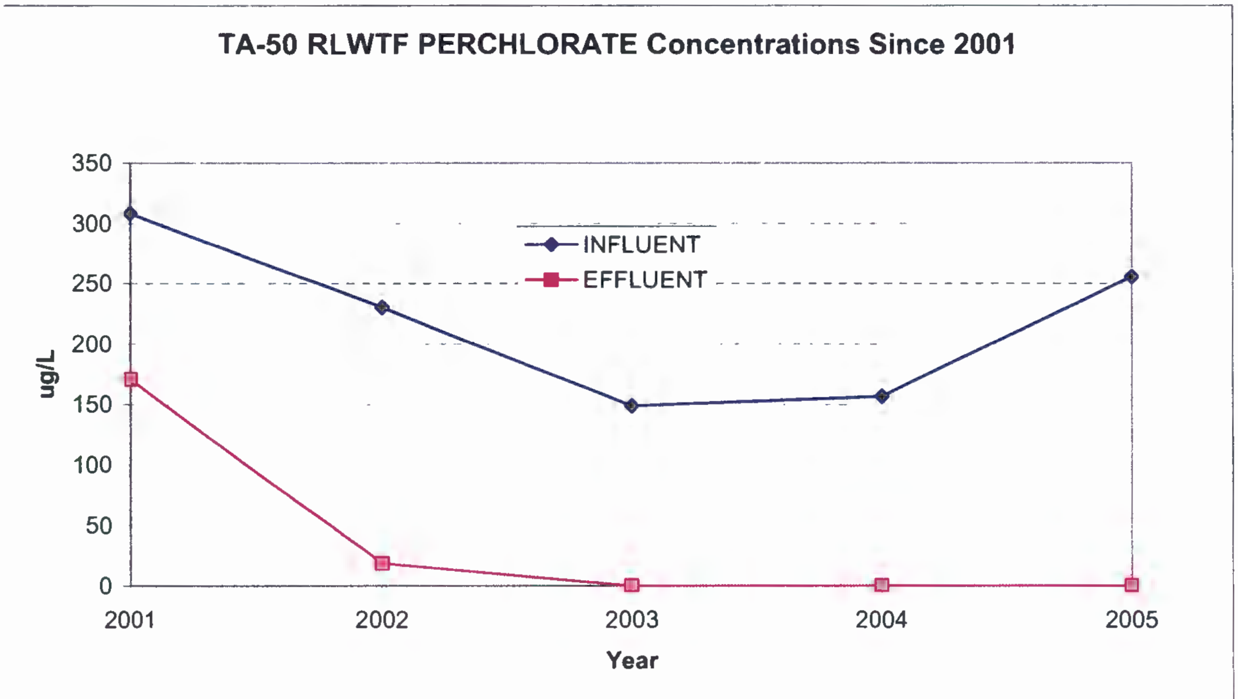

Historical TA-50 RLWTF MERCURY Quantities
250
200
150
100
50
0
Grams
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

Figure E-17


TA-50 RLWTF PERCHLORATE Concentrations Since 2001
350
300
250
200
150
100
50
0
ug/L
INFLUENT
EFFLUENT
2001
2002
2003
2004
2005
Year

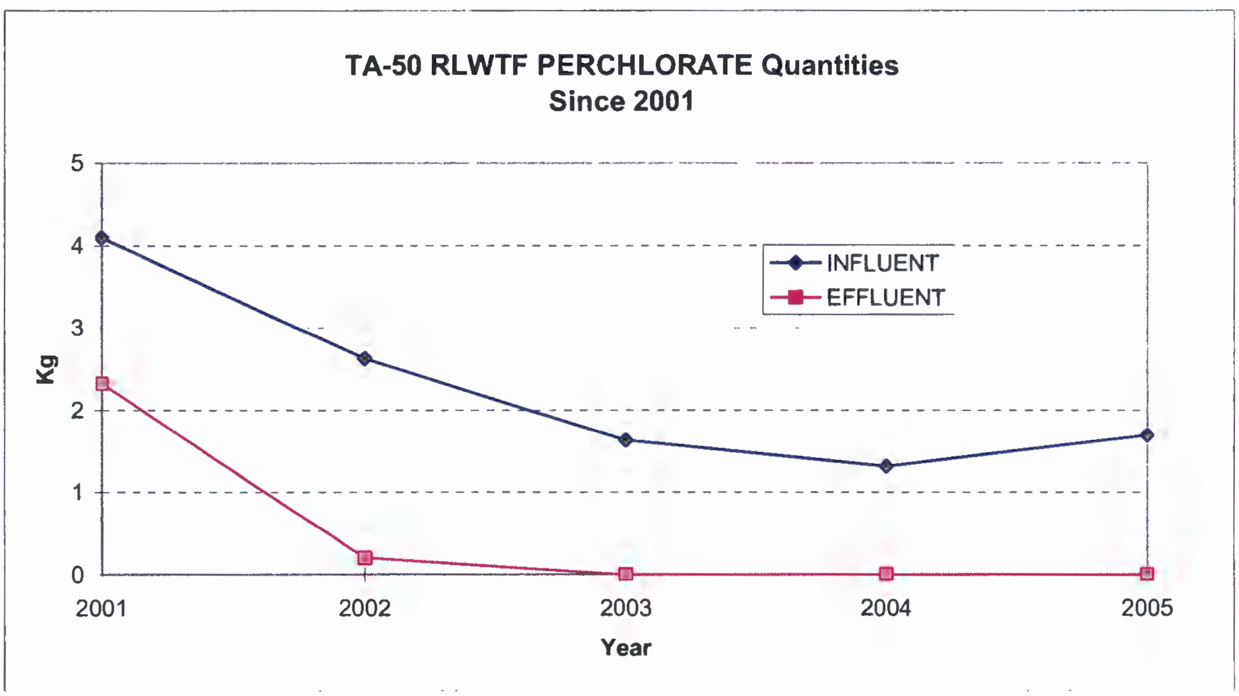
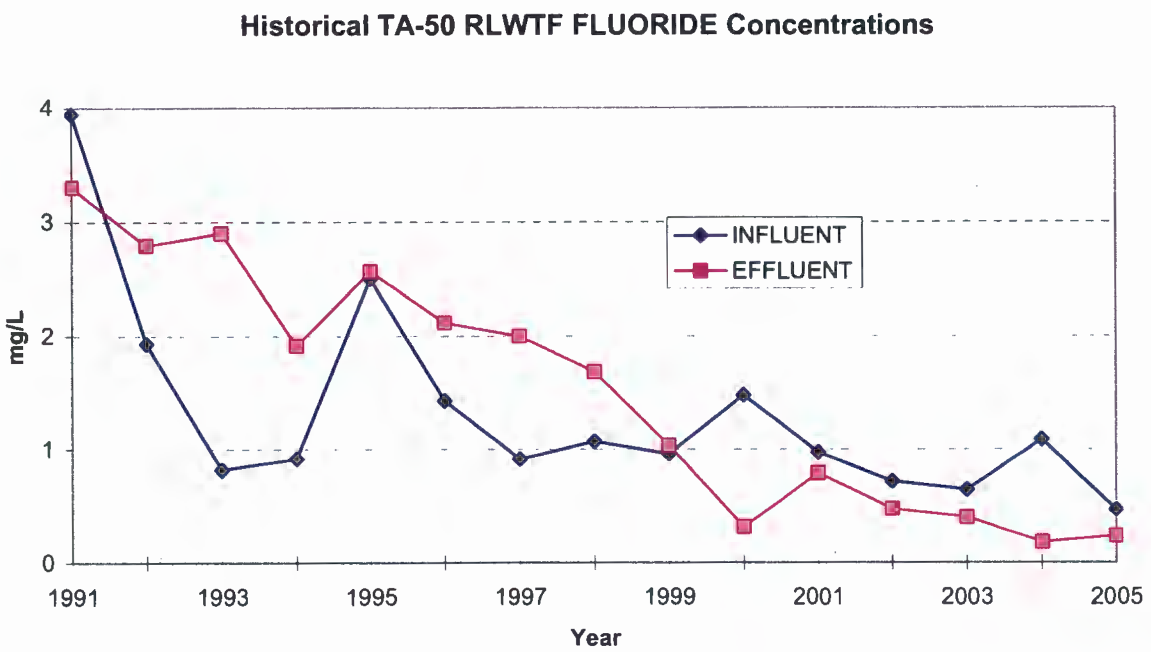

TA-50 RLWTF PERCHLORATE Quantities Since 2001
5
4
3
2
1
0
Kg
INFLUENT
EFFLUENT
2001
2002
2003
2004
2005
Year

Figure E-18


Historical TA-50 RLWTF FLUORIDE Concentrations
mg/L
0
1
2
3
4
1991
1993
1995
1997
1999
2001
2003
2005
Year
INFLUENT
EFFLUENT

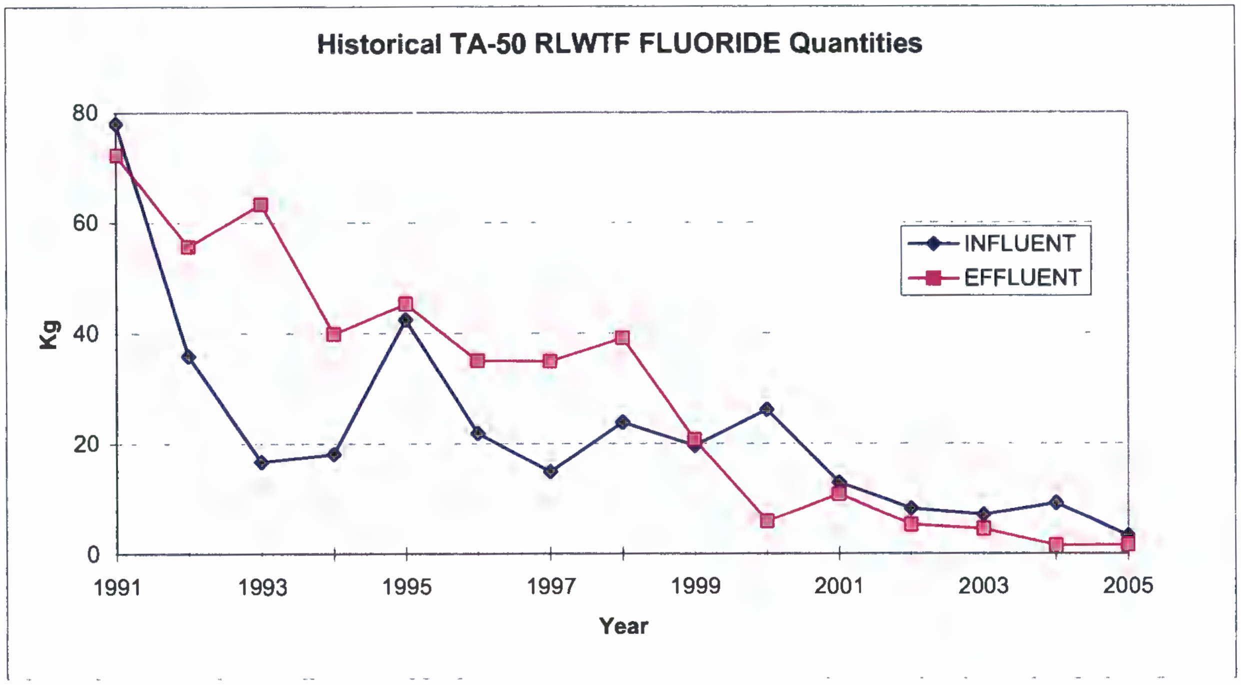
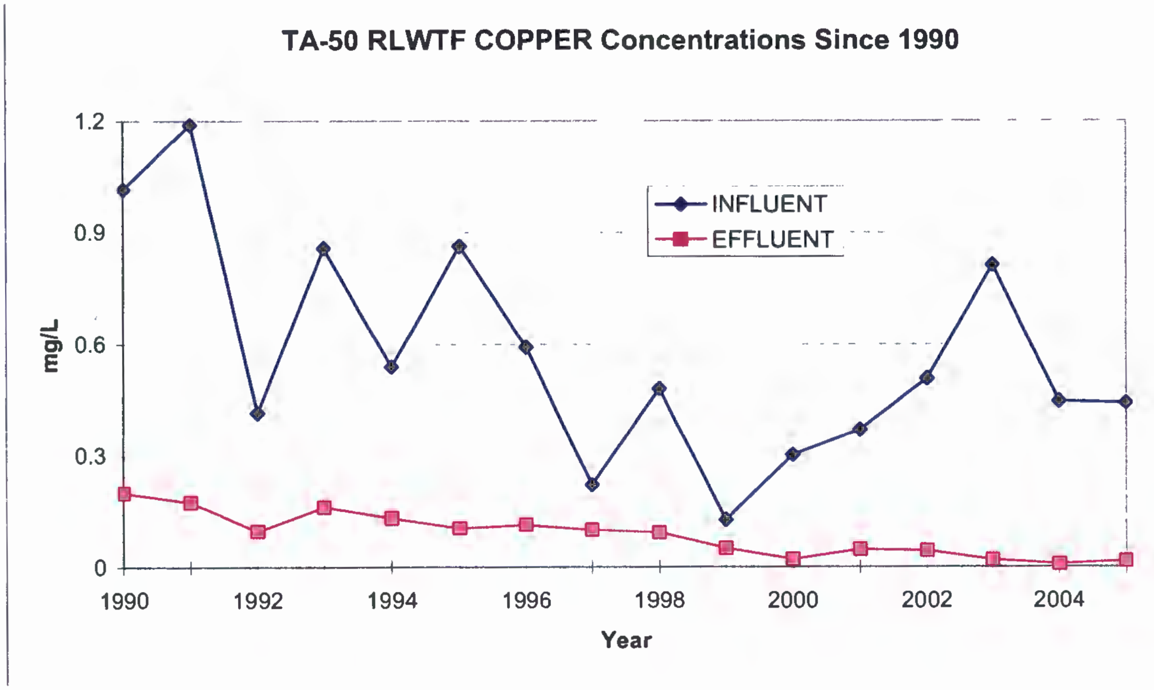
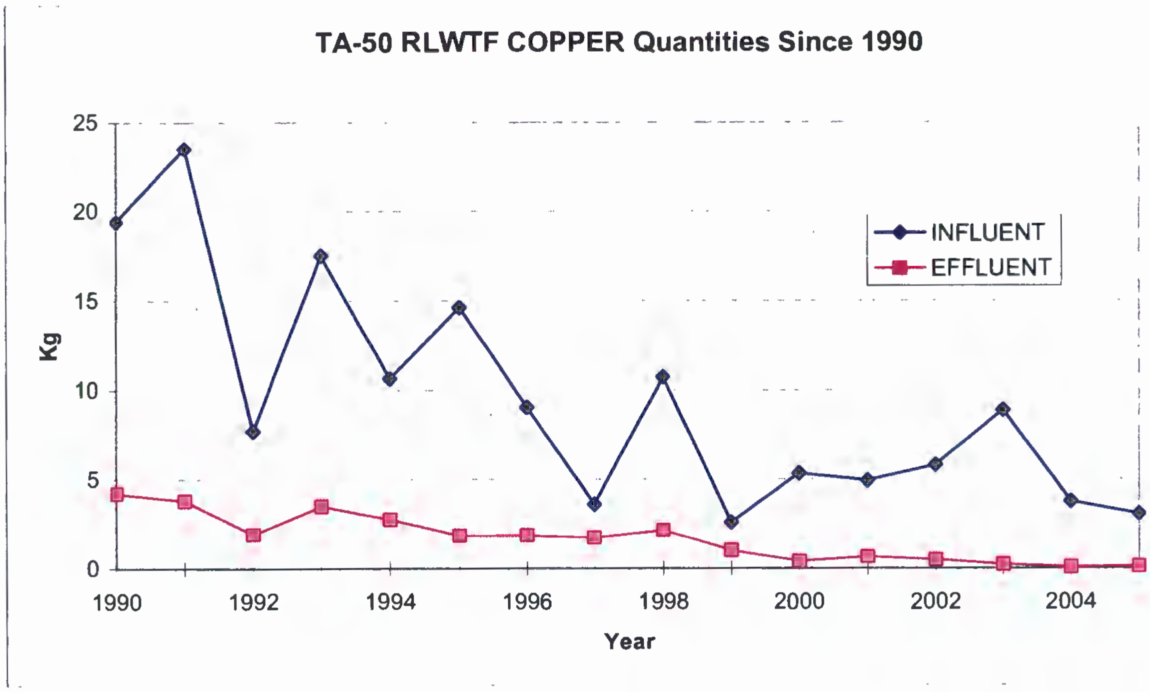

Historical TA-50 RLWTF FLUORIDE Quantities
Kg
0
20
40
60
80
1991
1993
1995
1997
1999
2001
2003
2005
Year
INFLUENT
EFFLUENT

Figure E-19



TA-50 RLWTF COPPER Concentrations Since 1990
mg/L
1.2
0.9
0.6
0.3
0
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year



TA-50 RLWTF COPPER Quantities Since 1990
Kg
25
20
15
10
5
0
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

E.5.4 Parameters of Process Concern

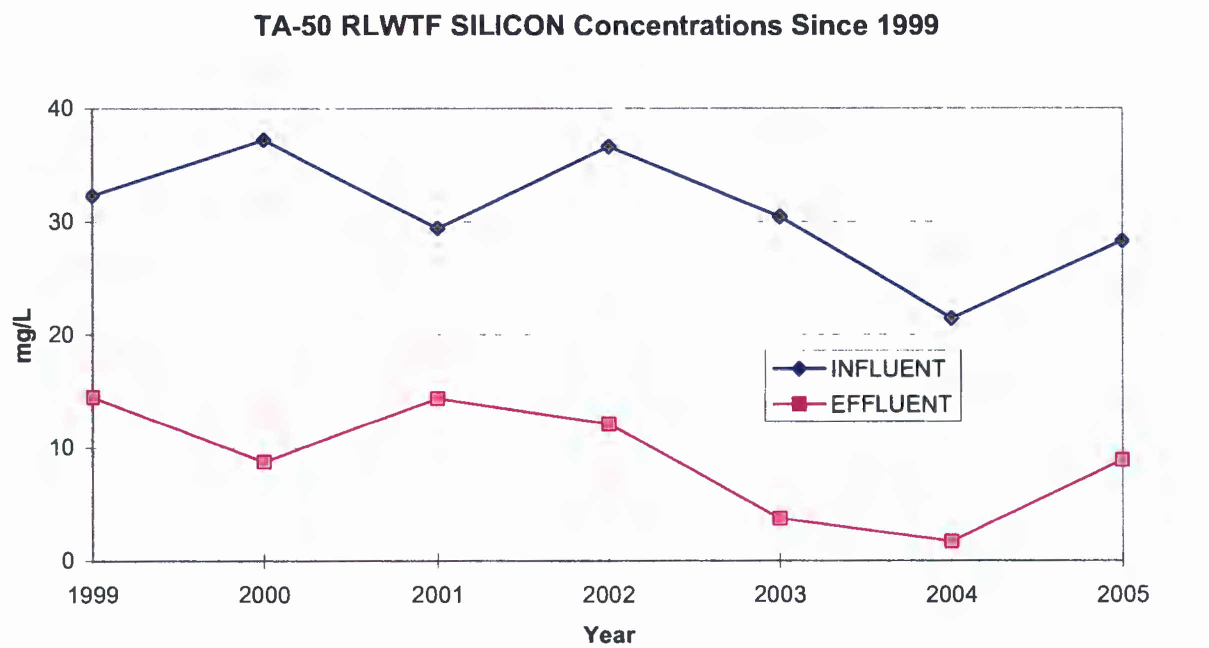
The final set of graphs show influent and effluent concentrations and quantities for three non-regulated parameters – silicon, calcium, and chemical oxygen demand. These parameters have historically been major components of dissolved solids in RLWTF influent and/or effluent; all continue to pose processing challenges.

- Figure E-20, Silicon: New Mexico ground water has sufficient silicon concentration that precipitation and plugging are ongoing process problems, especially when waters are concentrated at the reverse osmosis and evaporation steps. As shown, silicon influent and effluent concentrations have both been fairly constant over the years; Decreasing quantities are the result of decreases in RLW volumes.

- Figure E-21, Calcium: Calcium it has presented processing problems due to precipitation and plugging of equipment in both the MTP and in secondary treatment processes. As the figures illustrate, calcium concentrations in RLWTF influent have been somewhat stable over the years, but calcium in *effluent* has decreased dramatically since the membrane equipment became fully operational in late 1999.

- Figure E-22, COD: While there is an NPDES discharge standard (125 mg/L) for chemical oxygen demand, it presents a greater concern as an indicator of biofouling. Specifically, while RLWTF *influent* has historically been below this concentration, this has not prevented episodes of process upsets caused by biofouling. Of especial concern is that influent concentrations in the past three years have been the highest in the last 16 years. The fact that these higher influent concentrations have not been accompanied by higher effluent concentrations can be explained by the implementation of a pre-oxidation process step in 2001.

Figure E-20


TA-50 RLWTF SILICON Concentrations Since 1999
40
30
20
10
0
mg/L
INFLUENT
EFFLUENT
1999
2000
2001
2002
2003
2004
2005
Year

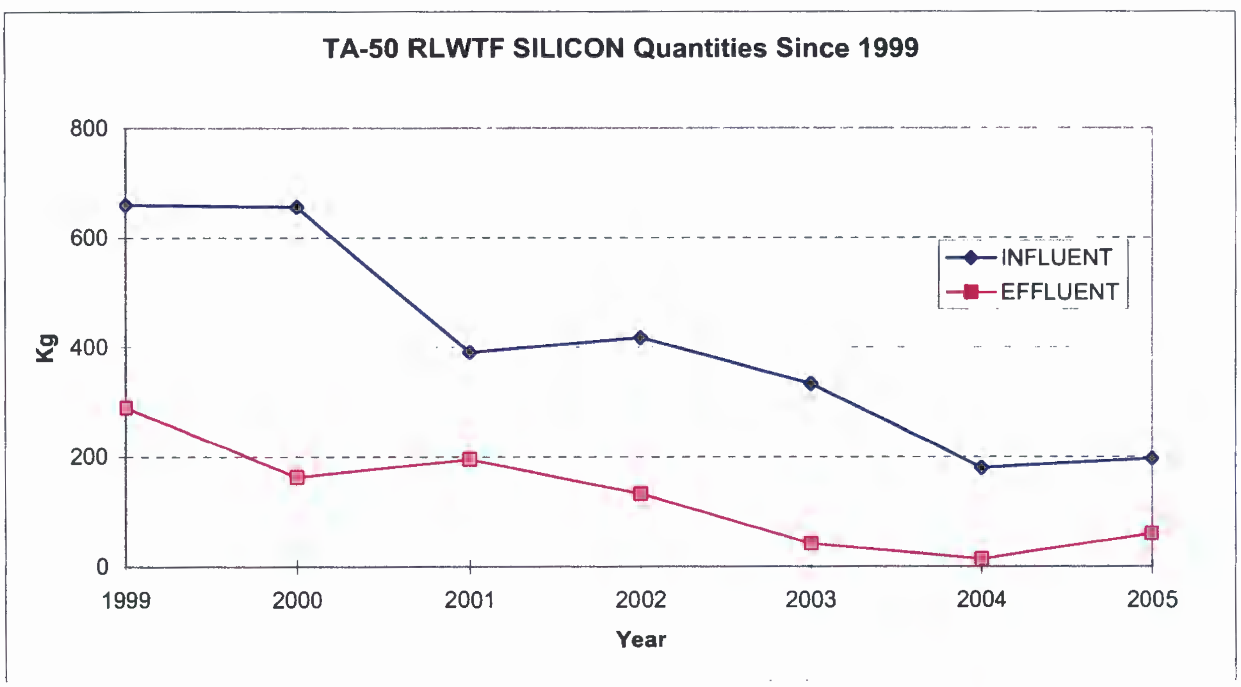
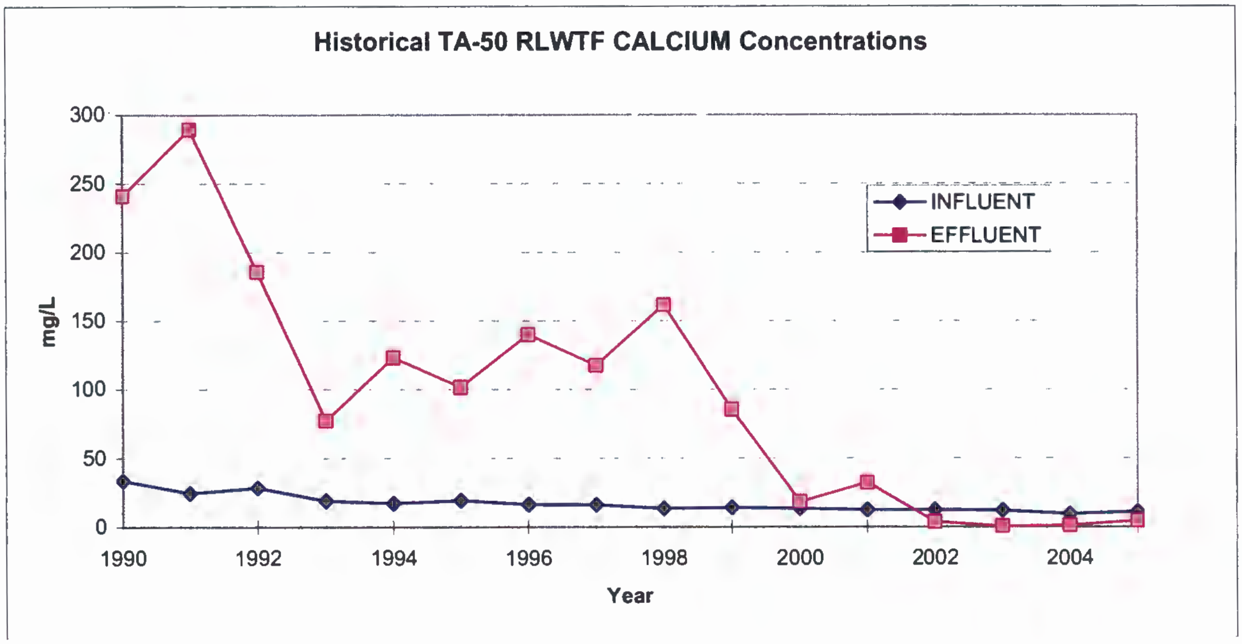

TA-50 RLWTF SILICON Quantities Since 1999
800
600
400
200
0
Kg
INFLUENT
EFFLUENT
1999
2000
2001
2002
2003
2004
2005
Year

Figure E-21


Historical TA-50 RLWTF CALCIUM Concentrations
300
250
200
150
100
50
0
mg/L
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

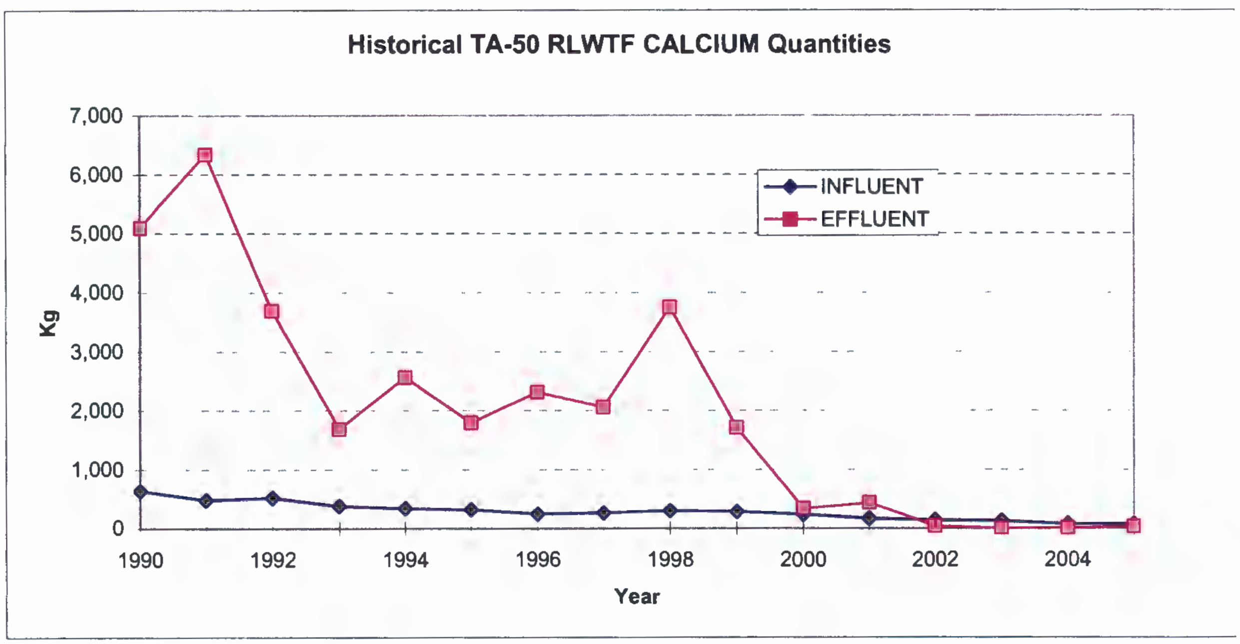
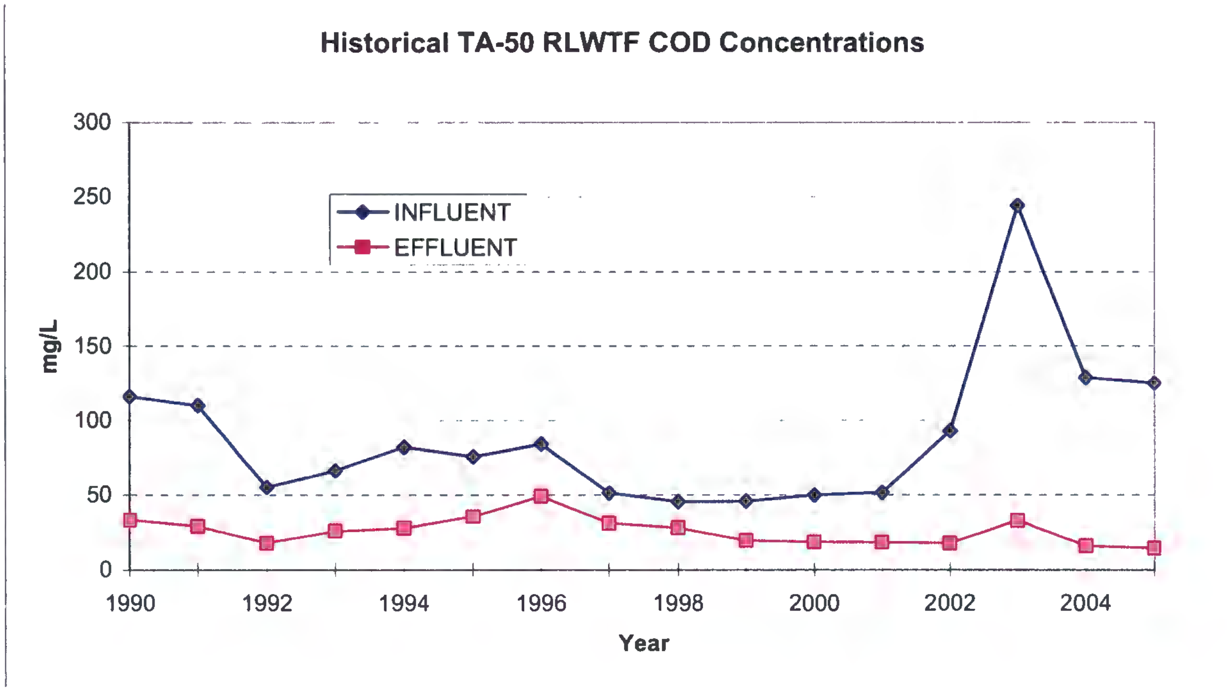
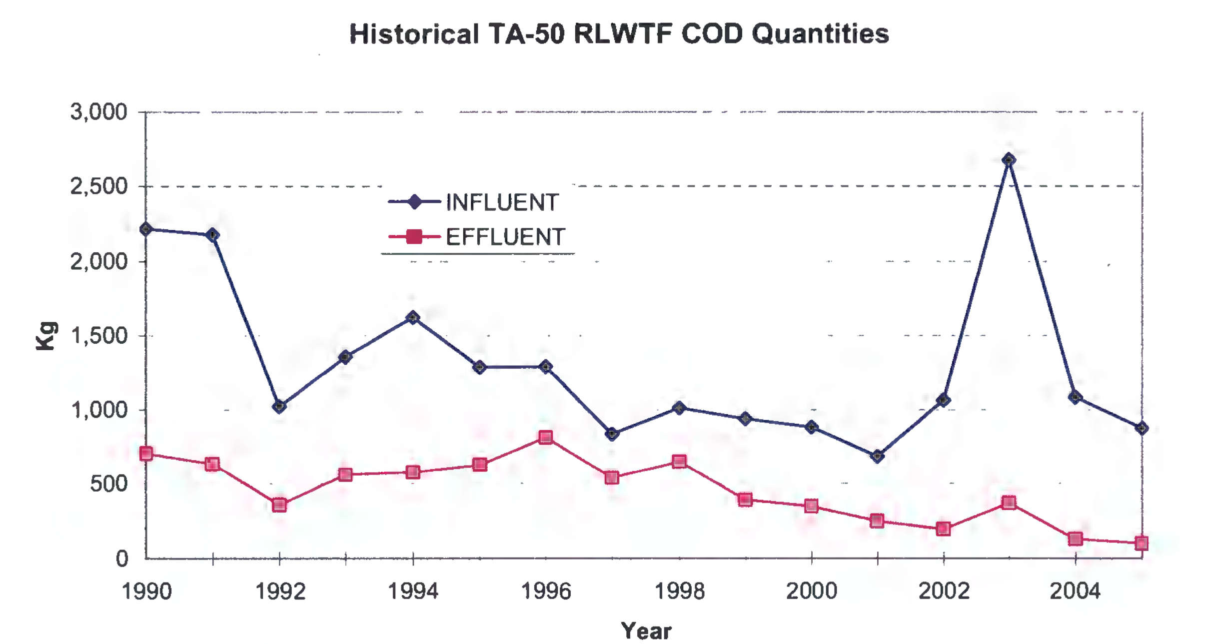

Historical TA-50 RLWTF CALCIUM Quantities
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Kg
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

Figure E-22


Historical TA-50 RLWTF COD Concentrations
300
250
200
150
100
50
0
mg/L
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year


Historical TA-50 RLWTF COD Quantities
3,000
2,500
2,000
1,500
1,000
500
0
Kg
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
Year

E.6 Facility Modifications

The TA-50 RLWTF is beyond its design life. Because of this, problems have been experienced in the facility during operations, and have been identified by self-assessment and external assessments. In order to address and correct the problems, a large number of repair, replace, and/or upgrade projects have had to be executed. A list of recent facility modification projects is summarized in Table E-4 below, and a brief description of each appears in the text that follows.

Table E-4
Recent RLWTF Facility Modifications

Completed	K$	Project
1993	400	1. Repair neutralization chamber
1995	520	2. Install emergency generator, new transformer, other electrical
1995	100	3. Replace acid tank in WM-66
1996	600	4. Repair 25K influent tank
1997	1,430	5. Replace waste lines, TA-55 to TA-50
1997	500	6. Consolidate stacks (only one CAM)
1997	500	7. De-scale clarifiers and piping
1999	5,200	8. TA-53 treatment facilities *
2000	450	9. Effluent tank clean and repair
2001	60	10. Closure of the TA-21 cross-country line
2003	575	11. Effluent manifold tie-in to cross-country line
2003	800	12. CGR ventilation upgrades
2003	500	13. Sludge tank cleanout

* All other projects took place at TA-50.

1. Neutralization chamber: This 30-year-old grit chamber had developed a leak. Completed in 1993 at a cost of $400,000.

2. Emergency generator and new transformer: This project resulted from a failure mode analysis performed by the DOE. The generator (1250 kilowatts) can handle the entire RLWTF electrical load in case of outage. The transformer pad, switchgear housing, and conduit were designed to incorporate a secondary transformer. In addition, Motor Control Center "A" was replaced. Completed in 1995 at a cost of $520,000.

3. Acid tank: This project resulted from an evaluation of the structural integrity of this 30-year-old tank. Completed in 1995 at a cost of $100,000.

4. 25K influent tank: This corrective action was performed in response to Tiger Team (1992-1993) and EPA (1993) audits. A 17,000-gallon steel vessel was inserted into the 25,000-gallon underground concrete cell, thus providing secondary containment and leak detection capability. Completed in 1996 at a cost of $600,000.

5. Waste lines from TA-55: A three-foot bow had developed in the valve pit at TA-50. The entire length of PVC pipe, both primary and secondary piping, was replaced. Completed in 1997 at a cost of $1,430,000.

6. Stack consolidation: Requirements of the Clean Air Act would have required that eight stacks at the RLWTF be outfitted with air samplers and continuous air monitoring. To avoid this expense, these and three other stacks were consolidated into a single stack equipped with an air sampler and CAM. Completed in 1997 at a cost of $ 500,000.

7. De-scale clarifiers and piping: Radioactive liquids were seeping through clarifier walls. Internal surfaces were de-scaled, then re-coated with an epoxy-based paint. Completed in 1997 at a cost of $500,000.

8. TA-53 treatment facility: The solar evaporation ponds at TA-53 had developed leaks, and the underground tanks did not meet RCRA requirements for containment and leak detection. The new facility has two lift stations, three aging tanks, and two above-ground solar evaporation ponds.

9. Effluent tank clean and repair: The high quality of permeate from the TUF and RO membrane units caused radioactivity to leach from the walls of the below-grade concrete effluent tanks. One of the effluent tanks also had developed a leak. To correct these items, tank walls were sandblasted clean, then coated with an impermeable epoxy paint. Completed in 2000 at a cost of $450,000.

10. Closure of the TA-21 cross-country line: This single-walled pipe, approximately two miles in length, was flushed, drained, and capped. Transfers of treated RLW from TA-21 have since been accomplished by truck.

11. Effluent manifold tie-in to cross-country line: The high quality of permeate from the RO unit caused radioactivity to leach from the walls of the effluent line to Mortandad Canyon. Effluent piping, therefore, was routed through the cross-country line that formerly brought pre-treated waters from TA-21 to the TA-50 influent tanks.

12. CGR ventilation upgrades: Existing fans and continuous air monitors were connected to the RS View process control system to allow remote monitoring and control capabilities in the event personnel could not safely report to the facility (e.g., during a wildfire). In addition, ductwork was patched and sealed (Diepolder, August 2003).

13. Sludge tank cleanout: The sludge tank is a 25,000-gallon, in-ground, single-walled, cement. The structural integrity of the tank was compromised at the 80% level, and it was removed from service in 2001. (There were no leaks to the environment.) . Cleanout, performed as preparation for ultimate closure, used a remote mechanism with a rotating, high-pressure nozzle. Completed in 2003 at a cost of $500,000.

E.7 Process Modifications

Discharge standards periodically become more stringent. In 2001, for example, the NPDES permit for Outfall #051 was revised. Improvements to the process are also continually sought. There are economic and environmental benefits from changing process equipment and/or flows. A list of recent process modification projects is summarized in Table E-5 below, and a brief description of each appears in the text that follows.

Table E-5
Recent RLWTF Process Modifications

Completed	K$	Project
1996	800	1. Replace old PDP 1144 computer control system
1997	1,200	2. Install four above-ground storage tanks (Bldg 50-248)
1999	200	3. Electrochemical denitrification
1999	4,050	4. Membrane processes (TUF, CUF, RO)
1999	350	5. Electrodialysis reversal
2000	1,400	6. Interim evaporator
2001	300	7. TUF upgrades and valve replacement
2001	6	8. Use of gravity filter effluent for clarifier chemicals
2001	20	9. Permanganate pre-oxidation
2002	300	10. Ion exchange for perchlorate removal
2003	150	11. Replace old G2 computer control system
2005	0	12. Recycle of reverse osmosis concentrate

1. Computer control system: Computer hardware and software are soon outdated. This project replaced the old (PDP 1144) with a newer (G2) control system. Completed in 1996 at a cost of $800,000.

2. Above-ground storage tanks: This corrective action was performed in response to Tiger Team (1992-1993) and EPA (1993) audits. Four above-ground steel tanks (20,000 gallons each) were installed within a concrete basin, thus providing secondary containment and leak detection capability. Completed in 1997 at a cost of $1,200,000.

3. Electrochemical Denitrification: This pilot-scale unit was installed for the treatment of small-volume RLW streams that have high nitrate concentrations. Completed in 1999 at a cost of $600,000.

4. Membrane processes: The tubular ultrafilter, centrifugal ultrafilter, and reverse osmosis unit operations were installed in order to produce high-quality discharge waters that met State of New Mexico limits for nitrates and DOE guidelines for radioactivity. Completed in 1999 at a cost of $4,050,000.

5. Electrodialysis reversal: This unit operation followed was installed to concentrate the reject waste stream from the new reverse osmosis unit. Completed in 1999 at a cost of $350,000.

6. Interim evaporator: This unit operation was installed to concentrate the reject stream from the electrodialysis reversal unit. Completed in 2000 at a cost of $1,400,000.

7. TUF upgrades and valve replacement: A total of 50 air-actuated control valves are used in the spongeball cleaning system. Low-quality valves developed leaks shortly after the TUF started up in 1999. Poor design prevented the replacement of any single valve without taking the entire TUF unit off line, and without removing the header to all 50 valves. Valves were replaced and the piping manifold re-designed to allow access to and replacement of individual valves. In addition, TUF capacity was enhanced by increasing the number of membrane tubes from 300 to 350. Completed in 2001 at a cost of $300,000.

8. Use of gravity filter effluent for clarifier chemicals: This process modification was a recommendation of the Secondary Stream Study. Industrial water had previously been used for the dissolution of lime and ferric sulfate. Use of gravity filter effluent reduced secondary waste generation by six gallons per minute or about 2,000 gallons per operating day. This modification resulted in pollution prevention awards from LANL and DOE/HQ.

9. Permanganate pre-oxidation: This process modification was a recommendation of the Secondary Stream Study. Use of permanganate both oxidizes plutonium and americium to higher valence states that are less soluble, and also creates a micro-flocculation effect that enhances settling and particle filtration.

10. Ion exchange for perchlorate removal: Pending EPA regulations for perchlorate discharges led to research into treatment methods. Ion exchange was successfully pilot-tested in 2002, and six full-scale columns subsequently installed. Completed in 2002 at a cost of $300,000.

11. Computer control system: Computer hardware and software are soon outdated. This project replaced the seven-year-old PDP 1144 system with a newer RS View control system. Completed in 2003 at a cost of $150,000.

12. Recycle of reverse osmosis concentrate: The RO concentrate stream had historically been drawn out of the main treatment process for subsequent treatment as a secondary waste stream. The process change was accompanied by a six-week plant test to assess impacts of the change. The test showed that up to 70% of the RO concentrate could be recycled. attendant savings include reduced evaporation costs, reduced transportation of bottoms for solidification, and reduced bottoms solidification costs.

:03547

Memorandum of Meeting or Phone Conversation

[redacted]

Telephone	X Meeting	Time: 2:00 – 3:00 PM	Date: 9/28/06

Individuals Attending Teleconference or Meeting:

__NMED: Robert George______________ __LANL: Bob Beers, Isaac Valdez, Steve Hansen

Subject: __LANL proposal to design evaporative basins for the discharge of TA-50 treated effluent.

Discussion:

1) LANL proposes the construction of 4, above ground evaporative basins with 4 ft walls, interconnecting piping and 1 foot of freeboard for the discharge of the TA-50 treated effluent as part of LANL's zero liquid discharge (ZLD) approach. Do the basins qualify as "lagoons" and are they subject to NMED's lagoon liner policy?

2) How would this project be best permitted?

- As a stand alone DP?

- As a modification or amendment of DP-1132?

3) A new rad/liquid waste facility will be constructed within 3 – 5 years that will eventually discharge preferentially to the new evaporative basins or, under emergency, to Mortedad canyon under the NPDES permit and DP.

4) Given the double liner and leak detection systems of the lagoons, would NMED require monitoring wells for the site of the evaporative basins?

5) If a permit were issued for the evaporative lagoons, would the TA-50 plant be able to discharge to it, or does DP-1132 need to become effective first?

Conclusions:

1) No, the basins are not lagoons and the policy does not apply. LANL must address NMED's concerns regarding the design of the basins, such as wind driven erosion or spillage, evaporative rate, sediment removal, etc. through engineering controls or some other demonstration.
2) NMED will need to deliberate on this and then discuss the outcome with LANL.
3) This unit will need to be permitted, perhaps under DP-1132.
4) It is likely that no ground water monitoring wells would be required, due to the double liners and leak detection. The DP conditions would be similar to the proposed conditions for the sigma mesa evaporative lagoons.__
5) This needs to be decided by NMED.

Initialed RJG

Distributions: __DP-1132 file

:03550

1-31-07

GROUND WATER

JAN 3 0 2007

BUREAU

Los Alamos
NATIONAL LABORATORY
EST.1943

Environmental Protection Division
Water Quality & RCRA (ENV-RCRA)
P.O. Box 1663, Mail Stop K490
Los Alamos, New Mexico 87545
(505) 667-7969/FAX: (505) 665-9344

Date: January 23, 2007
Refer To: ENV-RCRA: 07-011
LA-UR: 07-0277

Mr. Christopher F. Vick
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: GROUND WATER DISCHARGE PLAN QUARTERLY REPORT, FOURTH QUARTER 2006, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (DP-1132)

Dear Mr. Vick:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the fourth quarter (October, November, and December) of 2006. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at four Mortandad Canyon alluvial wells, MCO-3, MCO-4B, MCO-6, and MCO-7, during the fourth quarter of 2006. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Laboratory's Water Quality Database (http://wqdbworld.lanl.gov/).

RLWTF Effluent Monitoring Results
Table 2.0 presents the analytical results from the weekly composite sampling of the RLWTF's effluent for the period September-December, 2006. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated by the

RLWTF during a 7-day period. Samples are submitted to GEL for analysis. All of the FWC results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen, fluoride, and total dissolved solids.

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen, perchlorate (ClO_4, by Method 314.0, Ion Chromatography), fluoride, and total dissolved solids for the fourth quarter of 2006. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen, fluoride, and total dissolved solids. All of the FMC results were well below the federal Drinking Water Equivalent Level (DWEL) for perchlorate of 24.5 μg/L.

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & RCRA Group

BB/tag

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D. Moss, RLW, MS E518
ENV-RCRA, File, MS K490
IRM-RMMSO, MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, 4th Quarter, 2006.

Sampling Location	Sample Date	Perchlorate by LC/MS/MS[2] (ug/L)	Perchlorate by IC[3] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	11/13/2006	2.86	<4	1.40	0.09	0.18	144	0.35
MCO-3, field duplicate[4]	11/13/2006	2.89	<4	1.41	0.11	0.16	210	0.39
MCO-4B	10/19/2006	30.5J	29.8	1.88	<0.1	<0.01	285	0.98
MCO-4B, field duplicate[4]	10/19/2006	30.1J	30.6	1.84	<0.14	<0.01	283	0.95
MCO-6	10/30/2006	24.7J	24.5	1.96	0.24	<0.1	330	1.22
MCO-7	10/25/2006	26.9	25.3	1.93	0.17	<0.01	279	1.46
MCO-7	10/26/2006			1.96	1.74	<0.01		
NM WQCC 3103 Ground Water Standards (mg/L)		*NA*[5]	*NA*[5]	*10*[1]	*NA*[5]	*NA*[5]	*1000*	*1.6*

Notes:

[1]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

[2]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[3] IC means the EPA Method 314, perchlorate analysis by Ion Chromatography.

[4]LANL collects duplicate samples as part of its QC program.

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

J indicates an estimated value. The result was less than the reporting limit, but greater than the detection limit.

All analyses by General Engineering Laboratories, Charleston, SC.

All samples filtered.

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, 4th Quarter, 2006.

		RLWTF Final Weekly Composite Results (mg/L)		
Monitoring Period	**Sample Composite Date**	**NO3+NO2-N[1] (mg/L)**	**Fluoride[1] (mg/L)**	**TDS[1] (mg/L)**
September, 2006	9/11/2006	0.21	0.07J	74
	9/13/2006	0.22	0.08J	70
	9/18/2006	0.24	0.07J	76
	9/25/2006	0.38	0.10	111
October, 2006	10/2/2006	0.77	0.11	106
	10/10/2006	0.89	0.11	95
	10/16/2006	0.97	<0.16	127
	10/23/2006	1.29	0.14	191
	10/30/2006	1.09	0.19	200
November, 2006	No Discharge (10/30-11/4)			
	11/13/2006	0.94	0.24	298
	11/20/2006	2.01J	0.19	165
	No Discharge (11/19-11/25)			
December, 2006	12/4/2006	1.95	<0.03	79
	12/11/2006	2.40	0.17	152J
	No Discharge (12/17-12/23)			
	No Discharge (12/24-12/30)			
4th Quarter 2006 Averages (mg/L)[3]		**1.03**	**0.13**	**134**
NM WQCC 3103. Ground Water Standards (mg/L)		*10[2]*	*1.6*	*1000*

Notes:

[1]Analysis by General Engineering Laboratories, Inc., Charleston, SC

[2]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

[3]4th quarter averages include results from September 2006.

J means the reported value is greater than the Method Detection Limit (MDL) but less than the Reporting Limit (RL).

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 4th Quarter, 2006.

Monitoring Period	RLWTF FMC Results[1]			
	NO3-N (mg/L)	Perchlorate by IC[2] (ug/L)	TDS (mg/L)	F (mg/L)
October, 2006	0.69	0 +/-1	40	0.15
November, 2006	0.82	0 +/-1	209	0.12
December, 2006	1.1	0 +/-1	229	0.09
NM WQCC 3103. Ground Water Standards	*10 mg/L*	*24.5[3] ug/L*	*1000 mg/L*	*1.6 mg/L*

Notes:
[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.
[2]IC means EPA Method 314.0, perchlorate analysis by Ion Chromatography.
[3]The federal Drinking Water Equivalent Level (DWEL) for perchlorate is 24.5 ug/L.

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DP 1132 Blue file
MKS

GR... UND WATER

APR 26 2007

BUREAU

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Environmental Protection Division
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Date: April 23, 2007
Refer To: ENV-RCRA: 07-067
LA-UR: 07-2483

Mr. Robert George, Domestic Team Leader
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
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Santa Fe, New Mexico 87502-6110

SUBJECT: GROUND WATER DISCHARGE PLAN QUARTERLY REPORT, FIRST QUARTER 2007, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (DP-1132)

Dear Mr. George:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the first quarter (January, February, and March) of 2007. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at four Mortandad Canyon alluvial wells, MCO-3, MCO-4B, MCO-6, and MCO-7, during the first quarter of 2007. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Laboratory's Water Quality Database (http://wqdbworld.lanl.gov/).

RLWTF Effluent Monitoring Results
Table 2.0 presents the analytical results from the weekly composite sampling of the RLWTF's effluent for the period January through March, 2007. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated

by the RLWTF during a 7-day period. Samples are submitted to GEL for analysis. All of the FWC results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen, fluoride, and total dissolved solids.

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen, perchlorate (ClO_4, by Method 314.0, Ion Chromatography), fluoride, and total dissolved solids for the first quarter of 2007. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen, fluoride, and total dissolved solids.

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & RCRA Group

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David Moss, RLW, MS E518
ENV-RCRA, File, MS K490
IRM-RMMSO, MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, 1st Quarter, 2007.

Sampling Location	Sample Date	Perchlorate by LC/MS/MS[1] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	3/8/2007	1.80	3.89	0.366	0.027J	730	0.242
MCO-3, field duplicate[2]	3/8/2007	1.83	3.35	0.375	0.023J	715	0.238
MCO-4B	2/27/2007	15.7	1.55	0.138	<0.01U	284	0.761
MCO-6	2/28/2007	22.4	2.05	0.132	<0.01U	271	1.01
MCO-7	3/1/2007	27.7	1.31	0.157	<0.01U	276	1.27
NM WQCC 3103 Ground Water Standards		*NA*[4]	*10 mg/L*[3]	*NA*[4]	*NA*[4]	*1000 mg/L*	*1.6 mg/L*

Notes:

[1]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[2]LANL collects duplicate samples as part of its QC program.

[3]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

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

J indicates an estimated value. The result was less than the reporting limit, but greater than the detection limit.

All analyses by General Engineering Laboratories, Charleston, SC.

All samples filtered.

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, 1st Quarter, 2007.

		RLWTF Final Weekly Composite Results[1]			
Monitoring Period	**Sample Composite Date**	**NO_3+NO_2-N (mg/L)**	**ClO_4 (ug/L)**	**Fluoride (mg/L)**	**TDS (mg/L)**
January, 2007	1/8/2007	5.52	0.282	0.211	210
	1/15/2007	4.21	0.283	0.208	329
	1/22/2007	3.68	0.0503J	0.197	240
	1/29/2007	1.63	<0.05U	0.199	176
February, 2007	2/5/2007	1.93	<0.05U	0.170	338
	2/5/07-reanalysis	2.42	<0.05U	0.232	305
	2/12/2007	1.90	<0.05U	0.232	265
	2/19/2007	3.05	<0.05U	0.239	410
	2/26/2007	6.60	<0.05U	0.186	309
March, 2007	No Discharge (2/26-3/2)				
	3/7/2007	7.37	<0.05U	0.101	134
	3/12/2007	7.01	<0.05U	0.157	237
	3/19/2007	pending	pending	pending	pending
	3/26/2007	pending	pending	pending	pending
1st Quarter 2007 Averages (mg/L)		**4.12**	**0.092**	**0.194**	**268**
NM WQCC 3103 Ground Water Standards		*10 mg/L*[2]	*NA*[3]	*1.6 mg/L*	*1000 mg/L*

Notes:

[1]Analysis by General Engineering Laboratories, Inc., Charleston, SC

[2]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

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

J means the reported value is greater than the Method Detection Limit (MDL) but less than the Reporting Limit (RL).

U means that the analyte was not detected at the specified reporting limit.

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 1st Quarter, 2007.

	RLWTF FMC Results[1]			
Monitoring Period	**NO3-N (mg/L)**	**Perchlorate by IC[2] (ug/L)**	**TDS (mg/L)**	**F (mg/L)**
January, 2007	0.87	0 +/-1	221	0.32
February, 2007	1.13	0 +/-1	249	0.34
March, 2007	3.18	0 +/-1	124	0.19
NM WQCC 3103 Ground Water Standards	*10 mg/L*	*NA[3]*	*1000 mg/L*	*1.6 mg/L*

Notes:

[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.

[2]IC means EPA Method 314.0, perchlorate analysis by Ion Chromatography.

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

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Los Alamos
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GROUND WATER

JUN 13 2007

BUREAU

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Date: June 11, 2007
Refer To: ENV-RCRA: 07-135

Mr. Robert George, Domestic Team Leader
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Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
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SUBJECT: TA-50 RLWTF ANNUAL REPORT FOR 2006

Dear Mr. George:

Please find enclosed the following Los Alamos National Laboratory report: *Radioactive Liquid Waste Treatment Facility Annual Report for 2006* (LA-UR-07-3447, May 2007). This report is being provided to your agency as supporting documentation for the Laboratory's Ground Water Discharge Plan Application (DP-1132) for the Radioactive Liquid Waste Treatment Facility (RLWTF) at Technical Area (TA)-50.

The *RLWTF Annual Report for 2006* contains summary information about flows, concentrations, and quantities received and discharged at the four LANL radioactive liquid waste treatment facilities (two at TA-50, and one each at TA-21 and TA-53), with emphasis on the low-level RLW facility at TA-50. The report also has two appendices that provide additional information about the TA-50 RLWTF, including some historical perspectives and a detailed discussion of unit operations during 2006.

The report shows that, during calendar year 2006, TA-50 RLWTF effluent:

- Met DOE standards set forth in Department of Energy (DOE) Order 5400.5 for radiological discharges, and has now done so for seven consecutive years;
- Was in compliance with all 21 NPDES water quality parameters, and has also now done so for seven consecutive years;
- Voluntarily met NM WQCC 3103 ground water standards for fluoride, nitrate, and TDS, and has now met these standards for all but two weeks during the last seven years; and

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- Complied with DOE's request that tritium discharges be less than 1% of the standard set forth in Order 5400.5, and has now done so for 70 consecutive months.

Please contact me at 505-667-7969 if you have any questions regarding this report.

Sincerely,

Bob Beers
Water Quality and RCRA Group

BB/tag

Enclosures: a/s

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LA-UR-07-3447

Approved for public release; distribution is unlimited

Title: Radioactive Liquid Waste Treatment Facility Annual Report for 2006

Author(s): J.C. Del Signore
R.L. Watkins

Intended for: Environmental & Waste Management Facility Operations

May 2007

Los Alamos NATIONAL LABORATORY
EST. 1943

Form 836 (7/06)

LA-UR-07-3447

Radioactive Liquid Waste Treatment Facility Annual Report For 2006

	Signature	Date
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Report Preparation		
Ruth Watkins, EWMO -RLW	Ruth Watkins	[illegible]
Process Engineer		
R.L. McClenahan, EWMO -RLW	R L McClenahan	5/25/07
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Los Alamos National Laboratory
Radioactive Liquid Waste Treatment Facility
Mail Stop E518, Los Alamos, NM 87545

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Acronyms and Abbreviations

Ci	curie (3.7 x 10^{10} disintegrations per second)
COD	chemical oxygen demand
CY	calendar year
DCG	derived concentration guidelines
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
Final50	composite sample of effluent from the RLWTF
IX	ion exchange
Kg	kilogram
L	liter
LANL	Los Alamos National Laboratory
MDL	method detection limit
meq/L	milliequivalents per liter
mg/L	milligram per liter
µS/cm	microSiemens per centimeter
µg/L	microgram per liter
mrem	millirem
nCi/L	nanocuries per liter (10^{-9} curies per liter)
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
pCi/L	picocuries per liter (10^{-12} curies per liter)
Pu-239	plutonium isotope with atomic weight of 239
Raw50	composite sample of daily influent to RLWTF via the RLWCS
RLW	radioactive liquid waste
RLWCS	radioactive liquid waste collection system
RLWTF	radioactive liquid waste treatment facility
RO	reverse osmosis
SVOC	semi-volatile organic chemical(s)
TA	technical area
TDS	total dissolved solids
TSS	total suspended solids
TUF	tubular ultrafilter
VOC	volatile organic chemical(s)

1. Overview of Facilities and Operations

There are four Radioactive Liquid Waste Treatment Facilities (RLWTF) at the Los Alamos National Laboratory, one each at TA-21 and TA-53, and two at TA-50. The RLW facilities at TA-50 are housed within the same structure, but treat different radioactive liquid waste (RLW) streams and have different safety basis and quality assurance classifications and requirements.

1.1 TA-50 RLWTF for Low-Level RLW

The low-level RLW facility at TA-50 receives and treats low-level RLW from more than 1000 generating points at LANL. RLW are sent from generator facilities to TA-50 via an underground collection system that has about four miles of double-walled collection pipes. Treated waters are discharged to the environment through an outfall in Mortandad Canyon. One state and two federal agencies monitor the quality of these treated waters.

Primary structures at the TA-50 RLWTF for the treatment of low-level RLW are Building 50-01, 50-02, 50-90, 50-248, and a trailer-based evaporator. These structures, with a combined area of approximately 55,000 square feet, house process areas, operations support areas, analytical laboratories, and offices (Del Signore, 07/19/01). The facility has a main treatment process (MTP) with five unit operations, and a secondary treatment process consisting of two unit operations for the treatment of wastes generated by the MTP. Although the facility has been designated a Hazard Category 2 nuclear facility, low-level RLW operations primarily have Management Level 3 quality assurance requirements.

The TA-50 RLWTF is now 44 years old. Because of its age, and because of changing regulations, this facility has undergone significant modifications. The infusion of capital into the TA-50 facility for repairs and upgrades has exceeded $15 million since 1997, including projects for stack consolidation, repair of tanks and equipment, and the installation of new processes in 1999 and 2002 to address more stringent discharge standards.

1.2 TA-53 Facility

The facility at TA-53 treats RLW from accelerator research at the Los Alamos Neutron Science Center through water storage, to allow radioisotope decay, and solar evaporation. The TA-53 facility started operation in December 1999, and is categorized as a radiological facility.

Water flows by gravity into lift stations adjacent to Experimental Area A and the Lujan center. The RLW is pumped from these lift stations through double-walled underground piping to one of three 30,000-gallon tanks inside Building 53-945, at the east end of TA-53. The tanks allow decay of radioisotopes created by the LANSCE accelerator beam, most of which have short half-lives. After aging, the RLW is pumped to one of two solar evaporation basins, each with a capacity of 125,000 gallons.

Tritiated waters are occasionally trucked directly to the TA-53 basins for evaporation. The waters meet NPDES, NMED, and DOE discharge standards, but fail to meet the voluntary commitment to discharge tritium at less than 20,000 nanocuries per liter (i.e., at less than 1% of the DOE limit for tritium).

1.3 Transuranic RLW Facility

Also referred to as Room 60, the transuranic facility receives and treats an acid waste stream and a caustic waste stream from the plutonium facility at TA-55. These two streams flow to TA-50 via two underground double-walled collection pipes. Treated transuranic waters are sent to the low-level processes at TA-50.

The transuranic RLW process capability was designed and installed in 1982, and brought online in 1983. Structures consist of a valve station at 50-201, two influent storage tanks in 50-66, and the treatment process within Room 60 of Building 50-01. This facility has been designated a Hazard Category 2 nuclear facility, and primarily has Management Level 2 quality assurance requirements.

Current facility modifications include the replacement of transfer lines between TA-55 and TA-50, replacement of the caustic tank in 50-66, and replacement of piping and equipment in Room 60 itself.

1.4 TA-21 Facility

The facility at TA-21 pre-treats RLW from tritium research at TA-21 using a clarifier and a gravity filter. Effluent from the facility is transferred via tanker truck to either the TA-50 low-level RLWTF or the TA-53 Facility for additional treatment.

The facility is small (4200 ft^2) and, having been constructed in 1966, old (LANL, 09/30/03, p.B-3). Process equipment is smaller than that at the TA-50 RLWTF because volumes are smaller. For example, the TA-21 clarifier has a capacity of 4,000 gallons, while that at TA-50 can hold 24,000 gallons. Associated with the facility are an office trailer and a number of above-ground and below-grade storage tanks. The TA-21 RLWTF is categorized as a radiological facility.

2. TA-50 Operations Summary for 2006

2.1 Effluent Quality

Two federal and one state agency monitor the quality of treated waters discharged from the TA-50 RLWTF into Mortandad Canyon. The United States Environmental Protection Agency (USEPA) regulates discharges via NPDES permit number NM0028355 under the National Pollutant Discharge Elimination System (NPDES). The permit stipulates sampling method, sampling frequency, and water quality requirements (i.e., discharge limits) for 21 water parameters. (EPA, 12/29/00) Additionally, the TA-50 RLWTF effluent must meet the guidelines of the United States Department of Energy (DOE) Order 5400.5, "Radiation Protection of the Public and the Environment". (DOE, 01/17/93)

LANL also has voluntary commitments (a) to the New Mexico Environment Department (NMED) to meet groundwater standards set by the New Mexico Water Quality Control Commission for fluoride, nitrate-nitrogen and total dissolved solids (TDS), (b) to the NMED to meet the proposed EPA discharge standard for perchlorates, and (c) to the DOE to discharge at less than 1% of the DCG for tritium.

During calendar year 2006, TA-50 RLWTF effluent:

- met all DOE standards set forth in Order 5400.5 for radiological discharges, and has now done so for 82 of the past 84 consecutive months[A];
- was in compliance with all twenty-one (21) NPDES water quality parameters, and now has been for the past 84 months; and
- met NMED ground water standards for fluoride, nitrate, and TDS, and has now met these voluntary standards for all but two weeks of the last seven years[B].

Effluent radiological quality during 2006 is illustrated in Figure 2-1 by plotting the sum-of-ratios for each month. The DOE discharge standard, set forth in Order 5400.5, is that the sum-of-ratios of (the discharge concentration of each radioisotope divided by the discharge standard for that radioisotope) must be less than 1.0. The graph clearly shows the three months during which effluent was discharged with a sum-of-ratio greater than 0.16: June (0.30), July (0.54), and December (0.31). These excursions happened because (a) RO membranes were degraded during June and July and (b) ion exchange resins were nearing end-of-life during November and December. RO membranes were replaced on July 18^{th}, and the sum-of-ratios immediately fell. Similarly, ion exchange resins were replaced on December 20^{th}, and the sum-of-ratios again fell in January 2007.

[A] The monthly sum-of-ratios for discharge of radionuclides was 1.28 in January 2002 and 1.19 in February 2002. The sum-of-ratios for all other months beginning January 2000 has been below the DOE Guideline of 1.0.

[B] Two weekly composite samples of RLWTF effluent slightly exceeded the groundwater standard for fluoride during 2003. Sample values of 2.07 mg/L and 1.64 mg/L were obtained, versus the groundwater standard of 1.6 mg/L. (Watkins and Worland, March 2004, p. 30.)

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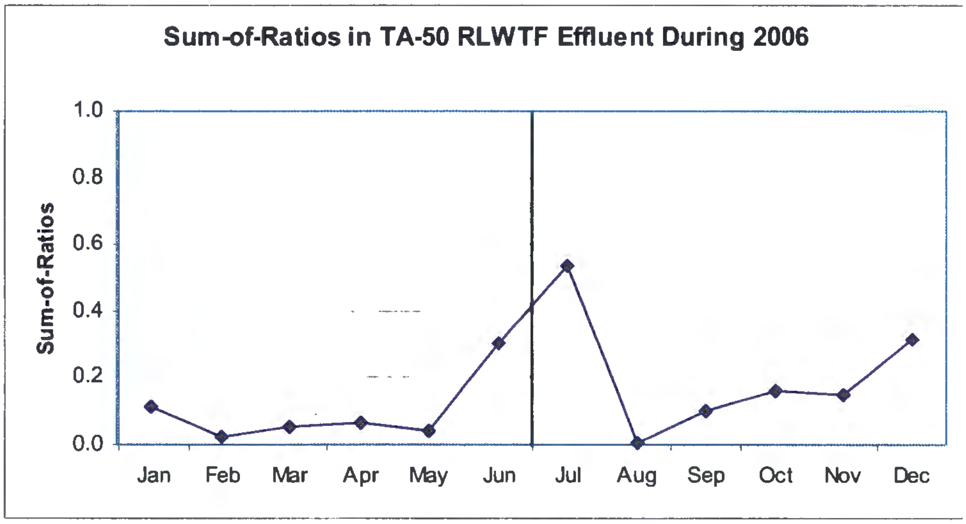
Figure 2-1
Sum-of-Ratios in Effluent from
the TA50 RLWTF During 2006



The average sum-of-ratios for all of 2006 was 0.14, or less than 15% of the DOE discharge standard. Effluent quality for the past three years has been the best in the history of the facility, with average annual SOR values of 0.16, 0.18, and 0.14 for 2004, 2005, and 2006, respectively.

Effluent quality versus NPDES discharge limits and NMED groundwater standards is summarized in Table 2-1. The table lists the 21 EPA parameters and their discharge standards, the three NMED parameters and their groundwater standards, and the average concentration of each parameter in RLWTF effluent during 2006. Annual average discharge concentrations were less than 20% of the discharge standard for each of the 24 non-radiological parameters.

2.2 Flows and Quantities

The TA-50 RLWTF received 6,351,826 liters of influent during 2006, and discharged 6,181,500 liters to Mortandad Canyon. Influent consisted primarily of water brought to the RLWTF via the underground collection system, but included 86,900 liters of water transported from generator facilities via truck, primarily from TA-54. No influent was received during 2006 from the TA-21 facility. Effluent consisted entirely of permeate from the reverse osmosis unit. Influent and effluent volumes are detailed by month in Table 2-2.

The influent brought with it 0.80 curie of radioactivity in 0.87 kilogram of radioactive materials. Uranium-238 accounted for nearly all of the radioactive mass, while plutonium and americium isotopes accounted for 95% of the radioactivity. Effluent contained just 0.03 curie in six grams of radioactive materials. Approximately 98% of the radioactivity in the effluent was due to the presence of tritium, which cannot be removed by RLWTF processes.

Table 2-1
TA50 RLWTF Effluent During 2006
Compared To NPDES and NMED Standards

Regulator	Regulated Parameter	Units	Standard	FINAL Avg.
NPDES	ALUMINUM	ug/L	5,000	27
NPDES	ARSENIC	ug/L	368	6
NPDES	BORON	ug/L	5,000	132
NPDES	CADMIUM	ug/L	50	5
NPDES	COBALT	ug/L	1,000	1
NPDES	COD	mg/L	125	10
NPDES	COPPER	ug/L	1,393	29
NPDES	IRON	ug/L	Report Only	93
NPDES	LEAD	ug/L	423	7
NPDES	MERCURY	ug/L	1	0
NPDES	NICKEL	ug/L	Report Only	112
NPDES	PERCHLORATE	ug/L	Report Only	*
NPDES	RADIUM*	pCi/L	30*	*
NPDES	SELENIUM	ug/L	5	1
NPDES	TOTAL CHROMIUM	ug/L	1,340	2
NPDES	TOXIC ORGANICS**	ug/L	1000	1.7
NPDES	TSS	mg/L	30	*
NPDES	VANADIUM	ug/L	100	2
NPDES	ZINC	ug/L	4,370	13
NPDES	pH	s.u.	6.0 – 9.0	7.0
NMED	FLUORIDE	ug/L	1,600	84
NMED	NITRATE-N	mg/L	10	1
NMED	TDS	mg/L	1,000	70

FINAL Avg. = Flow-weighted average concentration in effluent.
* Less than detection limit

A total of 1,406 kilograms of impurities entered the plant in the form of suspended solids (66 kilograms) and dissolved solids (1,340 kilograms). A total of 433 kilograms of dissolved solids were discharged with effluent into Mortandad Canyon. Sodium accounted for 67% of the dissolved solids in the effluent.

Treating these waters produced solid wastes, which result from removal of solids from the influent during water treatment, from the addition of chemicals needed to treat the influent, from facility maintenance, and from day-to-day operational activities. During 2006, a total of 25,300 kilograms of solid radioactive wastes and one kilogram of chemical waste were generated. No mixed low-level wastes, and no transuranic wastes, were generated during the year. Another 19,200 kilograms of low-level radioactive wastes (soil and debris) resulted from construction work on (a) the new influent pump house and (b) the caustic tank replacement project.

Table 2-2
Flow Summary for the TA50 RLWTF During 2006

Date	Influent	No. of Discharges	Discharged (Liters)
Jan-06	516,735	8	580,600
Feb-06	486,244	7	509,800
Mar-06	505,711	7	506,700
Apr-06	470,383	6	438,600
May-06	546,895	8	584,600
Jun-06	674,527	9	663,500
Jul-06	580,014	5	373,900
Aug-06	745,491	8	596,700
Sep-06	402,028	9	665,300
Oct-06	379,126	7	519,300
Nov-06	473,091	6	444,000
Dec-06	571,581	4	298,500
Total	6,351,826	84	6,181,500

2.3 Facility and Process Modifications

Although no significant facility modifications were *completed* during 2006 for any of the four RLW facilities, significant planning and construction activities took place. Construction, which started in 2004, continued for the new pump house and influent storage facility. The six influent storage tanks were installed, and most of the roof and exterior walls were completed. In addition, planning began or continued for a number of modifications to the transuranic RLW facility, including (a) activation of a new set of underground transfer piping between TA-55 and TA-50, (b) a replacement storage tank for caustic wastes from TA-55, and (c) equipment replacement in Room 60 itself.

No process modifications were made during 2006, and no plant tests were performed.

3. Radiological Nature of TA-50 RLWTF Waters

3.1 Radionuclides Detected

The influent wastewater to the TA-50 RLWTF is radioactive due to the presence of radionuclides that emit alpha and beta particles, gamma rays and neutrons. RLWTF influent and effluent samples are analyzed for thirty-eight (38) such radionuclides which, from past experience, are possible in LANL radioactive liquid wastes. Twenty of these radionuclides were detected in the RLWTF influent and 17 were detected at very low activities in the RLWTF effluent during 2006. Table 3-2, shown on the next page, summarizes the radionuclides for which analyses are performed, and the radionuclides that were detected in the RLWTF influent and effluent.

3.2 Radionuclide Removal

Table 3-1 shows the *mass* of the nine alpha-emitting radionuclides analyzed for in the RLWTF influent and effluent from the RLWTF in 2006. The table shows that uranium-238 comprised 97% of the mass of these radionuclides in RLWTF influent, and treatment removed 99.34% of the mass of these alpha emitters from the wastewater stream (866 grams in, 5.7 grams out).

Table 3-1
Mass of Alpha-Emitting Radionuclides in the RLWTF Influent And Effluent During 2006

Radionuclide	Mass in Influent (grams)	Mass in Effluent (grams)
Am-241	116 E-3	2.8 E-6
Np-237	*	*
Ra-226	*	*
Pu-238	13.9 E-3	397 E-9
Pu-239	1.9 E0	96.3 E-6
Th-232	10.7 E0	*
U-234	940 E-3	10.6 E-3
U-235	10.9 E0	110 E-3
U-238	842 E0	5.6 E0
Totals	866 E0	5.7 E0

* Less than Detection Limit

A similar perspective is obtained by examining removal of alpha *radioactivity* during 2006. As shown in Table 3-3, the treatment process at the RLWTF removed 99.98% of the radioactivity of the alpha emitters from the wastewater stream (0.76 curie in, 90 microcuries out).

Table 3-2
Radionuclide Analyses of the RLWTF Influent and Effluent in CY 2006

Radionuclides Analyzed for in the RLWTF Influent and Effluent	Radionuclides Present in RLWTF Influent	Radionuclides Detected in RLWTF Effluent
Alpha Particle Emitters		
Am-241	X	X
Np-237		
Ra-226		
Pu-238	X	X
Pu-239	X	X
Th-232	X	
U-234	X	X
U-235	X	X
U-238	X	X
Beta Particle Emitters		
As-74		X
Ba-133		
Be-7	X	X
Ce-141		
Co-56 and Co-57	Co-57	Co-56
Co-58 and Co-60	Co-58	Co-58
Cs-134	X	
Cs-137	X	X
Eu-152		
H-3	X	X
I-133	X	
Mn-52 and Mn-54		
Na-22	X	
Ra-228		
Rb-83	X	X
Rb-84	X	X
Sc-46 and Sc-48		
Se-75	X	X
Sn-113		
Sr-85	X	X
Sr-89	X	
Sr-90		
V-48		
Y-88		
Zn-65		X
38 Total	**20 Total**	**17 Total**

Table 3-3
Removal of Alpha Radioactivity
From RLWTF Influent During 2006

Month	Raw (Ci)	Final (Ci)	Removal Factor 100X(INF - EFF)/INF
Jan-06	9.2 E-3	1.6 E-6	99.982
Feb-06	60.9 E-3	372 E-9	99.999
Mar-06	20.6 E-3	861 E-9	99.996
Apr-06	35.3 E-3	794 E-9	99.998
May-06	90.1 E-3	655 E-9	99.999
Jun-06	47.5 E-3	33.3 E-6	99.930
Jul-06	46.9 E-3	12.6 E-6	99.973
Aug-06	120.1 E-3	*	100.000
Sep-06	24.2 E-3	5.3 E-6	99.978
Oct-06	67.3 E-3	11.9 E-6	99.982
Nov-06	57.6 E-3	11. E-6	99.981
Dec-06	179 E-3	11.7 E-6	99.993
Total	**758. E-3**	**90. E-6**	**99.984**
Volume of Flow: Influent = 6,351,826 liters Final = 6,181,500 liters			

* Less than Detection Limit

Removal of beta-emitting radioisotopes was less remarkable. Tritium, rubidium, and strontium isotopes were the major beta-emitters present in 2006, accounting for 36 of the 38 millicuries of beta activity received in influent. Only one-third of this was removed, and 24.3 millicuries were discharged in effluent.

Tritium is the primary reason for this low removal percentage. Tritium is present *as* water, and the RLWTF is not equipped to treat or remove tritium. Hence, the quantities entering and leaving the plant were the same (23.8 millicuries). Approximately 97% of non-tritium beta activity was removed during 2006 (14.1 millicuries in; 0.5 millicurie out).

Although treatment for and removal of beta-emitting radioisotopes was not as effective as for alpha-emitting radioisotopes, the quantities encountered were smaller. Influent contained just 38 millicuries of beta activity, versus 758 millicuries of alpha activity. This difference is illustrated in Table 3-4, which summarizes radioactivity (curies) into and out of the RLWTF for 2006 for all radioisotopes.

3.3 Regulatory Performance

In 1990 DOE issued Order 5400.5, "Radiation Protection of the Public and the Environment," which revised Derived Concentration Guidelines (DCGs) for all radionuclides discharged from DOE facilities. The concentration of each radionuclide divided by its particular DCG value

Table 3-4
TA50 RLWTF Radionuclide Summary For 2006

	RAW Avg (nCi/L)	Maximum (nCi/L)	Minimum (nCi/L)	Total (Ci)	FINAL Avg (pCi/L)	Maximum (pCi/L)	Minimum (pCi/L)	TOTAL (Ci)
Am-241	62.8 E0	140. E0	4.6 E0	398.8 E-3	1.6 E0	6.2 E0	530. E-3	9.8 E-6
As-74	*	*	*	*	12.6 E0	24. E0	8.6 E0	78.1 E-6
Ba-133	*	*	*	*	*	*	*	*
Be-7	23.8 E-3	200. E-3	34. E-3	150.9 E-6	1.5 E0	18. E0	18. E0	9.1 E-6
Ce-141	*	*	*	*	*	*	*	*
Co-56	*	*	*	*	4.4 E0	27. E0	25. E0	27.3 E-6
Co-57	17. E-3	160. E-3	160. E-3	107.9 E-6	*	*	*	*
Co-58	11.7 E-3	110. E-3	110. E-3	74.2 E-6	151.3 E-3	1.6 E0	1.6 E0	935.4 E-9
Co-60	*	*	*	*	*	*	*	*
Cs-134	2. E-3	19. E-3	19. E-3	12.8 E-6	*	*	*	*
Cs-137	21.6 E-3	130. E-3	64. E-3	137.5 E-6	3.3 E0	13. E0	3.3 E0	20.2 E-6
Eu-152	*	*	*	*	*	*	*	*
H-3	*	*	*	*	3.9 E3	5.2 E3	2.4 E3	23.8 E-3
I-133	17.5 E-3	220. E-3	220. E-3	111.3 E-6	20.1 E0	190. E0	27. E0	124. E-6
Mn-52	*	*	*	*	*	*	*	*
Mn-54	*	*	*	*	*	*	*	*
Na-22	20.1 E-3	220. E-3	8.7 E-3	127.5 E-6	*	*	*	*
Np-237	*	*	*	*	*	*	*	*
Pu-238	37.5 E0	110. E0	9.5 E0	238.4 E-3	1.1 E0	5.7 E0	600. E-3	6.8 E-6
Pu-239	18.1 E0	62. E0	3.7 E0	115. E-3	967.5 E-3	4.6 E0	370. E-3	6. E-6
Ra-226	*	*	*	*	*	*	*	*
Ra-228	*	*	*	*	*	*	*	*
Rb-83	896. E-3	12. E0	78. E-3	5.7 E-3	27.5 E0	110. E0	17. E0	169.9 E-6
Rb-84	155.2 E-3	2.6 E0	2.6 E0	985.7 E-6	420.1 E-3	8.7 E0	8.7 E0	2.6 E-6
Sc-46	*	*	*	*	*	*	*	*
Sc-48	*	*	*	*	*	*	*	*
Se-75	194. E-3	1.7 E0	650. E-3	1.2 E-3	3.8 E0	14. E0	5.3 E0	23.6 E-6
Sn-113	*	*	*	*	*	*	*	*
Sr-85	724. E-3	4.8 E0	83. E-3	4.6 E-3	151.2 E-3	1.8 E0	1.8 E0	934.7 E-9
Sr-89	136.3 E-3	640. E-3	500. E-3	865.5 E-6	*	*	*	*
Sr-90	*	*	*	*	*	*	*	*
Th-232	184.6 E-6	680. E-6	150. E-6	1.2 E-6	*	*	*	*
U-234	915.1 E-3	3.6 E0	100. E-3	5.8 E-3	10.6 E0	43. E0	5.4 E0	65.4 E-6
U-235	3.7 E-3	11. E-3	650. E-6	23.7 E-6	38.5 E-3	220. E-3	20. E-3	238.1 E-9
U-238	44.5 E-3	170. E-3	3.6 E-3	282.9 E-6	304.9 E-3	1.7 E0	40. E-3	1.9 E-6
V-48	*	*	*	*	*	*	*	*
Y-88	*	*	*	*	*	*	*	*
Zn-65	*	*	*	*	*	*	*	*

Twelve influent samples and 12 effluent samples for each isotope.
* Less than Detection Limit

results in a ratio. For waters containing more than one radionuclide, a ratio is to be found for each radionuclide, and these ratios are to be summed. To be in compliance with Order 5400.5, the sum of the ratios cannot exceed 1.0.

Compliance with Order 5400.5 insures that the yearly dose will be less than 100 millirem to a person drinking two liters of water (i.e., effluent) per day. The *millirem* is a unit for measuring the biological effects of radiation on the human body. For comparison to the 100 millirem standard, the average annual radiation dose received by a member of the general population in the United Sates is about 360 millirem, from both natural (296 mrem) and man-made (65 mrem) radiation sources.

Table 3-5 provides flow-weighted sum-of-the-ratios for individual isotopes, and shows that the average for all of 2006 was 0.14. Four isotopes accounted for 95% of the sum of the ratios in the RLWTF effluent during 2006: ^{234}U, ^{238}Pu, ^{239}Pu, and ^{241}Am; average discharges of these isotopes ranged from 2% to 5% of their individual DCG.

3.4 Graphs of Radiological Data

Figures 3-1 through 3-3 chart average concentrations in RLWTF influent and effluent for each month of 2006 for the major alpha-emitting isotopes: Pu-238, Pu-239, and Am-241. Figure 3-4 shows effluent concentrations for U-234, another alpha-emitter. It is important to note that the ordinate of the upper graphs are scaled in nanocuries per liter while the lower graphs are scaled in picocuries per liter, a factor of 1,000. Examination of the graph shows the following:

- The decontamination factor for each of these radioisotopes was four orders of magnitude (i.e., 10,000) or more. This was also indicated in Table 3-3.

- Effluent concentrations were well within the Derived Concentration Guidelines set forth in DOE Order 5400.5 -- typically less than 15% DCG.

- There was no pattern for influent concentrations for the alpha-emitting isotopes. For example, Pu-238 and Pu-239 influent concentrations edged upward at the end of the year, but Am-241 influent concentrations had a saw-tooth appearance. In addition, monthly influent concentrations varied by more than a factor of ten for each isotope.

- The transuranic isotopes exhibited the same pattern of effluent concentrations, with spikes in June and July due to degradation of the RO membranes, and a spike in December as the ion exchange resins neared end-of-life. U-234 showed the same summer spike, but showed steadily increasing effluent concentrations during October, November, and December (as opposed to a December spike). This phenomenon shows that U-234 was preferentially replaced on the ion exchange resins by the actinide isotopes as the resin neared end-of-life.

Figure 3-5 charts average concentrations, in picocuries per liter, of tritium by month in RLWTF effluent during 2006. Tritium was the only significant beta-emitting radionuclide in RLWTF effluent, accounting for 98% of the total beta activity discharged during 2006.

Table 3-5
TA50 RLWTF Effluent During 2006 Compared With DOE Order 5400.5

Radioactive Isotopes	Mean Concentration (pCi/L)	DCG 5400.5 (pCi/L)	Percent Of DCG
Am-241	1.6 E0	30	5.26
As-74	12.6 E0	40,000	0.03
Ba-133	*		
Be-7	1.5 E0	1,000,000	0.0001
Ce-141	*	50,000	*
Co-56	4.4 E0	10,000	0.04
Co-57	*	100,000	*
Co-58	151.3 E-3	40,000	0.0004
Co-60	*	5,000	*
Cs-134	*	2,000	*
Cs-137	3.3 E0	3,000	0.11
Eu-152	*	20,000	*
H-3	3.9 E3	2,000,000	0.19
I-133	20.1 E0	10,000	0.20
Mn-52	*	20,000	*
Mn-54	*	50,000	*
Na-22	*	10,000	*
Np-237	*	30	*
Pu-238	1.1 E0	40	2.75
Pu-239	967.5 E-3	30	3.22
Ra-226	*	100	*
Ra-228	*	100	*
Rb-83	27.5 E0	20,000	0.14
Rb-84	420.1 E-3	10,000	0.004
Sc-46	*	20,000	*
Sc-48	*	20,000	*
Se-75	3.8 E0	20,000	0.019
Sn-113	*	50,000	*
Sr-85	151.2 E-3	70,000	0.0002
Sr-89	*	20,000	*
Sr-90	*	1,000	*
Th-232	*	50	*
U-234	10.6 E0	500	2.11
U-235	38.5 E-3	600	0.006
U-238	304.9 E-3	600	0.051
V-48	*	20,000	*
Y-88	*	30,000	*
Zn-65	*	9,000	*
Sum of Ratios = 0.141			

* Less Than Detection Limit

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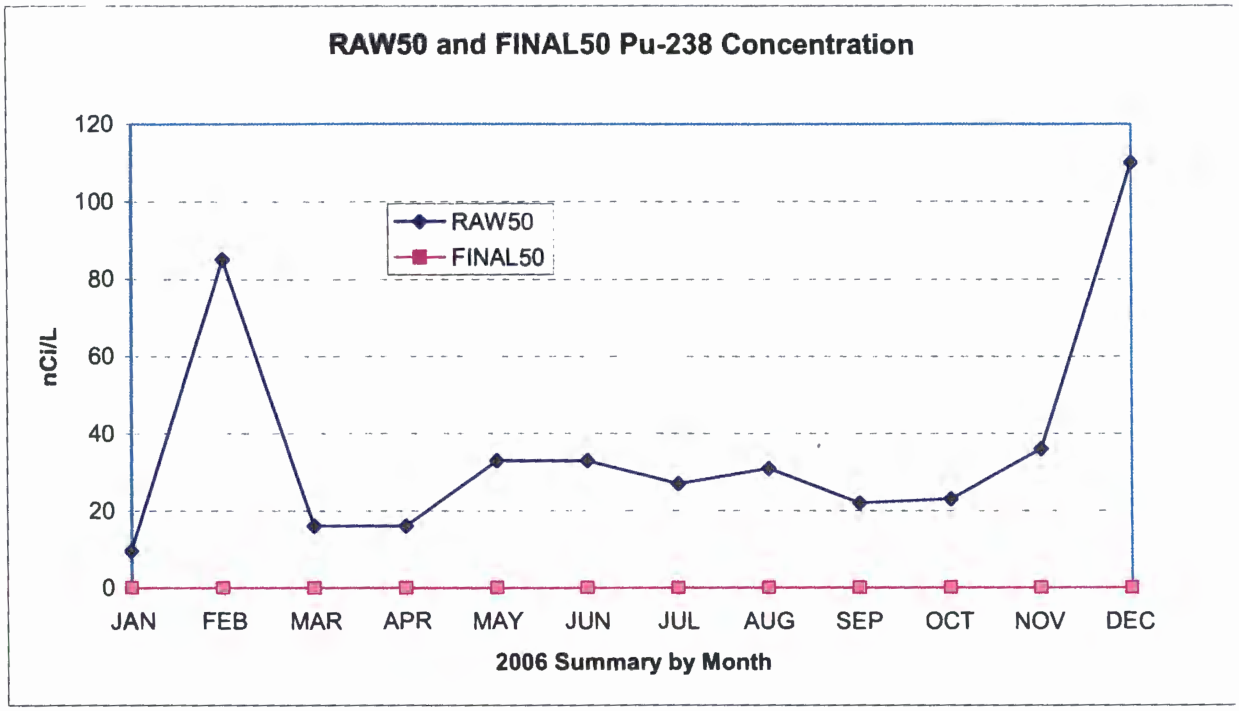
Figure 3-1
Pu-238 in RLWTF Influent and Effluent During 2006



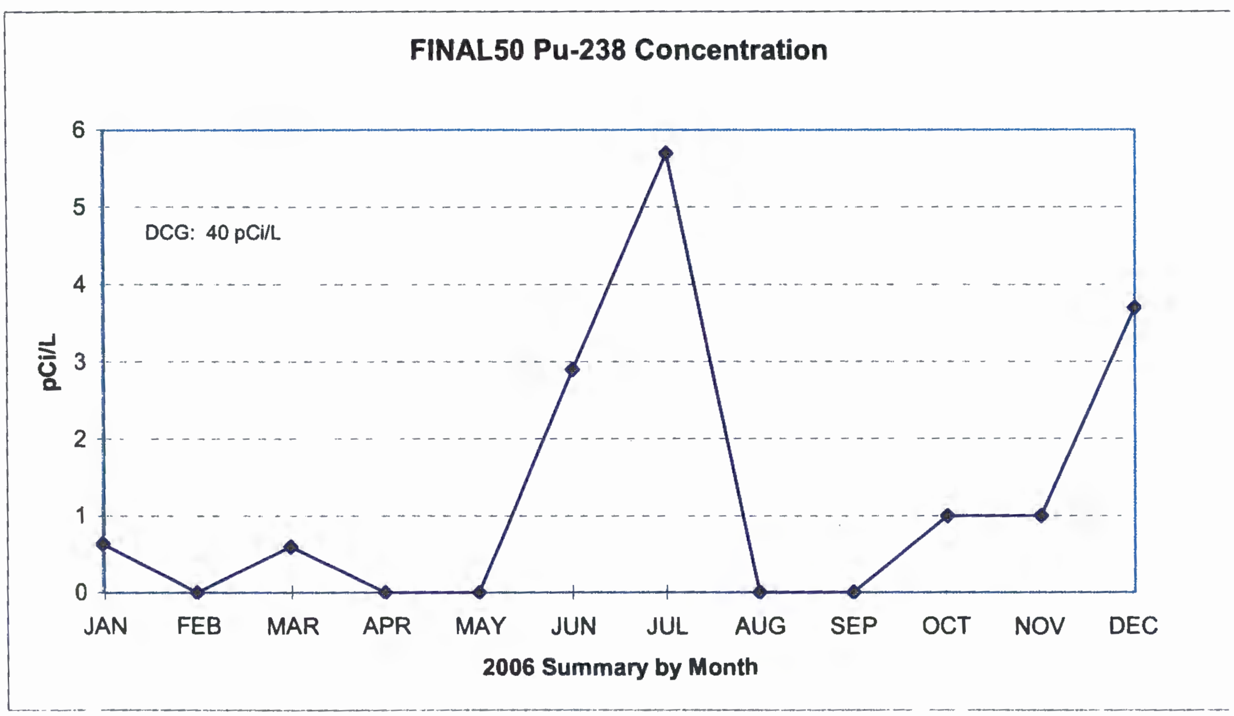


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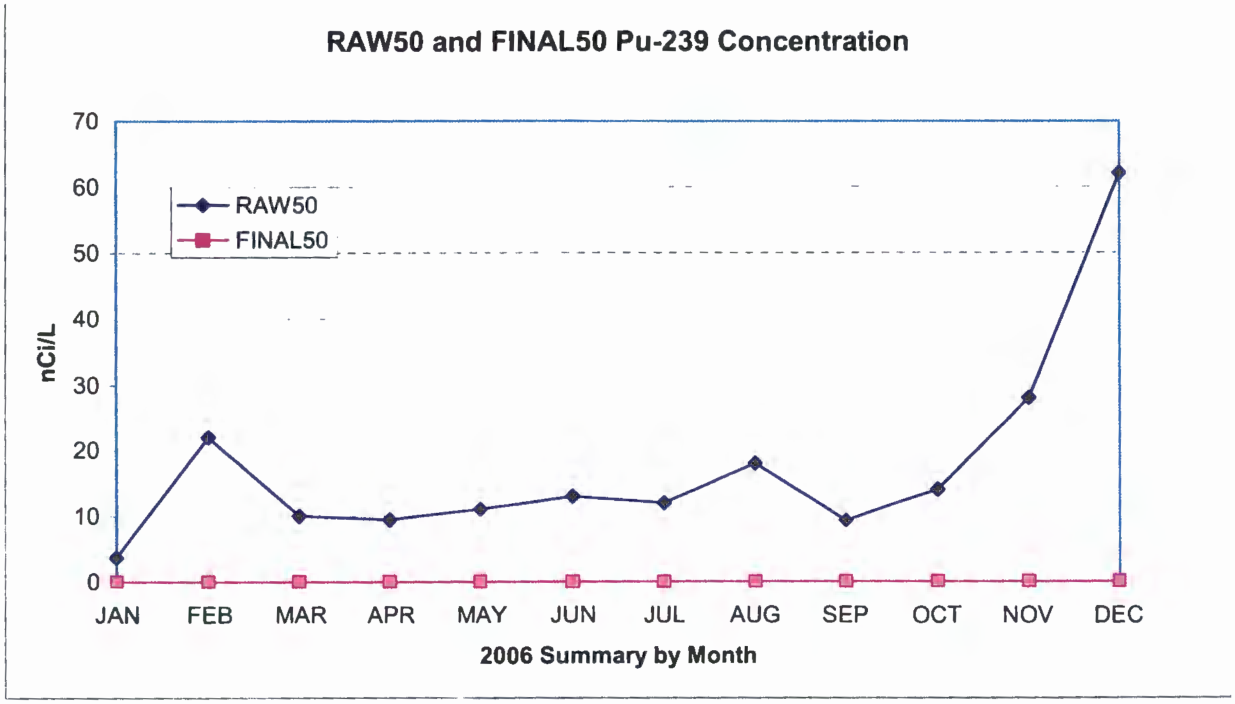
Figure 3-2
Pu-239 in RLWTF Influent and Effluent During 2006



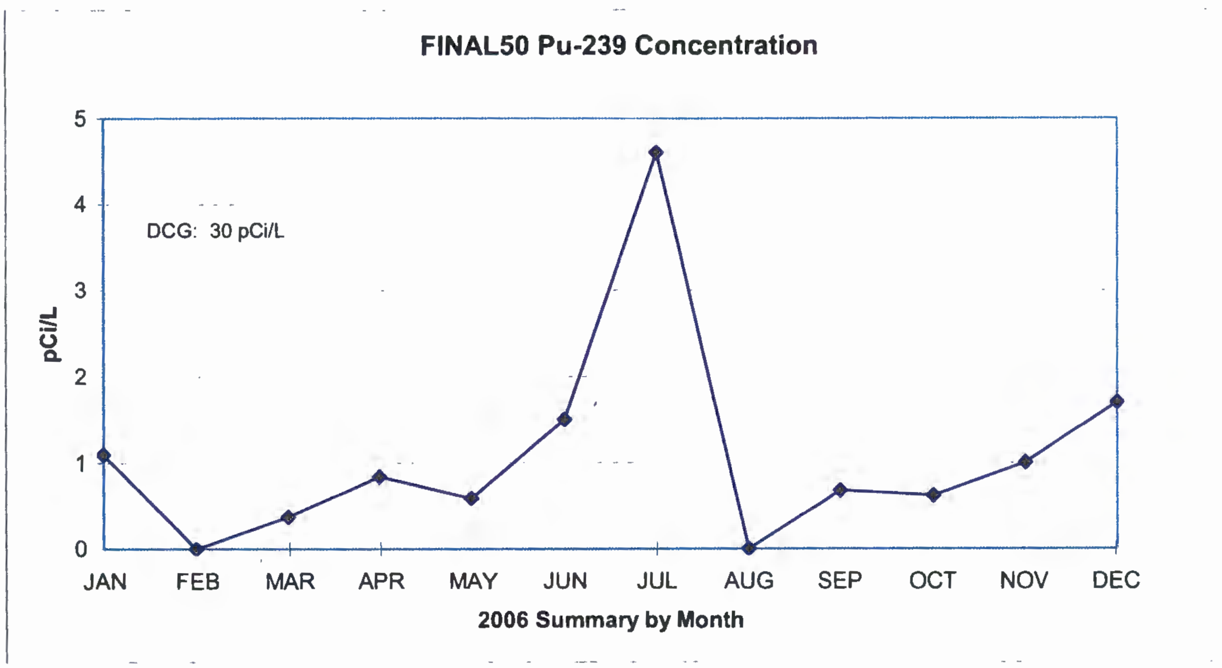
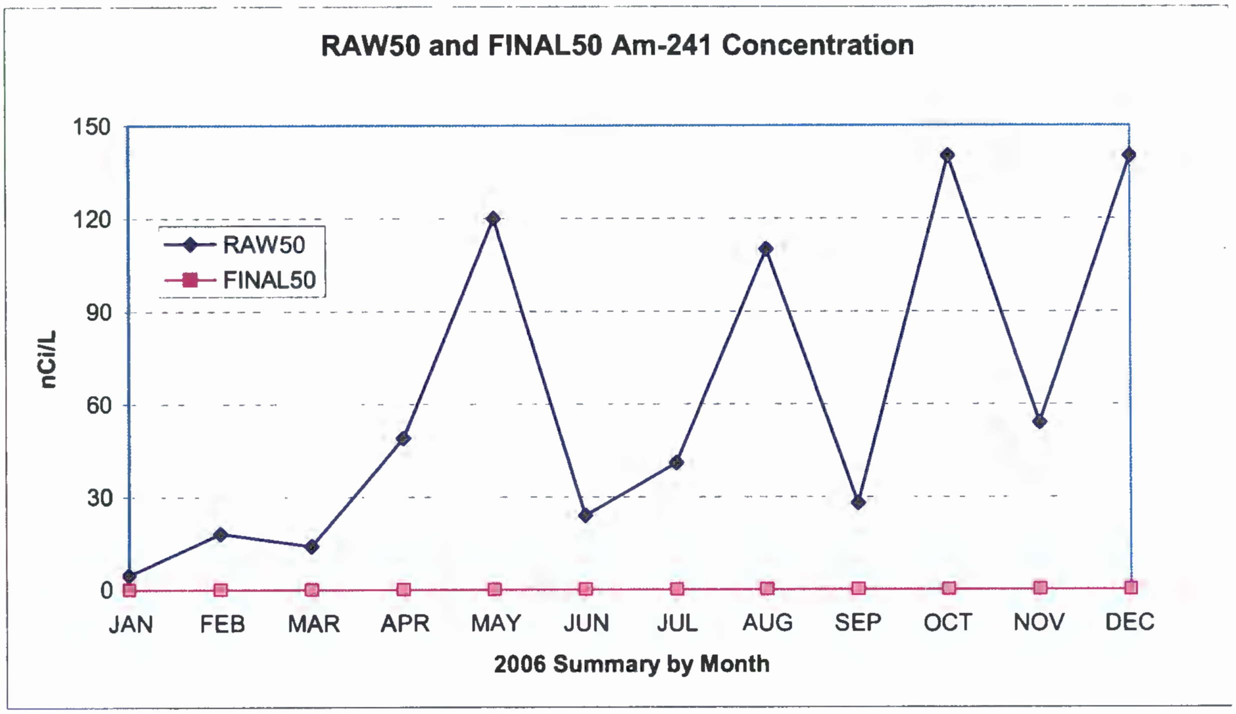


Figure 3-3
Am-241 in RLWTF Influent and Effluent During 2006



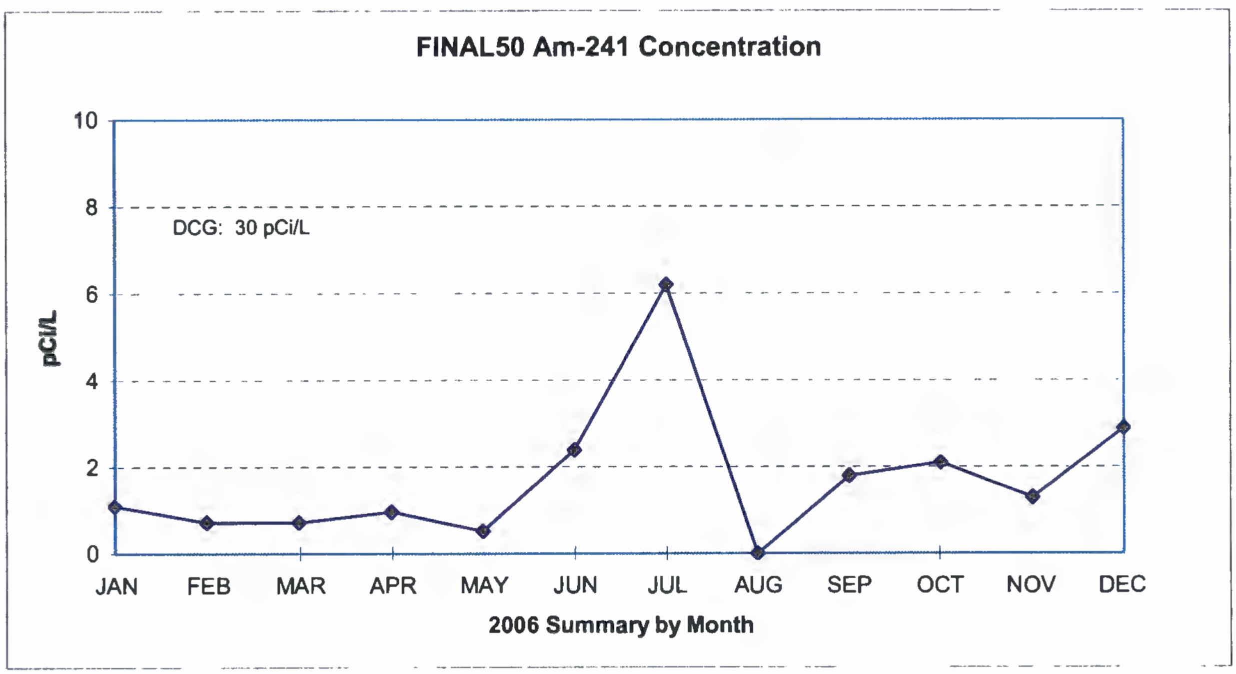


Figure 3-4
U-234 in RLWTF Effluent During 2006

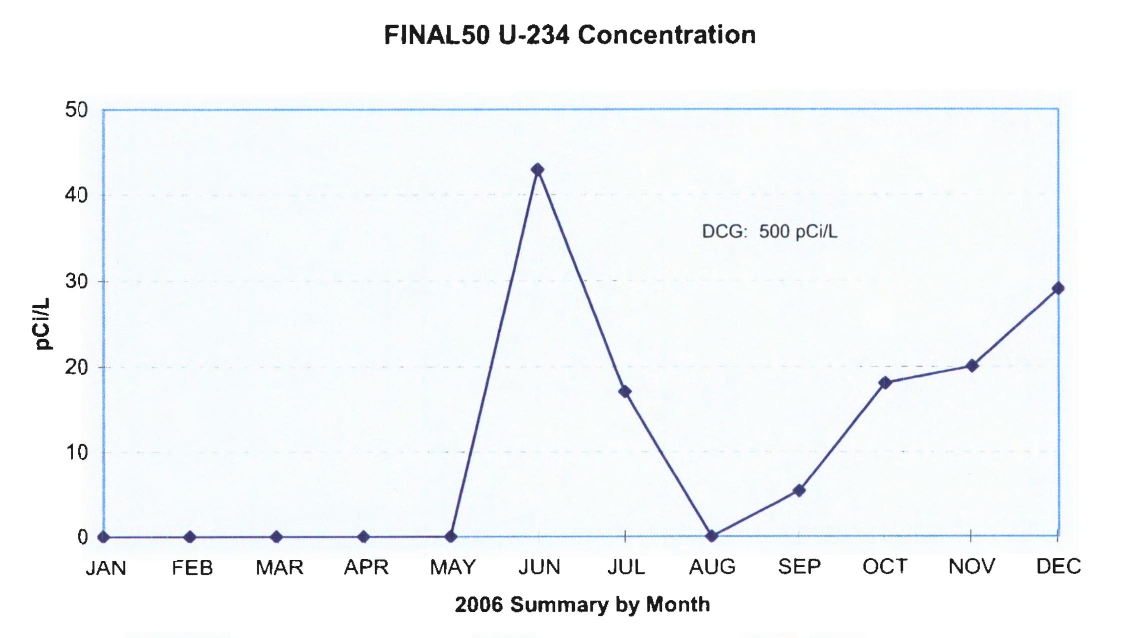
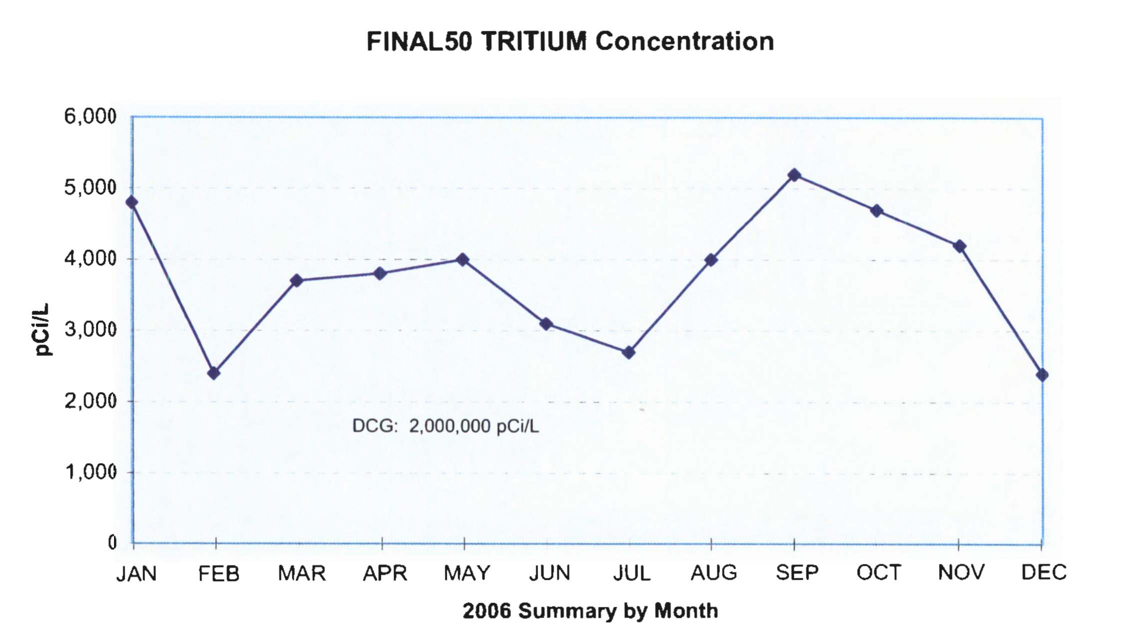


Figure 3-5
Tritium in RLWTF Effluent During 2006



4. Non-Radiological Nature of TA-50 RLWTF Waters

4.1 Minerals Detected

RLWTF influent samples are analyzed for 42 non-radiological water quality parameters; effluent samples are analyzed for the same 42 parameters and for total toxic organics. These non-radiological analyses can be aggregated into five categories:

(a) eight traditional water quality measures – chemical oxygen demand, conductivity, hardness, pH, total dissolved solids, total suspended solids, and two measurements for alkalinity.
(b) a total of 25 cation (metals) measurements, including total cations.
(c) five anions: chloride, fluoride, cyanide, sulfate, and perchlorate
(d) four nitrogen measurements – nitrogen as nitrates, nitrogen as ammonia, nitrogen as nitrites, and total Kjedahl nitrogen
(e) total toxic organics (effluent only)

All 42 non-radiological parameters were detected in the RLWTF influent in 2006; 38 were detected in the RLWTF effluent.

Samples are also analyzed for volatile and semi-volatile organic compounds, which are discussed in Section 4.5.

4.2 Removal of Minerals

Table 4-1 provides a summary of mineral concentrations and quantities received by (influent) and discharged from (effluent) the RLWTF during 2006. The information shows that 1,406 kilograms of contaminants entered the facility in the form of suspended solids (66 kilograms) and dissolved solids (1340 kilograms). This quantity is similar to the 1460 kilograms received during 2005, but less than half of the 2,890 kilograms present in 2004 influent.

In treating the influent, RLWTF personnel added lime at the clarifier to soften the water, ferric sulfate at the clarifier to precipitate radionuclides, and potassium permanganate and sodium hydroxide at the neutralization chamber to adjust pH. Other chemicals, including sodium hydroxide and hydrochloric acid were used to clean the TUF and RO membranes. Precise data does not exist for the quantities of these additional chemicals required for water treatment. As a rule of thumb, however, the sum of non-radiological chemicals added during and as part of treatment operations approximates the quantity of non-radiological chemicals and minerals that enter the RLWTF with the influent.

Table 4-1
TA50 RLWTF Mineral Summary For 2006

	RAW Average	Maxi-mum	Mini-mum	No. Samp.	Total In (Kg)	FINAL Average	Maxi-mum	Mini-mum	No. Samp.	Total Out (Kg)
ALKALINITY-MO**	850.7 E0	8.6 E3	31. E0	12	5.4 E3	106.3 E0	188. E0	34. E0	12	657.1 E0
ALKALINITY-P**	693.8 E0	7.7 E3	370. E-3	12	4.4 E3	*	*	*	12	*
ALUMINUM	423.7 E-3	1.6 E0	13. E-3	12	2.7 E0	26.9 E-3	190. E-3	4. E-3	12	166.5 E-3
AMMONIA-N	8.9 E0	17.4 E0	4.9 E0	12	56.3 E0	4.2 E0	12. E0	1.3 E0	12	25.7 E0
ARSENIC	612.4 E-6	8. E-3	8. E-3	12	3.9 E-3	5.6 E-3	20. E-3	5. E-3	12	34.9 E-3
BARIUM	35.7 E-3	50. E-3	25. E-3	12	226.7 E-3	2.2 E-3	23. E-3	23. E-3	12	13.4 E-3
BERYLLIUM	516.6 E-6	6. E-3	6. E-3	12	3.3 E-3	*	*	*	12	*
BORON	247.4 E-3	1.3 E0	45. E-3	12	1.6 E0	131.8 E-3	350. E-3	40. E-3	12	814.6 E-3
CADMIUM	1.1 E-3	5. E-3	3. E-3	12	6.7 E-3	5.2 E-3	57. E-3	5. E-3	12	32. E-3
CALCIUM	10.5 E0	19. E0	70. E-3	11	67. E0	2.1 E0	5.3 E0	50. E-3	12	12.7 E0
CHLORIDE	20.7 E0	34.4 E0	12.3 E0	12	131.6 E0	5.7 E0	18. E0	1.2 E0	12	35.3 E0
COBALT	2.4 E-3	10. E-3	2. E-3	12	15.5 E-3	845.3 E-6	9. E-3	9. E-3	12	5.2 E-3
COD	122.8 E0	229. E0	45. E0	12	779.8 E0	9.9 E0	36. E0	16. E0	12	61. E0
CONDUCTIVITY**	320. E0	680. E0	190. E0	11	22.4 E3	205.5 E0	450. E0	77. E0	12	1.3 E3
COPPER	365. E-3	880. E-3	93. E-3	12	2.3 E0	9.3 E-3	16. E-3	5.3 E-3	12	57.5 E-3
CYANIDE	*	*	*	12	*	*	*	*	12	*
FLUORIDE	510 E-3	1.3 E0	290. E-3	11	2.7 E0	84.1 E-3	240. E-3	90. E-3	12	519.7 E-3
HARDNESS**	37.8 E0	75.4 E0	26.6 E0	12	240. E0	2.1 E0	13.4 E0	207.2 E-3	12	12.9 E0
IRON	1.3 E0	2. E0	590. E-3	12	8. E0	92.7 E-3	910. E-3	10. E-3	12	573.2 E-3
LEAD	84.1 E-3	200. E-3	13. E-3	12	533.9 E-3	7.3 E-3	70. E-3	10. E-3	12	45.1 E-3
MAGNESIUM	3.2 E0	6.8 E0	2.1 E0	12	20.4 E0	21.1 E-3	120. E-3	5. E-3	12	130.2 E-3
MERCURY	3. E-3	4.9 E-3	450. E-6	12	18.8 E-3	42.4 E-6	460. E-6	22. E-6	12	262.2 E-6
NICKEL	12.4 E0	130. E0	270. E-3	12	78.8 E0	111.5 E-3	1.1 E0	4. E-3	12	689.4 E-3
NITRATE-N	9.4 E0	31.5 E0	250. E-3	12	59.8 E0	523.2 E-3	1.1 E0	260. E-3	12	3.2 E0
NITRITE-N	4.2 E0	24. E0	220. E-3	12	26.8 E0	1.1 E0	6.3 E0	120. E-3	12	6.6 E0
PERCHLORATE	135.8 E-3	350. E-3	19. E-3	12	862.6 E-3	*	*	*	12	*
PHOSPHORUS	2.2 E0	3.9 E0	790. E-3	12	13.8 E0	53.9 E-3	150. E-3	3. E-3	12	333.4 E-3
POTASSIUM	2. E0	7.3 E0	50. E-3	12	12.6 E0	766.9 E-3	4.3 E0	60. E-3	12	4.7 E0
SELENIUM	1.5 E-3	14. E-3	11. E-3	12	9.8 E-3	919.7 E-6	2. E-3	600. E-6	12	5.7 E-3
SILICON	30.4 E0	36. E0	23. E0	12	193.1 E0	1.8 E0	6.3 E0	380. E-3	12	11.3 E0
SILVER	2.5 E-3	20. E-3	300. E-6	12	16.1 E-3	167.8 E-6	1. E-3	1. E-3	12	1. E-3
SODIUM	41.5 E0	130. E0	22.5 E0	12	263.9 E0	46.9 E0	108. E0	16. E0	12	290. E0
SULFATE	16.8 E0	27. E0	2.1 E0	12	106.9 E0	3.5 E0	9.3 E0	150. E-3	12	21.6 E0
TDS	253. E0	523 E0	133. E0	11	1.34 E3	70. E0	229. E0	32. E0	12	432.9 E0
TKN	17.6 E0	35. E0	7.6 E0	12	111.8 E0	3.4 E0	5.1 E0	130. E-3	12	21. E0
TOTAL CATIONS**	19.2 E0	180. E0	2.2 E0	12	122.1 E0	10.5 E0	99. E0	860. E-3	12	64.8 E0
TOTAL CHROMIUM	46.7 E-3	170. E-3	20. E-3	12	296.8 E-3	2.1 E-3	22. E-3	22. E-3	12	12.8 E-3
TOXIC ORGANICS	n.m.	n.m.	n.m.	n.m.	n.m.	1.7 E-3	17.5 E-3	1.1 E-3	12	10.6 E-3
TSS	10.4 E0	21. E0	4.4 E0	12	65.8 E0	*	*	*	12	*
URANIUM	145.9 E-3	530. E-3	60. E-3	12	926.5 E-3	931.4 E-6	5.1 E-3	120. E-6	12	5.8 E-3
VANADIUM	13.5 E-3	40. E-3	8. E-3	12	86. E-3	2.1 E-3	17. E-3	6. E-3	12	12.9 E-3
ZINC	131.4 E-3	170. E-3	90. E-3	12	834.5 E-3	4.4 E-3	20. E-3	8. E-3	12	26.9 E-3
pH	7. E0	13.2 E0	4. E0	12	--	7.3 E0	8. E0	6.8 E0	12	--

Volume of Flow: Influent = 6,351,826 liters Final = 6,181,500 liters

**Units: All figures in mg/L except: Alkalinities and hardness as mg CaCO3/l; Conductivity as uS/cm; Total Cations as meq/l; Otherwise: mg/l.

* Less than Detection Limit n.m.: Not measured

As can be derived from the final column of Table 4-1, the total amount of chemicals leaving the facility with the effluent was 433 kilograms, the sum of total dissolved solids and total suspended solids. This was 31% of the total quantity entering as influent.

Table 4-2
Mass of Major Inorganic Minerals in RLWTF Influent and Effluent During 2006

Mineral	Mass in Influent (Kgs)	Mass in Effluent (Kgs)	Percent Removed
Sodium	264	290	-10
Silicon	193	11	94
Chloride	132	35	73
Sulfate	107	22	80
Nickel	79	1	99
Calcium	67	13	81
Nitrate-Nitrogen	60	3	95
Ammonia-Nitrogen	56	26	54
Nitrite-Nitrogen	27	7	75
Subtotal, Major Minerals	985	408	59
Total Solids *	1404	433	69

* Total Dissolved Solids + Total Suspended Solids

Nine inorganic chemicals comprised the vast majority (~94%) of these chemicals in effluent; they are summarized in Table 4-2, along with percent removed from the RLWTF influent. With respect to influent, nickel was received in surprising concentrations, and three nitrogen compounds were among the major minerals.

4.3 Regulatory Performance

Twenty-one (21) parameters in the effluent from the RLWTF are regulated by the National Pollutant Discharge Elimination System in compliance with the Federal Clean Water Act (EPA, 12/29/00). LANL also has a voluntary commitment with the New Mexico Environment Department to discharge effluent from the TA-50 RLWTF below groundwater standards set by the New Mexico Water Quality Control Commission (NMED, 04/20/05) for three water quality parameters: fluoride, nitrogen-as-nitrate, and total dissolved solids. Table 4-3 identifies these 24 parameters, the sampling frequency required for each, and their regulatory limits.

During calendar year 2006, TA-50 RLWTF effluent, for the seventh consecutive year, was in compliance with all twenty-one (21) NPDES water quality parameters. TA-50 effluent also met NMED ground water standards for fluoride, nitrate, and TDS every week of the year, and has now met these voluntary standards for all but two weeks over the last seven years[C]. Table 2-1 compared discharge standards and average concentrations for the year.

Table 4-3
NPDES and NMED Regulated Parameters

Parameter	Sampling Frequency	Units	Monthly Average	Daily Max
NPDES Parameters				
Chemical Oxygen Demand	1	mg/L	125	125
Flow	4	----	Report	Report
Perchlorate	3		Report	Report
pH	1	s.u.	6 – 9 su	6 – 9 su
Radium 226 + Radium 228	3	pCi/L	30	30
Tritium (accelerator produced)	3	pCi/L	20,000	20,000
Total Aluminum	3	µg/L	5,000	5,000
Total Arsenic	3	µg/L	368	368
Total Boron	3	µg/L	5,000	5,000
Total Cadmium	1	µg/L	50	50
Total Chromium	1	µg/L	1,340	2,680
Total Cobalt	3	µg/L	1,000	1,000
Total Copper	1	µg/L	1,393	1,393
Total Iron	1	----	Report	Report
Total Lead	1	µg/L	423	524
Total Mercury	1	µg/L	0.77	0.77
Total Nickel	2		Report	Report
Total Selenium	3	µg/L	5	5
Total Suspended Solids	1	mg/L	30	45
Total Toxic Organics	2	µg/L	1,000	1,000
Total Vanadium	3	µg/L	100	100
Total Zinc	1	µg/L	4,370	8,750
NMED Parameters				
Fluoride	5	mg/L	1.6	
Nitrogen-as-Nitrate	5	mg/L	10	
Total Dissolved Solids	5	mg/L	1,000	

Sampling frequencies:
[1] weekly grab sample
[2] monthly grab sample
[3] yearly grab sample
[4] continuous record
[5] weekly composite sample

[C] Two weekly composite samples of RLWTF effluent slightly exceeded the groundwater standard for fluoride during 2003. Sample values of 2.07 mg/L and 1.64 mg/L were obtained, versus the groundwater standard of 1.6 mg/L. (Watkins and Worland, March 2004, p. 30.)

4.4 Graphs of Non-Radiological Data

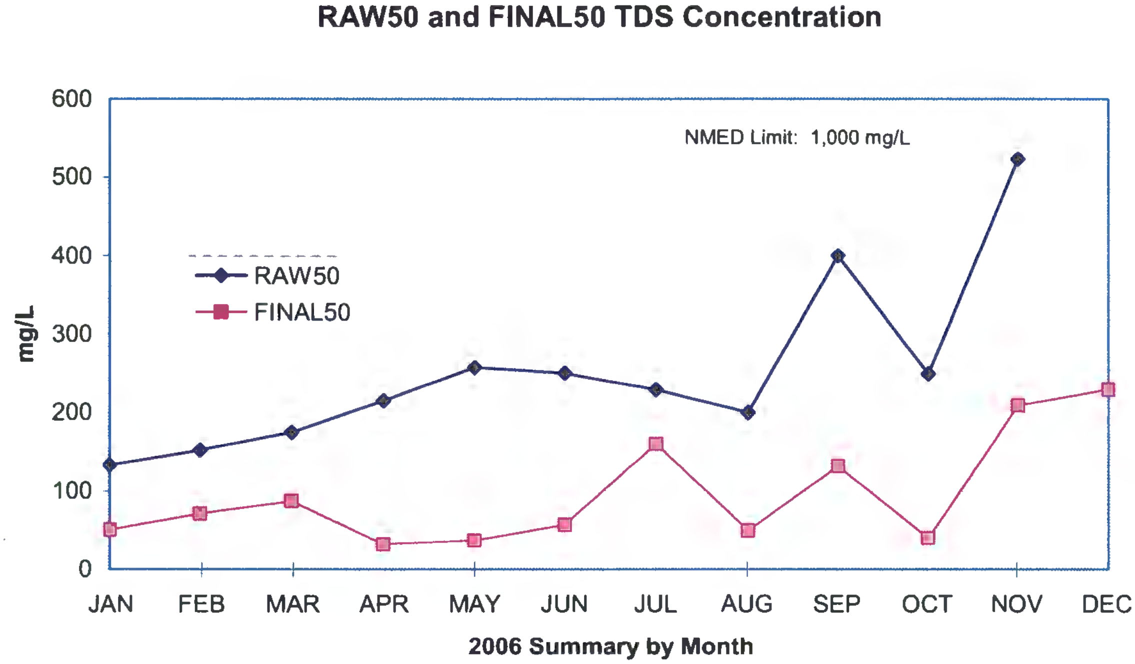
The following series of graphs highlight important information about non-radiological components of the TA-50 RLWTF influent and effluent. Some of the minerals are of regulatory concern. Mercury, for example, has an extremely low NPDES discharge limit of 0.77 microgram per liter. Some of the minerals present processing challenges; silicon and calcium, for example, can precipitate and plug process piping and pumps. Others have been selected because they are among the major inorganic minerals present in waters discharged to Mortandad Canyon. Each figure plots mineral concentration in RLWTF influent and effluent by month during 2006.

Figure 4-1 shows total dissolved solids and total suspended solids in RLWTF influent and effluent during 2006. These two parameters provide general information about water purity since they represent the sum of all contaminants present. Both parameters also have regulatory discharge limits – 1000 mg/L for TDS and 30 mg/L for TSS. In the RLWTF treatment process, the gravity filter and ultrafilter remove essentially all suspended solids. Reverse osmosis removes varying percentages of dissolved solids, depending upon particle charge and size.

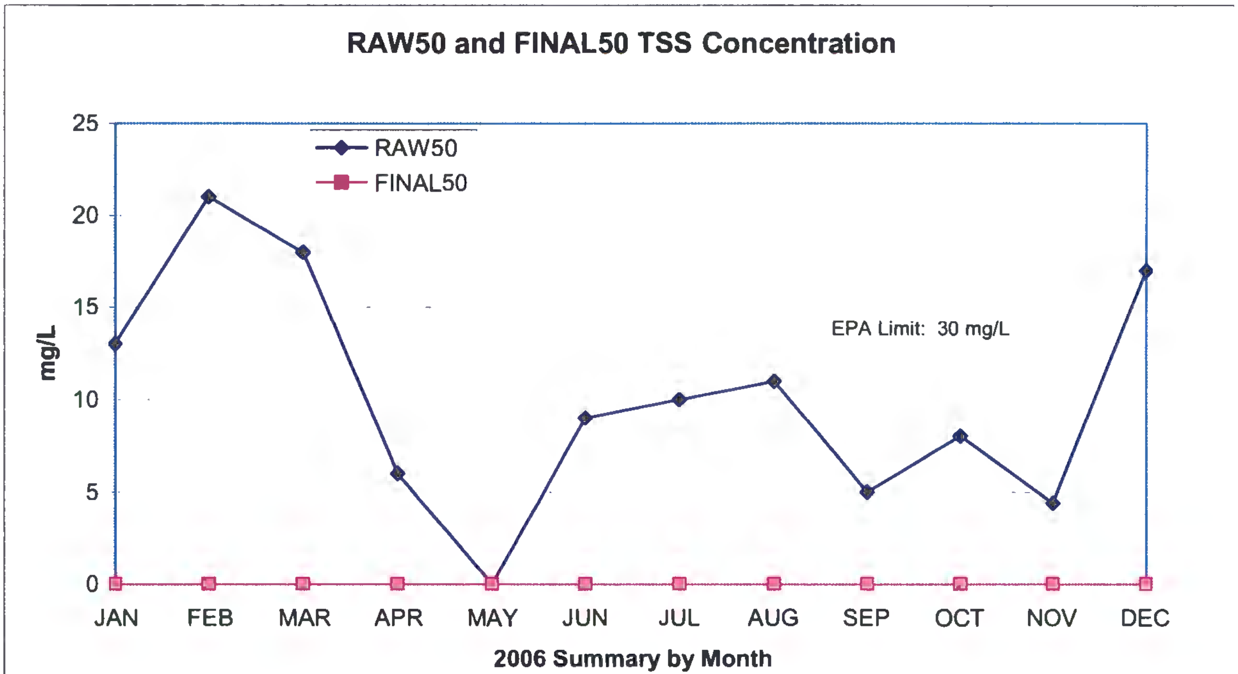
- The TDS graph shows increasing effluent concentrations as RO membranes deteriorated in June and July, and again towards the end of the year. New membranes were installed on July 18^{th}, and two months after the year ended, on 27 February 2007.

- The TSS graph shows varying influent concentrations, but consistent effluent concentrations of zero. All twelve monthly composite results for 2006 were less than the Method Detection Limit of 4 mg/L.

Figure 4-1
Dissolved and Suspended Solids in RLWTF Waters During 2006



FINAL50 results for January, February, and March are based upon conductivity analyses.



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The next four graphs provide information about nitrogen compounds in RLWTF influent and effluent during 2006. Nitrogen discharges are of concern to the NMED Groundwater Bureau, which may impose limits for nitrates and/or total nitrogen. Figure 4-2 graphs total nitrogen and ammonia concentrations in RLWTF influent and effluent, while Figure 4-3 illustrates nitrogen-as-nitrate and nitrogen-as-nitrite concentrations. These allow the following observations:

- TKN: Nitrogen in effluent was consistently 5 mg/L or less, regardless of influent concentrations. This pattern differs from that observed during 2005 when nitrogen removal did not occur at all during the last half of the year. The reasons for these behaviors are not known. There is no discharge standard for total nitrogen.

- Ammonia: Except for June, influent concentrations were consistent in the range of 7-12 mg/L, the same as in 2005. Effluent concentrations were less than 7 mg/L except during September. There is no discharge standard for ammonia.

- Nitrate: Effluent concentrations were consistently maintained at 10% - 15% of the NMED discharge standard of 10 mg/L, despite a steady and significant during rise during the second half of the year. Influent concentrations returned to normal levels in the January and February 2007, and the cause of the influent trend is unknown.

- Nitrite: Except for a spike in influent concentration in August, both influent and effluent concentrations were very consistent. The increase in effluent concentration in December may reflect the fact that the ion exchange resins had reached end-of-life. There is no discharge standard for nitrite.

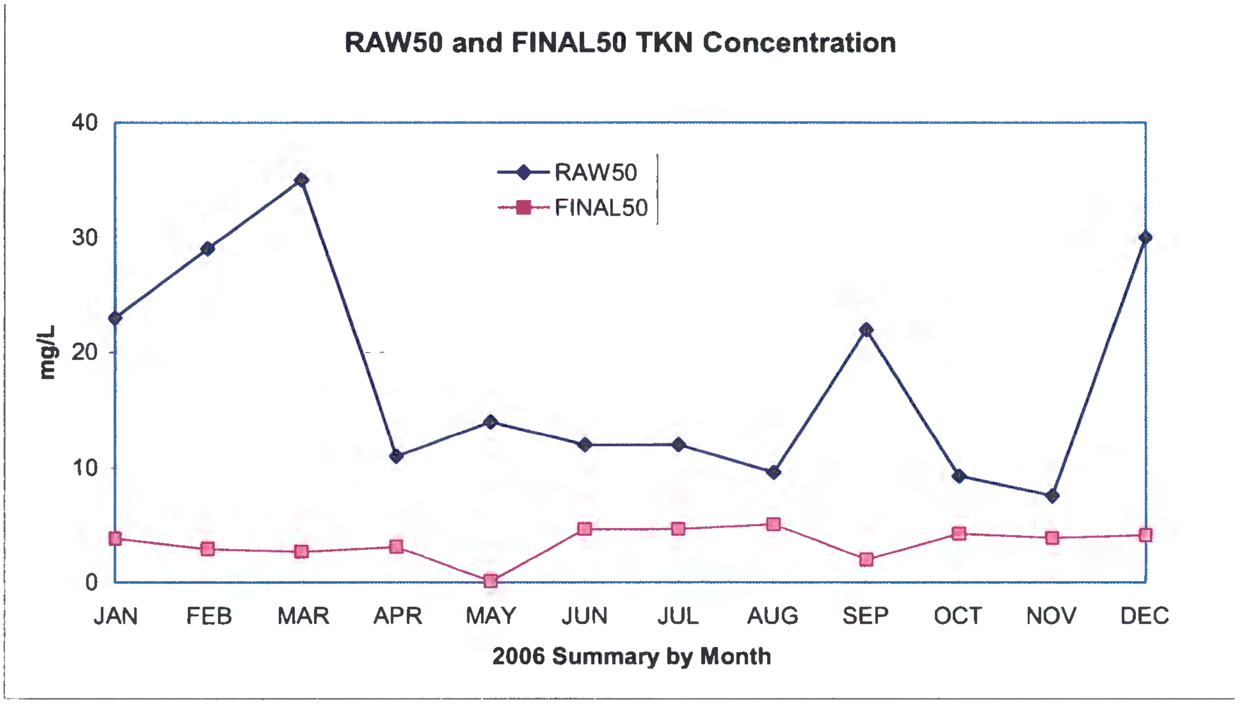
Table 4-5 presents average concentrations for nitrogen compounds for the year. Of note is the fact that 2006 average influent concentrations for were all higher than those of 2005. TKN was twice as high; nitrate was 1.6 times as high; and average nitrite concentration was ten times as high. Average effluent concentrations in 2006, however, were similar to those in 2005 for all four nitrogen compounds.

Table 4-4
Nitrogen Compounds in RLWTF Waters During 2005

	Influent*	Effluent*
Total Kjedahl Nitrogen	17.6	3.4
Nitrogen-as-Ammonia	8.9	4.2
Nitrogen-as-Nitrate	9.4	0.5
Nitrogen-as-Nitrite	4.2	1.1

* Average concentration for 2006, in mg/L.

Figure 4-2
Total Kjedahl Nitrogen and Nitrogen-as-Ammonia
in RLWTF Waters During 2006



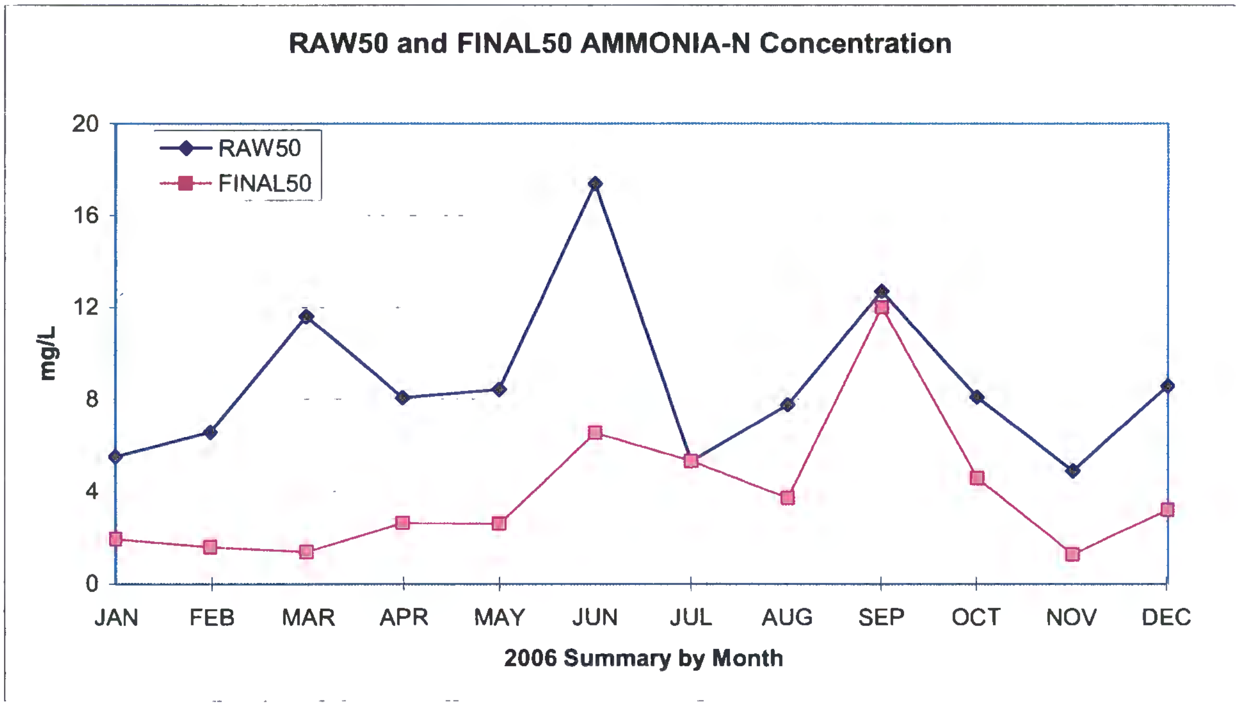
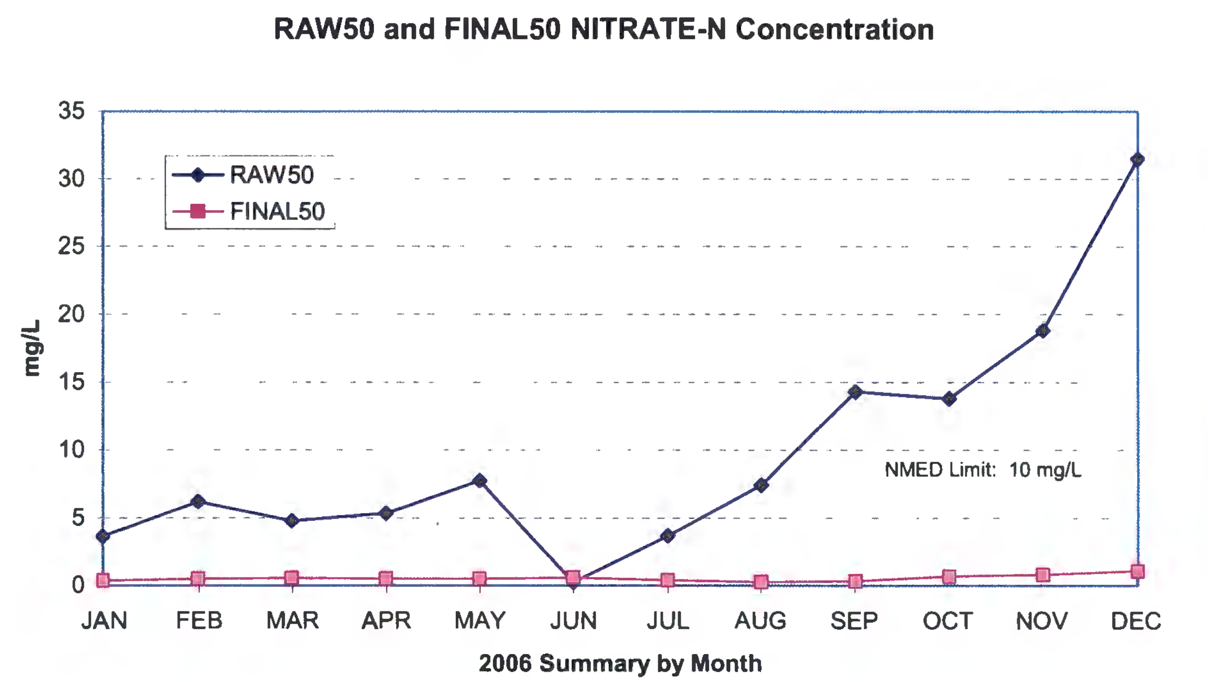
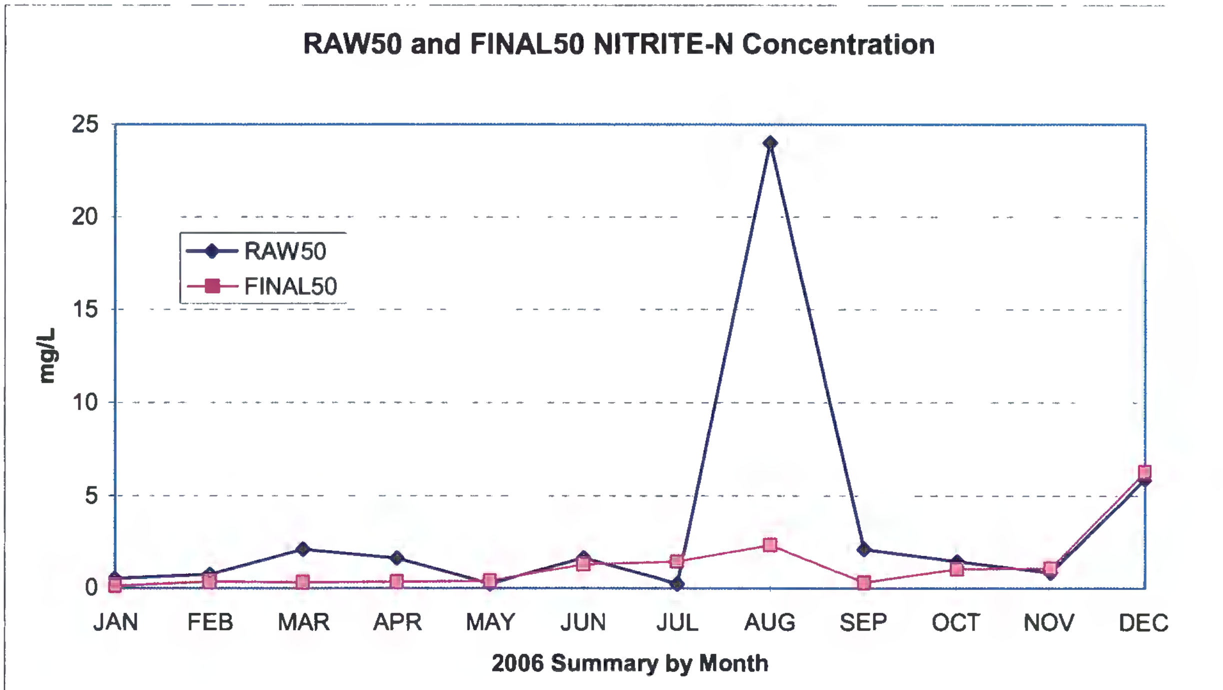


Figure 4-3
Nitrogen-as-Nitrate and Nitrogen-as-Nitrite
in RLWTF Waters During 2006





The next two graphs provide information about parameters of regulatory concern. Each figure plots mineral concentration in RLWTF influent and effluent during 2006.

- Figure 4-4 charts concentrations for mercury and perchlorates, the two chemicals with the most restrictive discharge limits. The NPDES limit for mercury is just 0.77 µg/L (i.e., less than one part per billion). Eight of the 12 monthly average effluent concentrations were below the Method Detection Limit of 0.02 µg/L, and three were below 0.10 µg/L. Average effluent concentration for April was 0.46 µg/L. Perchlorate has a voluntary discharge limit of just four parts per billion, for which ion exchange treatment columns were installed in 2002. No perchlorate has been detected in effluent in concentrations at or above the Method Detection Limit of one part per billion since the ion exchange columns were installed, including during 2006.

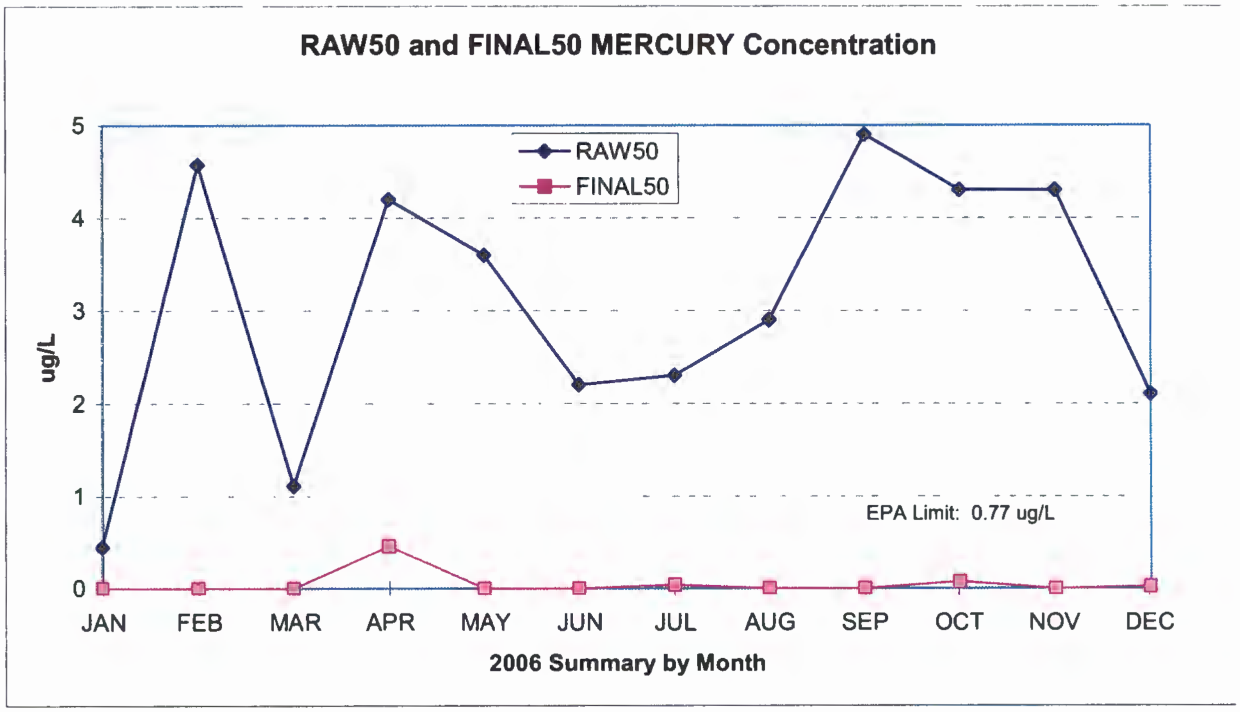
- Figure 4-5 graphs another two parameters of regulatory concern, fluoride and copper. Fluoride has an NMED discharge limit of just 1.6 mg/L. Fluoride effluent concentrations were all less than 20% of the limit. The existing discharge standard for copper is 1.4 milligrams per liter, but the standard *proposed* by the EPA, 8.6 µg/L, is lower by a factor of 160.

  - As shown in the graphs, there was no difficulty in meeting current EPA discharge standards during 2006 for either fluoride or copper.

  - However, effluent concentrations for copper ranged from five to 18 µg/L, and exceeded the proposed standard of 8.6 µg/L during seven months in 2006.

  - A Plant Test conducted during 2005 (Del Signore and McClenahan, March 2006, p.33) showed that copper is one of several metals that exist in both the soluble and insoluble states. Enough of the soluble fraction survives the Main Treatment Process to appear in plant effluent in concentrations greater than the proposed discharge standard. The draft NPDES permit allows three years to achieve compliance with the proposed standard, which should give sufficient time to install cation exchange or another treatment step.

Figure 4-4
Mercury and Perchlorate in RLWTF Waters During 2006



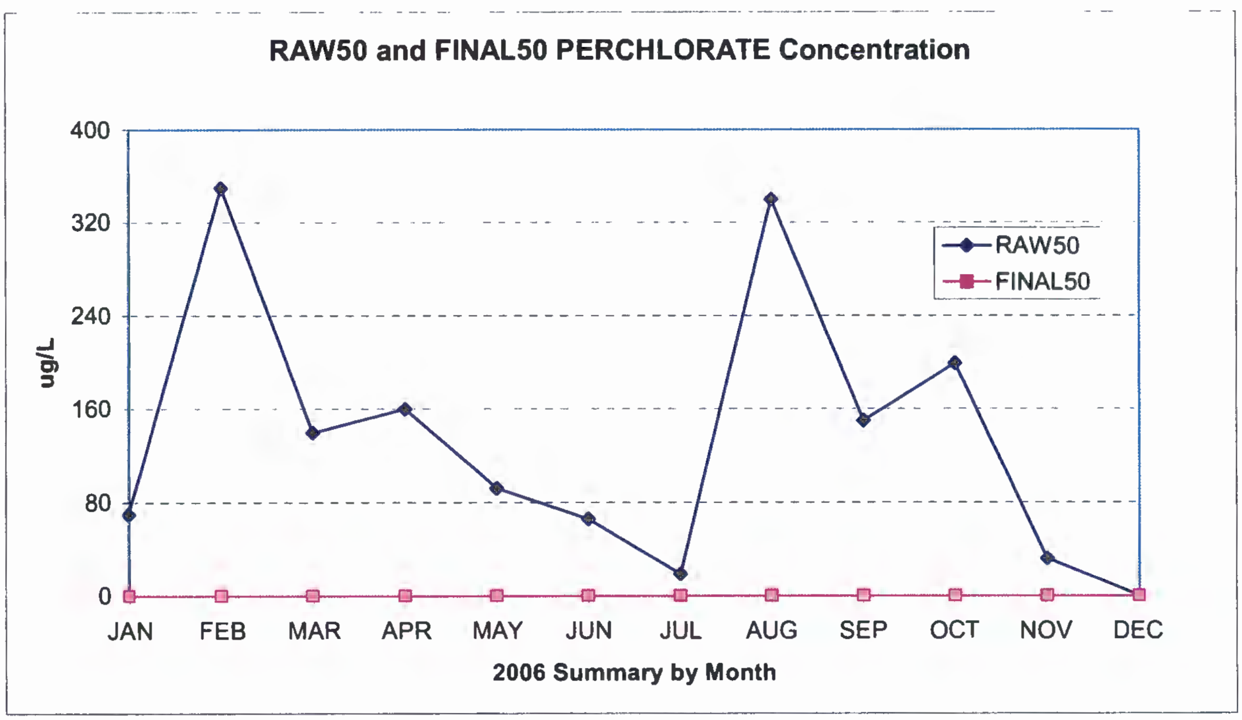
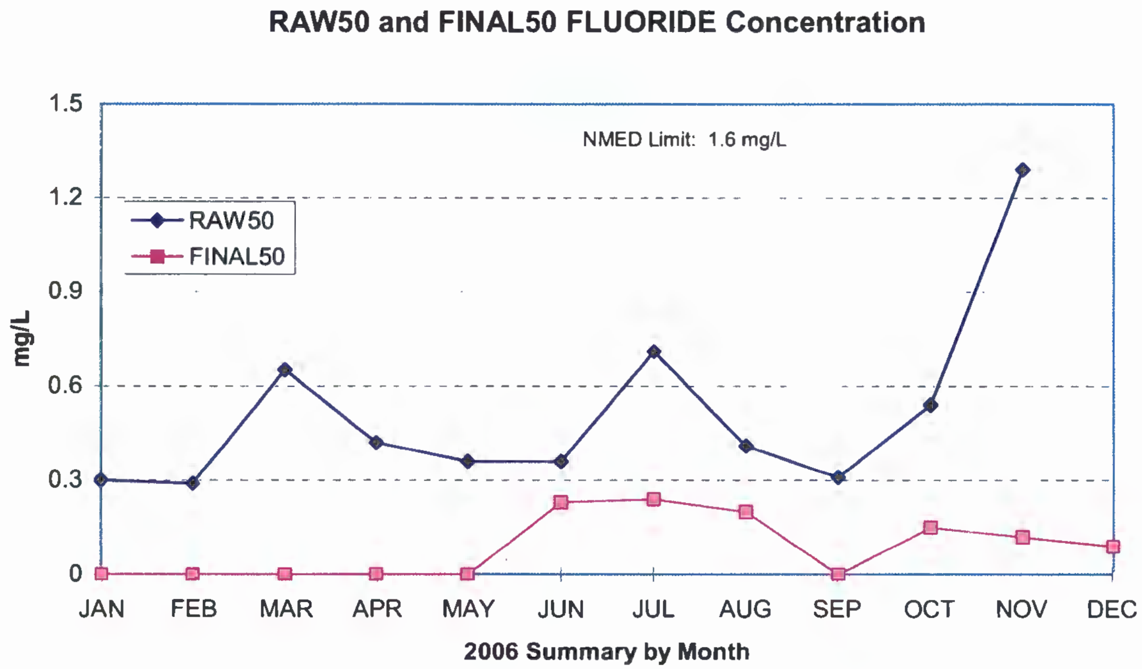


Figure 4-5
Fluoride and Copper in RLWTF Waters During 2006



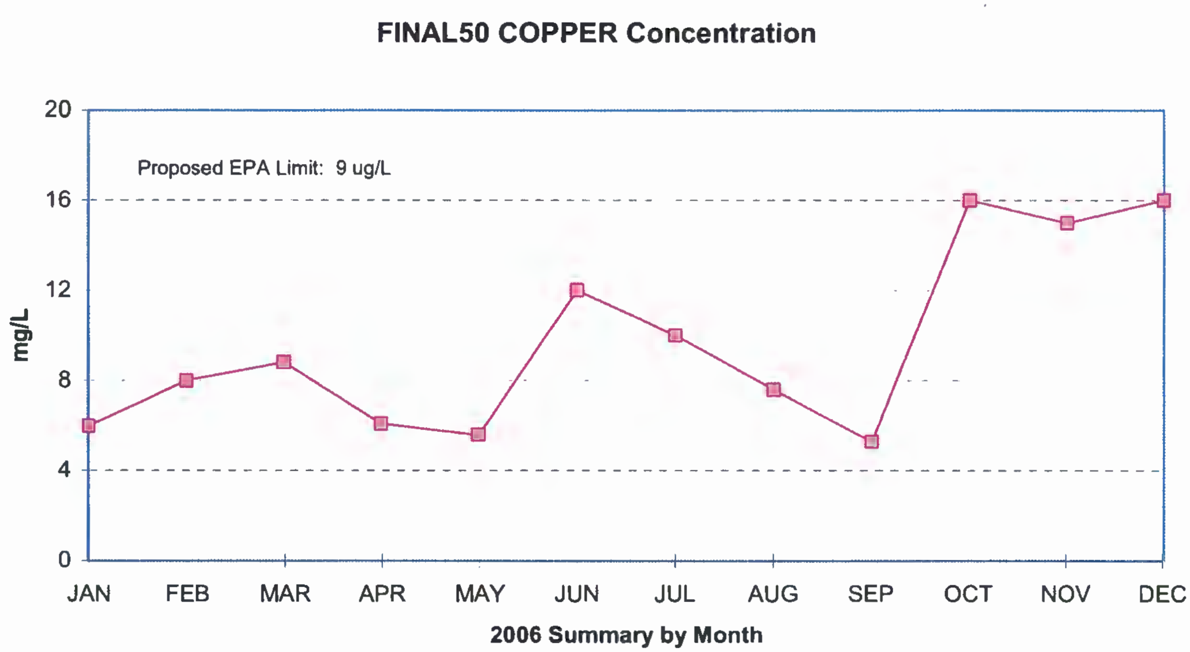


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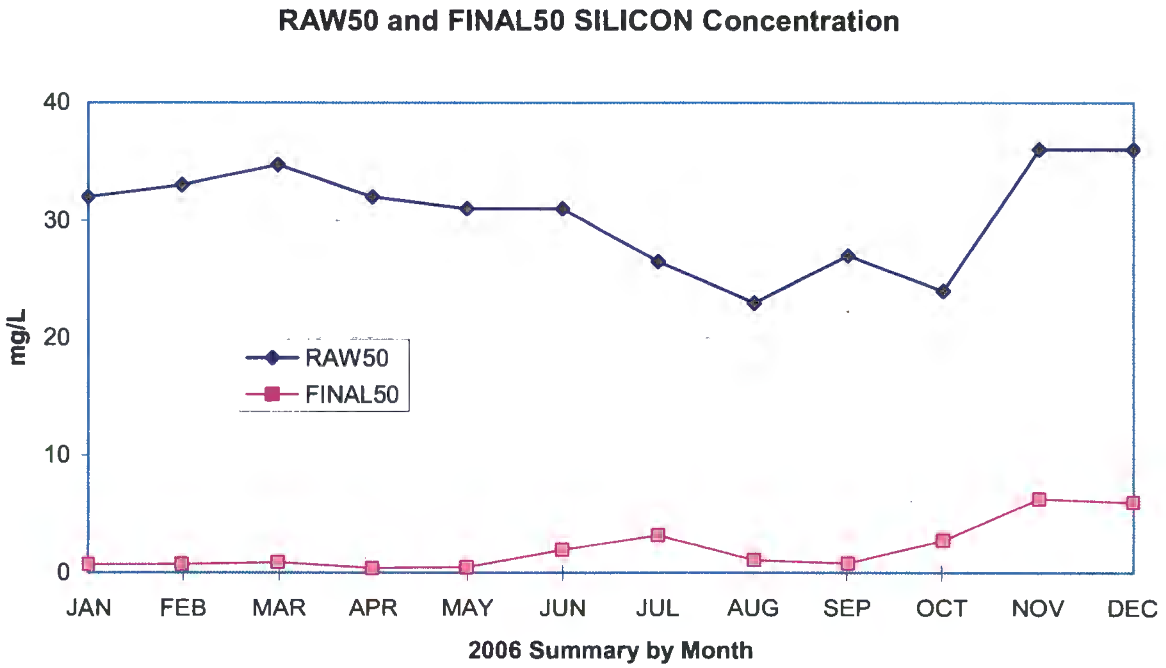
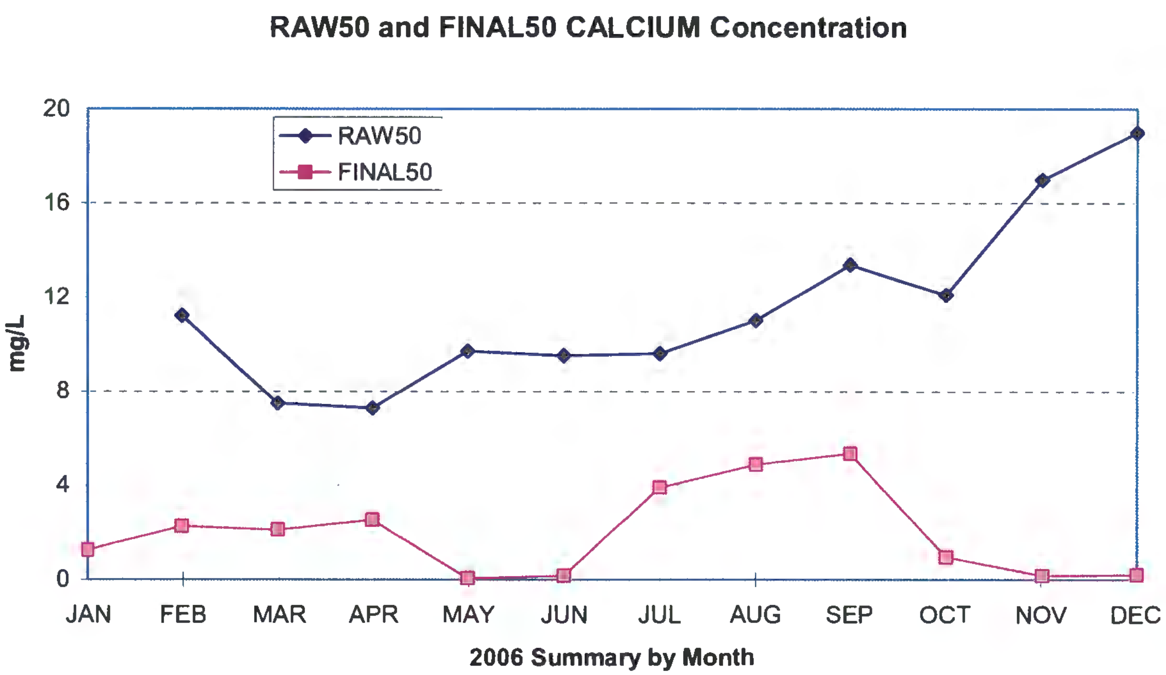
Figure 4-6 charts concentrations for two minerals of processing concern, silicon and calcium. These presented significant problems and downtime when the membrane processes were first installed, and remain processing concerns today. The top graph shows influent silicon concentrations of 20-40 mg/L, typical of waters in northern New Mexico, but high compared to concentrations in other parts of the country. The lower graph shows that calcium effluent concentrations were lower than influent concentrations for all months, indicative of excellent control of the rate of addition of lime to the clarifier.

Finally, Figure 4-7 shows influent and effluent concentrations for sodium and chloride. As shown in Table 4-2, sodium was the chief constituent in RLWTF influent during 2006, and also accounted for two-thirds of the 433 kilograms of minerals discharged to Mortandad Canyon. The fact that more sodium is discharged than comes in with the influent is due to the use of sodium hydroxide to adjust pH of the influent. Both sodium and chloride are soluble, and hence are not removed prior to treatment by reverse osmosis. The graphs for sodium and chloride also provide clear evidence of degradation of the RO membranes in June and July, as shown in the spikes in effluent concentration.

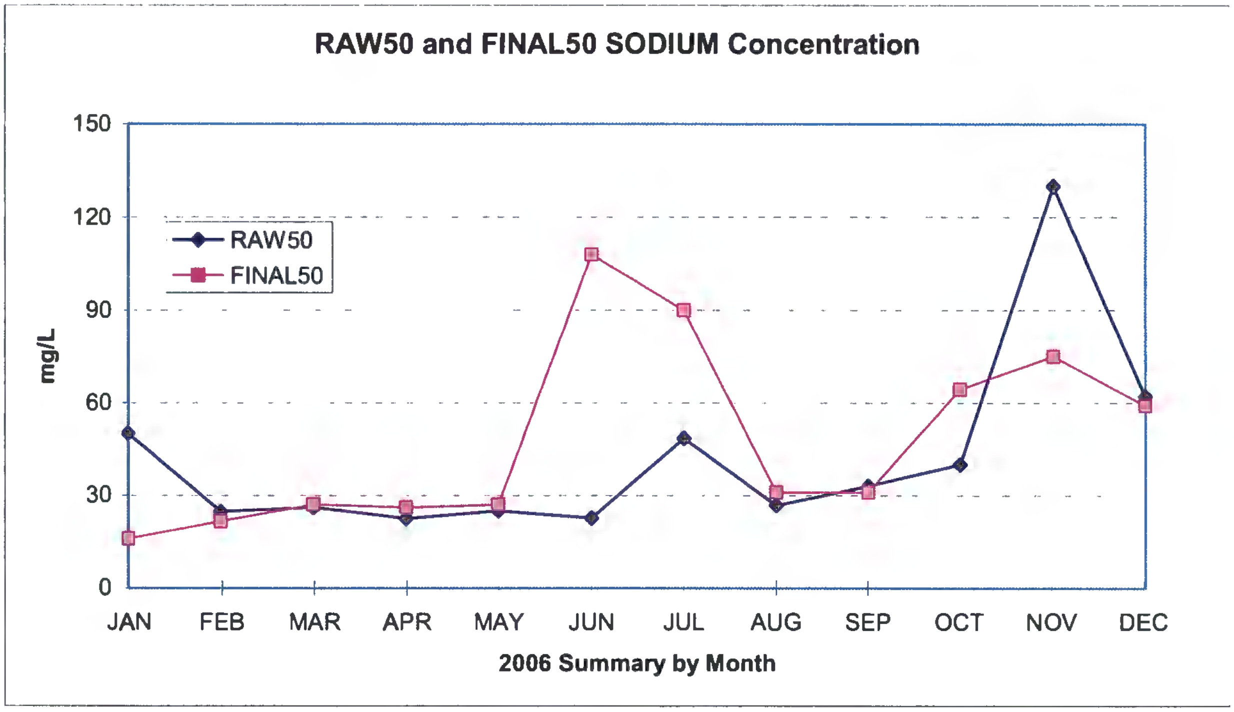
Figure 4-6
Silicon and Calcium in RLWTF Waters During 2006

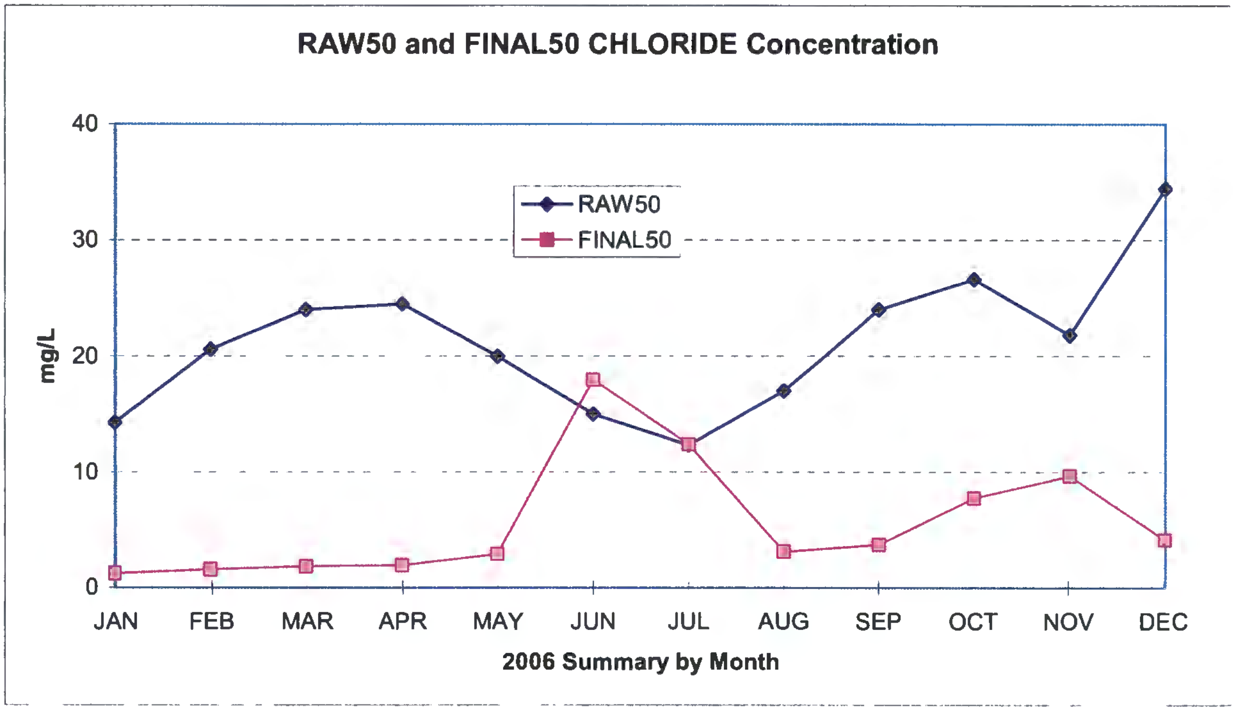




May 2005 RAW50 concentration plotted at MDL of 10 mg/L.

Figure 4-7
Sodium and Chloride in RLWTF Waters During 2006





4.5 Organic Chemicals

Grab samples of influent and effluent waters are analyzed for volatile organic chemicals (VOC) and semi-volatile organic chemicals (SVOC) on a weekly and monthly basis, respectively. Additionally, individual batches of sludge are also analyzed for VOC and SVOC. Analyses are performed by an external EPA-certified laboratory according to EPA approved methods 624 for VOC, and 625A and 625B for SVOC.

Tables 4-5 and 4-6 summarize the VOC and SVOC detected in the RLWTF influent during 2006 and the concentration range of these chemicals. The "months" column in these tables indicates the number of monthly samples in which a particular chemical was detected. This influent sampling had the following results:

- 14 volatile organic and 14 semi-volatile organic compounds were detected in RLWTF influent throughout the year.
- A total of 157 "detects" occurred, an average of just three per week. Four compounds accounted for 135 (86%) of the "detects": acetone, methylene chloride, 4-methyl-2-pentanone, and bis(2-ethylhexyl)phthalate.
- Maximum concentration was 1.6 mg/L (acetone); the second-highest analyzed concentration was just 0.25 mg/L. These concentrations are far below the waste acceptance ceiling of 25 mg/L for total organics.

Table 4-5
VOC Detected in Weekly Samples of 2006 RLWTF Influent

VOC (Method 624)	Weeks	Low (mg/L)	High (mg/L)
1,2,4-TRIMETHYLBENZENE	3	2.3 E-3	8.6 E-3
1,3,5-TRIMETHYLBENZENE	1	2.9 E-3	2.9 E-3
1,4-DICHLOROBENZENE	1	2.9 E-3	2.9 E-3
2-BUTANONE	1	14. E-3	14. E-3
4-METHYL-2-PENTANONE	26	15. E-3	250. E-3
ACETONE	40	20. E-3	1.6 E0
BROMOMETHANE	3	3. E-3	9.8 E-3
CHLOROBENZENE	1	3.2 E-3	3.2 E-3
CHLOROMETHANE	3	3.4 E-3	6.5 E-3
IODOMETHANE	2	1.9 E-3	6.6 E-3
METHYLENE CHLORIDE	32	1.6 E-3	32. E-3
STYRENE	2	4.4 E-3	6.8 E-3
TETRACHLOROETHENE	1	2.7 E-3	2.7 E-3
TRICHLOROETHENE	3	2.4 E-3	3.6 E-3

Table 4-6
SVOC Detected in Weekly Samples of 2006 RLWTF Influent

VOC (Methods 625A and 625B)	Weeks	Low (mg/L)	High (mg/L)
1,3-DICHLOROBENZENE	1	1.1 E-3	1.1 E-3
2-NITROPHENOL	4	1.2 E-3	21. E-3
4,6-DINITRO-2-METHYLPHENOL	1	7.2 E-3	7.2 E-3
4-NITROPHENOL	1	6.6 E-3	6.6 E-3
AZOBENZENE	2	1.1 E-3	5.7 E-3
BENZOIC ACID	11	5.8 E-3	75. E-3
BENZYL ALCOHOL	1	2.9 E-3	2.9 E-3
BIS(2-ETHYLHEXYL)PHTHALATE	37	4.5 E-3	200. E-3
BUTYLBENZYLPHTHALATE	6	550. E-6	2.9 E-3
DI-N-BUTYLPHTHALATE	6	1.1 E-3	26. E-3
DIETHYLPHTHALATE	3	730. E-6	1.4 E-3
N-NITROSO-DI-N-PROPYLAMINE	6	4.3 E-3	11. E-3
PHENOL	5	610. E-6	11. E-3
PYRIDINE	3	6.7 E-3	20. E-3

Tables 4-7 and 4-8 show the VOC and SVOC, respectively, detected in the RLWTF effluent, and the number of weeks in which that chemical was detected, during CY 2006. Effluent sampling had the following results:

- One volatile organic and 13 semi-volatile organic compounds were detected in RLWTF effluent throughout the year.
- Maximum effluent concentration, 1.5 μg/L, was a thousand times lower than the maximum influent concentration. These effluent concentrations are far below the NPDES discharge standard of 1,000 μg/L for total organics.

Finally, Tables 4-9 and 4-10 summarize the VOC and SVOC detected in RLWTF sludge samples during 2006. (Since sludge operations were limited during 2006, just one sample was collected.) As the tables show, six volatile organic and nine semi-volatile organic compounds were detected in that sample. Bis(2-ethylhexyl)phthalate was measured at 10 mg/L; the remaining 14 organic compound concentrations were less than 0.3 mg/L.

Table 4-7
VOC Detected in Monthly Samples of 2006 RLWTF Effluent

VOC (Method 624)	Months	Low (ug/L)	High (ug/L)
Chlorobenzene	1	1.07	1.07

Table 4-8
SVOC Detected in Monthly Samples of 2006 RLWTF Effluent

SVOC (Methods 625A and 625B)	Months	Low (ug/L)	High (ug/L)
Acenaphthene	1	1.26	1.26
Anthracene	1	1.44	1.44
Benzo(a)anthracene	1	1.5	1.5
Benzo(a)pyrene	1	1.11	1.11
Benzo(b)fluoranthene	1	1.22	1.22
Benzo(k)fluoranthene	1	1.22	1.22
Chloronaphthalene[2-]	1	1.25	1.25
Chrysene	1	1.42	1.42
Fluoranthene	1	1.48	1.48
Fluorene	1	1.51	1.51
Naphthalene	1	1.21	1.21
Phenanthrene	1	1.41	1.41
Pyrene	1	1.44	1.44

Table 4-9
VOC Detected in 2006 RLWTF Sludge Samples *

VOC (Method 624)	Low (mg/L)	High (mg/L)
1,2,4-TRIMETHYLBENZENE	12. E-3	12. E-3
1,3,5-TRIMETHYLBENZENE	2. E-3	2. E-3
ETHYLBENZENE	1. E-3	1. E-3
TOLUENE	30. E-3	30. E-3
TRICHLOROETHENE	13. E-3	13. E-3
XYLENE (TOTAL)	4.4 E-3	4.4 E-3

Table 4-10
SVOC Detected in 2006 RLWTF Sludge Samples *

SVOC (Methods 625A and 625B)	Low (mg/L)	High (mg/L)
2-NITROPHENOL	100. E-3	100. E-3
BENZO(A)ANTHRACENE	110. E-3	110. E-3
BIS(2-ETHYLHEXYL)PHTHALATE	9.8 E0	9.8 E0
BUTYLBENZYLPHTHALATE	110. E-3	110. E-3
CHRYSENE	110. E-3	110. E-3
DI-N-BUTYLPHTHALATE	100. E-3	100. E-3
DI-N-OCTYL PHTHALATE	270. E-3	270. E-3
FLUORANTHENE	130. E-3	130. E-3
PYRENE	120. E-3	120. E-3

* Low and high values are the same because there was but one sludge sample in 2006.

5. TA-50 Wastes

During the treatment of wastes, other (secondary) waste streams are generated. These secondary wastes can be grouped under two headings – secondary liquid waste streams, and solid wastes.

5.1 Secondary Liquid Wastes

Secondary liquid wastes include a wide variety of waste streams from each of the treatment operations. For example, clarifier and gravity filter operations result in both backwash waters and a liquid, sludge-containing slurry. Similarly, operating the reverse osmosis unit creates a concentrate stream and membrane cleaning solutions. Each of these secondary liquid waste streams are re-treated within the TA-50 RLWTF. Clarifier sludge, for example, is processed through the rotary vacuum filter in Room 116; gravity filter backwash waters are returned to the influent tanks to be re-processed through the clarifier; and RO concentrate is processed through the interim evaporator.

The volume of these secondary liquid waste streams during 2006 was an estimated four million liters, more than 90% of which are generated via operation of the tubular ultrafilter and the reverse osmosis units. This secondary liquid waste volume, sadly, totaled 60% of the raw influent volume for the year. This was not good performance, and resulted primarily from the operation of the tubular ultrafilter. Daily purging of tubular feed tanks and recycle of spongeball waters unnecessarily generate large volumes of liquids that must be re-treated.

5.2 Solid Wastes

Influent to the TA-50 RLWTF contained 1,404 kilograms of dissolved and suspended solids. Treatment of this influent to achieve compliance with DOE, EPA, and NMED discharge standards resulted in the generation of 25,280 kilograms of solid wastes. These solid wastes can be broadly grouped into three waste sources:

- operations wastes generated while conducting day-to-day activities (6,700 kg),
- process sludge that results from chemical precipitation (2,580 kg), and
- dried salts from evaporator bottoms (16,000 kg).

In addition to solid wastes generated by treating RLW, solid wastes in the form of soils and debris were generated (a) during the construction of the new pump house and influent storage tank building that is part of the Cerro Grande Rehabilitation Project and (b) during the cleanout of WM-66 and replacement of the caustic waste tank. This non-routine waste totaled 30 cubic meters and 19,240 kilograms of radioactive low-level waste that was disposed at Area G.

Table 5-1 provides details of solid waste containers, volumes, and weights.

Table 5-1
Solid Wastes Shipped From the TA-50 RLWTF During 2006

	Chem-ical	LLW	MLLW	TRU	Totals
No. Items:					
Construction debris	0	7	0	0	7
Operations	1	18	0	0	19
Salts from Bear Creek	0	10	0	0	10
Sludge	0	16	0	0	16
Totals	1	51	0	0	52
Volume (m^3):					
Construction debris	0	30.3	0	0	30.3
Operations	0.001	45.9	0	0	45.9
Salts from Bear Creek	0	12.5	0	0	12.5
Sludge	0	3.3	0	0	3.3
Totals	0.001	92.0	0	0	92.0
Weight (Kg):					
Construction debris	0	19,242	0	0	19,242
Operations	1.36	6,701	0	0	6,702
Salts from Bear Creek	0	16,014	0	0	16,014
Sludge	0	2,580	0	0	2,580
Totals	1.36	44,536	0	0	44,538

5.2.1 Operations Wastes

Operations wastes result from both day-to-day water treatment activities and from facility and equipment repairs and modifications. A total of 46 cubic meters (230 drum equivalents) weighing 6,700 kilograms of operations wastes were generated at the TA-50 RLWTF during 2006. Operations wastes consisted broadly of compactible and other trash generated in radiation control areas at the RLWTF. Compactible trash includes paper, discarded plastic sampling vials and bottles, protective gloves, and similar materials needed for day-to-day activities. Other operations waste included empty containers, process consumables such as spent filter cartridges, and waste from repairs and modifications such as piping and worn pumps and motors.

5.2.2 Salts From Bear Creek

Bottoms from the interim evaporator are shipped to a subcontractor in Bear Creek, TN, where the bottoms are dried. The resultant dried salts are returned for disposal at Area G as LLW. During 2006, although no shipments containing evaporator bottoms were made to Bear Creek, 60 drums of dried salts weighing 16,010 kilograms were returned to LANL from drying operations during 2005.

5.2.3 Process Sludge

MTP clarifier sludge, after being processed through the rotary vacuum filter, are drummed and then shipped to Area G for disposal (LLW). During 2006, 16 drums containing 2,580 kilograms of process sludge were shipped for disposal as LLW at Area G. (See Table 5-2 for details.)

Clarifier sludge from Room 60 is drummed, then solidified, prior to disposal as transuranic waste at the Waste Isolation Pilot Plant. No drums of solidified transuranic sludge were shipped from TA-50 during 2006.

Table 5-2
Vacuum Filter Sludge Shipped for Disposal During 2006

Date	No. of Drums	Total Volume (Liters)	Gross Weight (Kg)
03-Aug	3	624	518
05-Oct	13	2,707	2,062
TOTAL	16	3,331	2,580

6. Operations in 2006 at the Other RLW Facilities

The preceding chapters of this annual report discussed the TA-50 RLWTF for low-level radioactive liquid wastes. This chapter discusses the remaining three Radioactive Liquid Waste treatment facilities.

6.1 TA53 RLW Facility

The TA-53 RLWTF treats radioactive liquid waste from accelerator research at the Los Alamos Neutron Science Center. The treatment process includes wastewater storage to allow short-lived radioisotope decay, followed by solar evaporation. Three flows are of importance.

- Water flows by gravity into lift stations adjacent to Experimental Area A and the Lujan Center. The RLW is pumped from the lift stations through double-walled underground piping to one of three 30,000-gallon tanks inside Building 53-945. A total of 131,040 liters of RLW were transferred from the lift stations to the RLWTF during 2006.

- Tritiated waters are occasionally trucked directly to the TA-53 basins for evaporation. During 2006, 9500 liters were trucked to the basins from TA-16, and another 1500 from TA-21. These trucked wastewaters met the waste acceptance criteria for the TA-53 RLWTF. This additional trucked quantity raised total influent volume for 2006 to 142,050 liters.

- After aging in the RLWTF tanks, the RLW is pumped to the evaporator basins. During 2006, three pump-outs occurred, one for each tank. The volume of RLW pumped to the basins totaled 212,350 liters.

The quantity of water sent to the basins during 2006 is far below the evaporative capacity (1.4 millions liters per year) of the basins at TA-53.

6.2 Transuranic RLW Facility

Several events have combined to limit operations of the Room 60 Facility, which treats transuranic RLW generated by TA-55. First, it was discovered in September 2003 that the influent storage tank for caustic wastes was leaking. Second, the Room 60 facility was shut down in July 2004 as part of the LANL-wide work suspension for safety due to deteriorating equipment and vessels. Then, maintenance efforts to repair these items were impaired by a variety of factors including multiple management changes during the period 2003-2005, and a contamination incident in March 2005 when preparing to remove the leaking caustic tank[D].

As a result, the Room 60 Facility was operated sparingly during 2006. Only one *transfer* from TA55 occurred during the year; 1184 liters of acid waste were transferred on 13 February. Four batches of acid were *treated* during 2006, a total of 6080 liters. This treatment emptied the acid waste tank, a safety basis requirement prior to the replacement of the leaking caustic waste tank.

Caustic wastes were neither transferred from TA55 to the caustic storage tank at TA50, nor processed through Room 60 during 2006.

6.3 TA21 RLW Facility

The facility at TA-21 treats RLW from tritium research at TA-21 using a clarifier and a gravity filter. Effluent from the TA-21 Facility is transferred to either the TA-50 low-level RLWTF or the TA-53 Facility for further treatment. From 1966 through 2000, effluent from this facility was transferred via underground piping to TA-50. Beginning in 2001, treated TA-21 waters have been transferred to TA-50 by truck.

Volumes and concentrations of tritiated RLW have declined as tritium activities have been scaled back at TA-21. Although influent volumes historically exceeded one million liters, they declined to just 30,000 liters in 2002, 32,000 liters in 2003, and nearly zero since. The TA-21 RLWTF was last operated in 2003. During 2006, influent approximated zero, and the facility was again not operated. One tanker truck of liquids (1500 liters) was transported to the TA53 basins for solar evaporation.

The TA-21 facility has an inventory of waters in tanks and process equipment, estimated to be about 250,000 liters, that remains to be processed. Condition of the equipment for this processing is of concern, however, due to age and intermittent use. A return to operation will require major efforts, including procedure reviews and walkdowns, equipment checks and tests, processing trials using non-radioactive waters, a Management Self Assessment, and a LANL Readiness Assessment.

After the existing inventory of waters have been processed, and resulting sludge removed, the TA-21 facility will be placed in cold shutdown status to await decommissioning.

[D] Personnel exposures during the incident were all less than one-fifth of DOE safety limits.

7. References

Nearly all of the information presented in this Annual Report come from the RLWTF process control system, which has three sources of data input: analytical results, manually-entered data, and input from a Supervisory Control and Data Acquisition (SCADA) system. The below list of references points to the fourth major data source used in compiling the Annual Report – published reports that are cited within the text of the Annual Report.

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Appendix A
TA-50 RLWTF Unit Operations During 2006

Text:

List of Tables:

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Appendix A
Low-Level RLW Unit Operations During 2006

One method to measure and report plant operations is to look at the unit operations that comprise the Low-Level RLW processes. These operations, defined in Table A-1, represent all Low-Level RLW operations. The first five unit operations embody the Main Treatment Process, while the final two are secondary treatment processes. Operations of each of these unit operations during 2006 are discussed in the following seven sections; they are then summarized in Section A.8.

Table A-1
TA-50 Low-Level RLW Unit Operations

Unit Operation	Includes	#Vessels	Capacity (gals.)
1. Influent Storage	17K, 75K, 100K tanks	3	192,000
2. Clarifier/ Gravity Filter	Clarifier #2, Gravity Fliter	2	33,000
3. Ultrafilter	TUF, TK-71, 72, 73	4	23,700
4. Ion Exchange	TK-9, Ion exchange columns	7	10,360
5. Reverse Osmosis	RO, FRAC-N, FRAC-S, Clarifier #1	4	64,000
6. Evaporator	Evap, Tank Farm, EFF-S, EFF-N	8	126,600
7. Rotary Vacuum filter	RVF, TK-8	2	8,000
Total Low-Level RLW		30	457,660

A.1 Influent Tanks

Description: The influent tanks collect (a) raw influent from LANL waste generators, (b) secondary waste waters generated by the Main Treatment Process, and (c) tertiary waste waters generated by the two secondary treatment processes, the RVF and evaporator. These waters are then fed to the first treatment step in the low-level process.

Boundaries: The MTP influent tank unit operation consists of the 17K, 75K, and 100K tanks. Unit operation capacity is 192,000 gallons.

RLW Streams Collected:

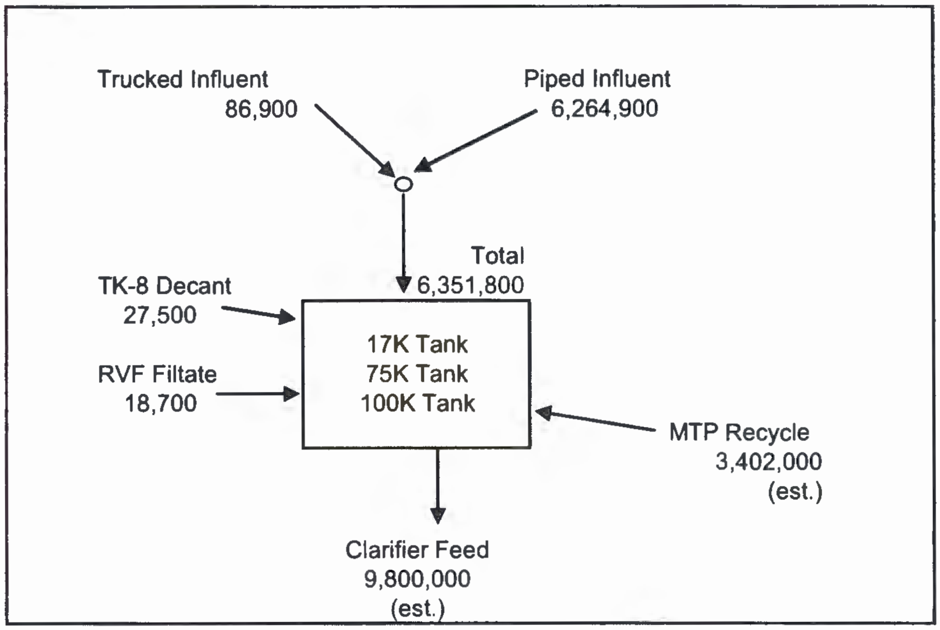
- Raw influent from LANL generators (piped and trucked)
- Secondary waste waters from the TA-50 Main Treatment Process
- Tertiary waste waters from the two secondary treatment processes

RLW Stream Generated, and Disposition:

- Raw daily feed: sent to MTP Clarifier #2

2006 Operations: Inflow to the influent tanks consisted of 6.35 million liters of raw influent from other LANL facilities, and an estimated 3.45 million liters of secondary and tertiary waste waters. A flow diagram for 2006 is shown in Figure A-1.

Figure A-1
Influent Tank Flows During 2006



A.2 Clarifier and Gravity Filter

Description: The clarifier and gravity filter (CGF) remain the workhorse of the Main Treatment Process, removing more than 90% of constituents, both radioactive and non-radioactive, from influent waters. In addition to raw influent from other LANL generators, the units are fed internal recycle streams such as the daily purge of ultrafilter feed tanks, decant and filtrate from sludge treatment, and membrane cleaning solutions. Clarifier treatment consists of chemical addition to precipitate impurities, settling to remove the majority of these precipitates, and gravity filtration of overflow waters through a mixed bed of sand and anthracite to remove more solids. The gravity filter removes particles down to 6-10 microns in size.

Boundaries: The CGF unit operation consists of the clarifier and gravity filter. Unit operation capacity is 33,000 gallons.

RLW Streams Treated: Water from the influent tanks

RLW Streams Generated, and Disposition:

- Gravity filter backwash: sent to MTP influent tanks
- Clarifier sludge: sent to TK-8, for processing through the RVF

2006 Operations: The clarifier and gravity filter operated on 147 days, processing 6.35 million liters of influent, plus an estimated 3.4 million liters of recycle streams (such as spongeball waters from the TUF). Quantities of lime and ferric sulfate used for clarifier operations were not available.

A total of 184,000 liters of secondary wastes were generated from this unit operation during 2006: 43,200 liters of sludge were removed from the clarifier (10 transfers from the clarifier to TK-8), and another 140,600 liters of gravity filter backwash were generated (Table A-2). This total secondary waste volume amounts to 1.9% of the volume of water treated [E].

Table A-2
Gravity Filter Backwash During 2006

Date	Liters	Tank_Name	Origin_of_Water
1/6/2006	37,377	EFF_WM2_T1	South EFF
2/24/2006	17,737	EFF_WM2_T1	South EFF
4/27/2006	24,332	EFF_WM2_T1	South EFF
6/16/2006	17,469	EFF_WM2_T1	South EFF
9/8/2006	26,739	EFF_WM2_T2	North EFF
11/29/2006	16,935	EFF_WM2_T1	South EFF

Totals: 6 backwashes, 140,600 liters.
An average of 23,430 liters per backwash.

A.3 Ultrafilter

Description: Discharge from the gravity filter is fed to the tubular ultrafilter (TUF), which removes essentially all remaining solids. The TUF is also sometimes fed (a) distillate from evaporator operations and (b) RLWTF effluent that does not meet NPDES, NMED, or DOE discharge limits. Chemicals are not used in the treatment process, but acid and caustic solutions may be used to clean the membranes. The TUF removes particles down to 0.08 micron in size.

Boundaries: The TUF unit operation consists of the ultrafilter itself, the feed tanks (TK-71 and TK-72), and associated TK-73. Unit operation capacity is 23,700 gallons.

RLW Streams Treated:

- Gravity filter effluent
- Off-specification effluent
- evaporator distillate

[E] The volume of sludge withdrawn from the clarifier should be higher in order to attain optimal clarifier efficiency, and more sludge *would* have been withdrawn had the rotary vacuum filter been operated more frequently during 2006. CGF performance suffered as a result.

RLW Streams Generated, and Disposition:

- Daily purge of TK-71 and TK-72: sent to MTP influent tanks
- Monthly drain of TK-71 and TK-72: sent to MTP influent tanks
- Spongeball waters: sent to MTP influent tanks
- Daily membrane soak, flush, or cleaning: sent to MTP influent tanks

2006 Operations: The ultrafilter operated 780 hours over 148 days during 2006, an average of 5.3 hours per day of operation. Membrane cleaning or flushing was performed 131 times, using either RO permeate (100 times), acid solutions (seven times), or caustic solutions (24 times). Membranes were soaked the remaining nights with acid on 18 occasions, with caustic (68 times), or with RO permeate. Membranes were not changed during 2006.

TUF operating status for 2006 is presented in Table A-3, and membrane cleaning information in Table A-4.

Table A-3
Ultrafilter Operating Status Report for 2006

Run Status		Records	Days	Hours
1 =	Concentrate	173	146	706
33 =	Auto Concentrate	4	2	75
	Totals	**177**	**148**	**780**

Table A-4
Ultrafilter Cleaning Data for 2006

Acid	Caustic	Water	Sum	
3	3	1	7	**Cleaned in Place**
4	21	99	124	**Flushed**
18	68	82	168	**Soaked Overnight**
25	92	182	299	**Total Times**

A.4 Ion Exchange

Description: Ion exchange columns were installed during 2002 for the removal of perchlorate. Six columns operate in parallel, receiving TUF permeate and sending it on to reverse osmosis for final treatment. The six columns, 22" diameter x 65" high, hold 54 total cubic feet of SR-7 resin. Processing capacity is 70 gallons per minute, or just under 12 gpm for each column. (Worland, 10/01/01) Carbon dioxide gas bubbled into the feed tank (TK-9) is the only chemical used in the treatment process.

Boundaries: The ion exchange unit operation consists of the feed tank (TK-9) and the six IX columns. Unit operation capacity is 10,360 gallons.

RLW Stream Treated: Ultrafilter permeate

RLW Stream Generated, and Disposition:

- Ion exchange effluent: sent to the reverse osmosis unit
- Daily purge of TK-9: sent to MTP influent tanks

2006 Operations: During 2006, the ion exchange columns operated 739 hours over 149 days, an average of 5.0 hours per day of operation. This information is summarized in Table A-5.

Three secondary waste streams are generated from this unit operation: TK-9 purge waters, cartridge filters, and the ion exchange resins themselves. Records show that TK-9 was purged on 52 occasions during the year, and that the average purge volume was 3500 gallons. This translates into an estimated 690,000 liters of secondary liquid wastes that were recycled to the influent tanks, and re-processed through the low-level treatment plant. This purge volume represents 11% of the volume of treated waters.

Cartridge filters and spent ion exchange resin are disposed as a low-radioactive solid waste at Area G. The cartridge filter on the feed line was changed on 34 occasions, indicating that there was plenty of bacterial matter in feed to the columns. The resins were changed out on December 20th.

Table A-5
Ion Exchange Operating Status Report for 2006

Run Status	Records	Days	Hours
3 = Off	544	365	7,992
6 = On	174	149	739
Totals	**718**	365	**8,731**

A.5 Reverse Osmosis

Description: The reverse osmosis (RO) unit removes any suspended solids that escape the TUF, and up to 99% of dissolved solids. While it is not always necessary to use the RO to achieve waters that meet discharge limits, a policy decision made in April 2002 requires that all effluent shall have been processed through the RO unit in order to yield the highest-quality discharge waters. Acid and caustic solutions are used to clean the membranes.

Boundaries: The reverse osmosis unit operation consists of the RO unit itself, the settler for RO concentrate (Clarifier #1), and the two FRAC tanks used to receive permeate. Unit operation capacity is 64,000 gallons.

RLW Streams Treated: Ion exchange discharge

RLW Streams Generated, and Disposition:

- Daily membrane soak, flush, or cleaning: sent to MTP influent tanks
- RO concentrate: sent to MTP influent tanks (~70%) and to the evaporator (~30%)
- RO permeate: used for membrane cleaning, or discharged

2006 Operations: The RO operated 735 hours over 149 days during 2006, an average of 4.9 hours per day of operation. Membrane cleaning was performed 130 times, using either RO permeate (94 times), acid solutions (seven times), or caustic solutions (29 times). Membranes were flushed or soaked the remaining nights with acid on 23 occasions, with caustic (79 times), or with RO permeate. Membranes were changed once during 2006, on July 18th.

Operating status for 2006 is presented in Table A-6, and membrane cleaning information in Table A-7.

Table A-6
Reverse Osmosis Operating Status Report for 2006

Run Status		Records	Days	Hours
1 =	Concentrate	107	91	451
33 =	Auto Concentrate	68	58	284
	Totals	**175**	149	**735**

Table A-7
Reverse Osmosis Cleaning Data for 2006

Acid	Caustic	Water	Sum	
7	29	94	130	**Cleaned in Place**
0	1	4	5	**Flushed**
23	78	57	158	**Soaked Overnight**
30	108	155	293	**Total Times**

A.6 Rotary Vacuum Filter

Description: The rotary vacuum filter (RVF) treats sludge that precipitates in the clarifier. Sludge is transferred from the clarifier to TK-8, allowed to settle in TK-8, and is then pumped to the rotary vacuum filter. At the RVF itself, sludge collects on the filter surface, is removed and placed into 55-gallon drums, and is shipped to Area G for disposal as low-level radioactive solid waste. Perlite™ is added to the process to aid filtration, and can account for half of the solids volume in the drums shipped to Area G.

Boundaries: The RVF unit operation consists of the vacuum filter itself and TK-8. Unit operation capacity is 8,000 gallons.

RLW Stream Treated: MTP sludge

RLW Streams Generated, and Disposition:

- Decant from TK-8: sent to MTP influent tanks
- Sludge: drummed and disposed at TA-54
- Filtrate: sent to MTP influent tanks

2006 Operations: The rotary vacuum filter operated during 2006, for the first time since the LANL work suspension of July 2004. This lack of sludge processing has affected clarifier and gravity filter processing efficiency, and has placed a greater burden on the ultrafilter and RO units. There is still a significant backlog of sludge to be processed.

Sludge processing occurred on 18 days during the year, and 37 drums of sludge were generated. Two shipments of sludge were subsequently made to TA54. Three drums were shipped on August 3rd, and 13 drums on October 5th.

A.7 Evaporator

Description: The evaporator reduces the volume of RLW that must be shipped off-site for solidification. It is a mobile, forced-circulation unit enclosed within a transport trailer, complete with its own boiler (in a second trailer), a condenser, and two small cooling towers. Acids are periodically flushed through the system to remove solids from heat exchangers, pumps, piping, and other components.

Boundaries: The evaporator unit operation consists of the evaporator itself, the 3K tank, the four tank farm tanks in Building 50-248, and the two below-grade tanks used to collect overheads. Unit operation capacity is 126,600 gallons.

RLW Streams Treated: Reverse osmosis concentrate, Room 60 filtrate

RLW Streams Generated, and Disposition:

- Overheads: used for gravity filter backwash, or reprocessed through TUF and RO
- Bottoms: shipped to Bear Creek, TN to be dried
- Cleaning solutions: Added to bottoms stream
- Off-Spec overheads and bottoms: Recycled through the evaporator

2006 Operations: Two evaporator campaigns were conducted during 2006. The first lasted five weeks, from 10 May through 14 June; the second was nearly three weeks in length, from 12/02 through 12/19. A summary of the campaigns appear in Table A-8.

Total feed was comprised primarily of reverse osmosis concentrate from low-level RLW operations, but included 11,120 liters of filtrate from transuranic RLW operations in Room 60. The overall volume reduction factor of 3.6 was about 10% lower than reductions achieved historically.

Table A-8
Evaporator Operations During 2006

	May/June	December	Totals
Days	36	18	54
Total Feed	103,300	92,700	196,000
Room 60 Feed	3,980	7,140	11,120
Distillate	70,100	69,100	139,200
Bottoms	31,300	23,600	54,900
VRF	3.3	3.9	3.6

VRF: volume reduction factor

A.8 Unit Operations Summary

Table A-9 summarizes 2006 operating data for each of the unit operations. Waste volumes were calculated only for CGF and RVF operations.

Table A-9
Unit Operations Data for 2006

Unit Operation	Operation (days)	Operation (hours)	Treated (liters)	Rate (gpm)	Waste (liters)	Waste (%)
Main:						
Influent Tanks	365	--	9,800,000	--	0	0%
Clarifier/ Gravity Filter	148	682	9,800,000	63	184,000	2%
Tubular Ultrafilter [A]	148	780	9,800,000	55	--	--
Ion Exchange	149	739	--	--	--	--
Reverse Osmosis	149	735	--	--	--	--
Secondary:						
Rotary Vacuum Filter [B]	18	--	18,700	--	69,700	--
Evaporator	54	--	196,000	--	--	--

A: Treated is feed volume.
B: Waste volume represents TK-8 decant and RVF filtrate.

Appendix B
Historical Perspective for the TA-50 RLWTF

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Appendix B
Historical Perspective for the TA-50 RLWTF

This appendix presents some indicators for recent operations performance, reaching as far back as 1990, the year in which DOE published Order 5400.5 with radiological discharge limits. This historical data adds perspective to the information presented in the body of the annual report.

B.1 Flows

Figures B-1 through B-4 present historical influent and effluent flows for the four Radioactive Liquid Waste Treatment Facilities at LANL.

- Figure B-1, Low-Level RLW Treatment Facility: As can be seen, flows during 2006 were the lowest ever for the TA-50 RLWTF. Decreases since 1998 are the result of LANL waste minimization efforts, such as the 2001 re-routing of non-radioactive cleanup waters from the TA-48 boiler to the TA-46 sewage plant.

- Figure B-2, TA-53 RLW Facility: Volumes at the TA-53 facility during 2006 were the lowest since the facility went into operation in December 1999. There is no trend to the flows, however, and they remain well below the evaporative capacity (1.4 million liters per year) of the basins.

Figure B-1

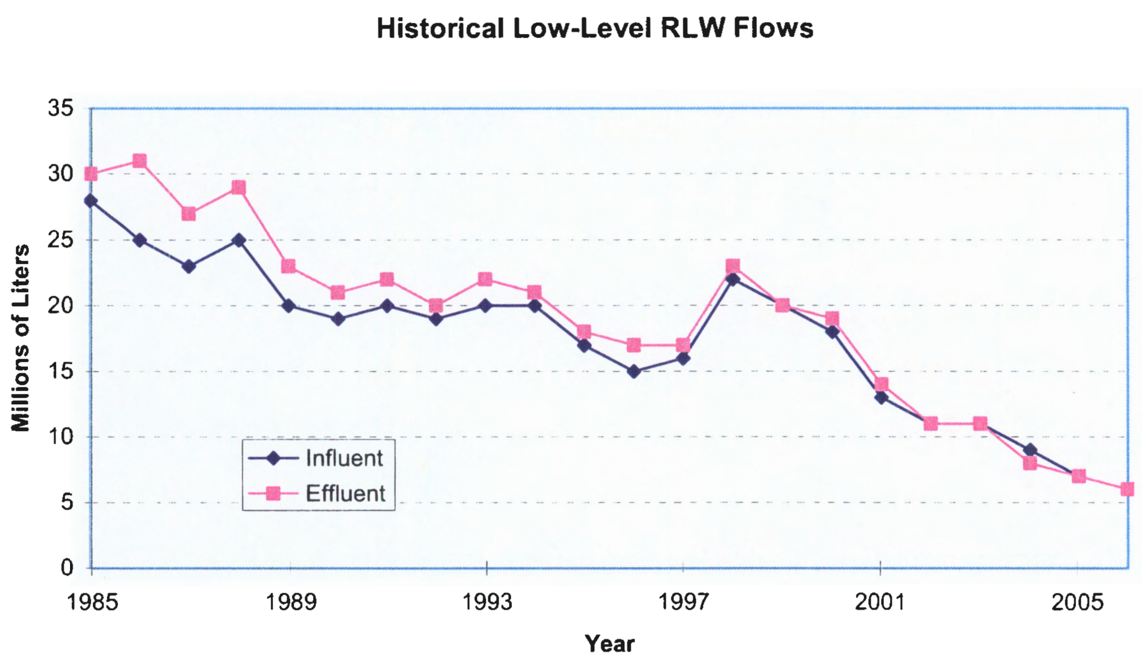


Figure B-2

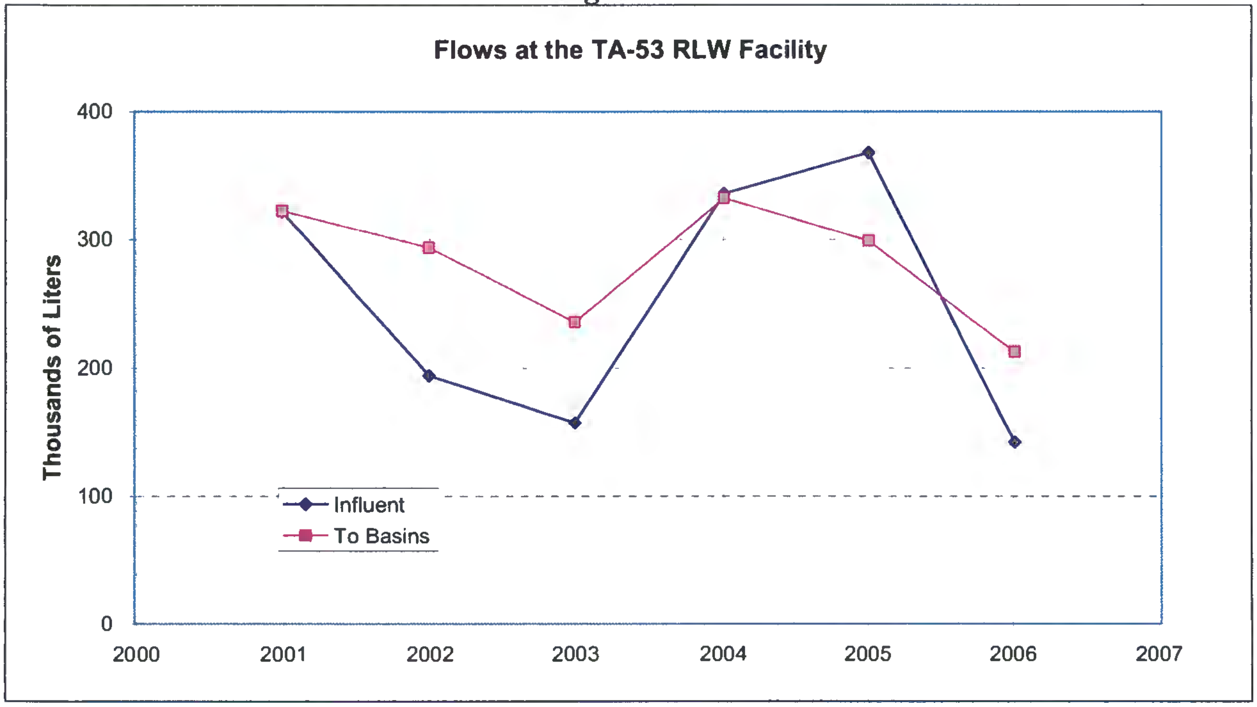
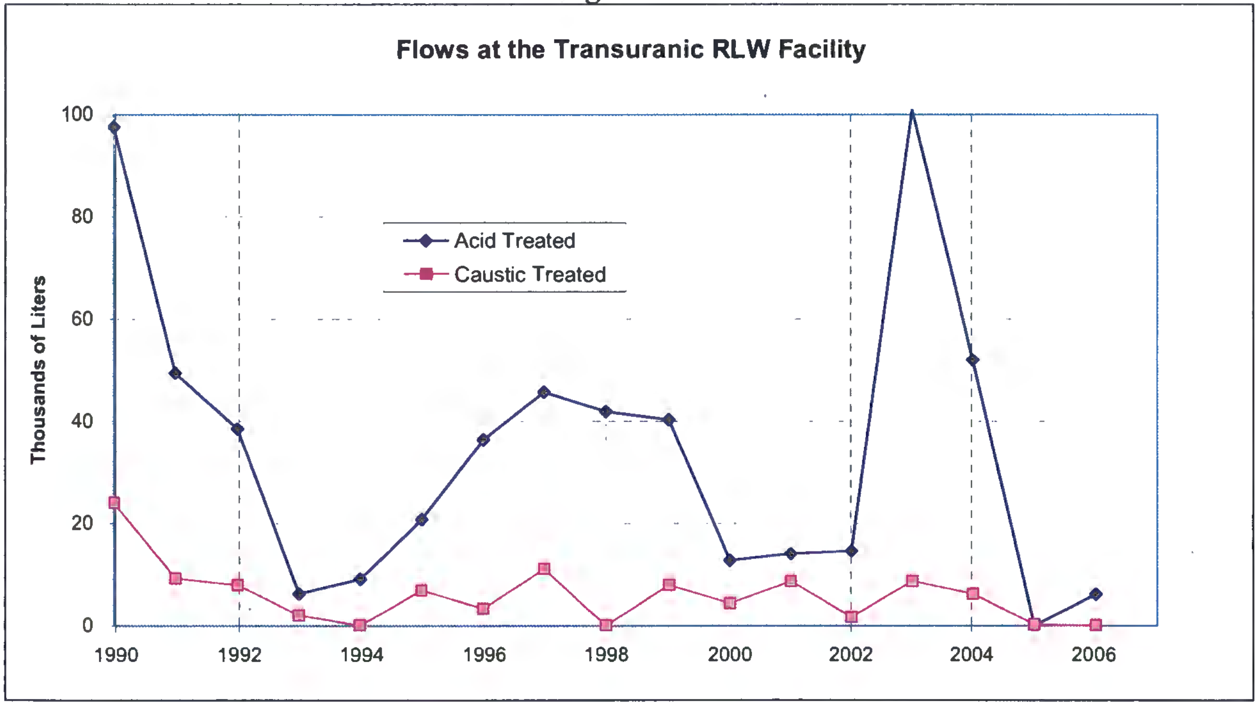
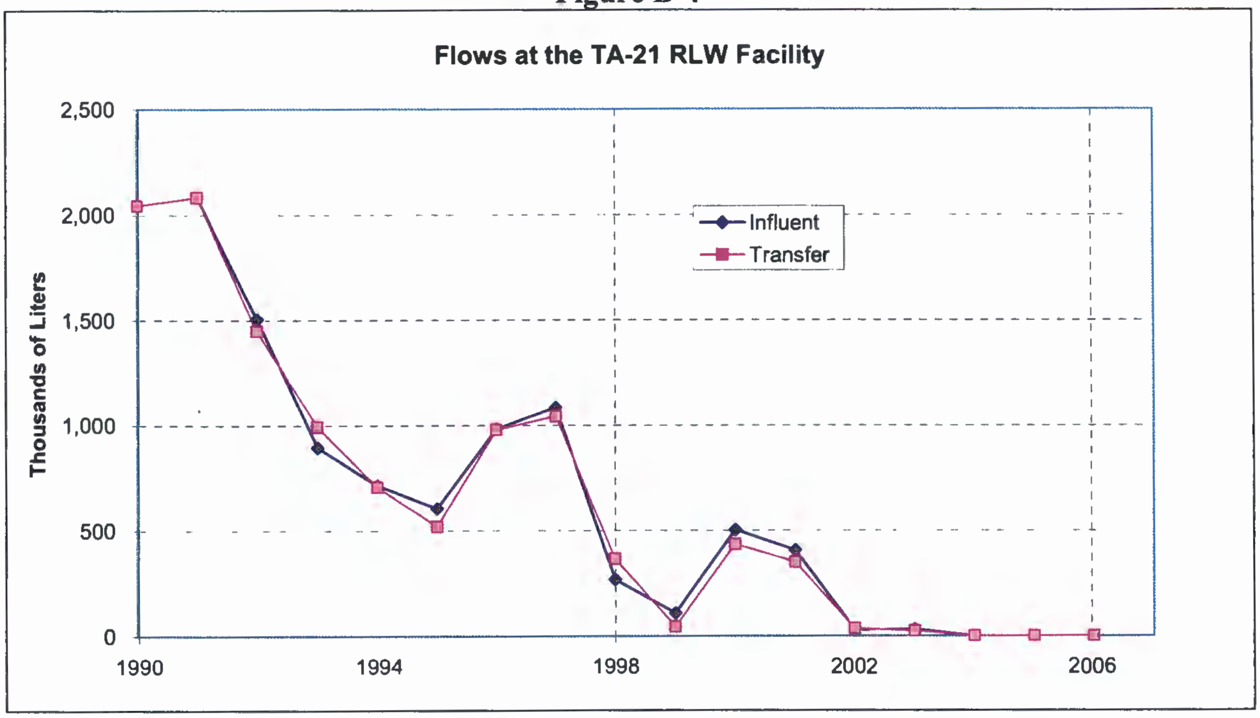


Figure B-3



- Figure B-3, Transuranic RLW Facility: The transuranic RLW processes were not operated from June 2004 until May 2006. Volumes in 2006 (6080 liters of acid) remained quite low.
- Figure B-4, TA-21 RLW Facility: RLW volumes at the TA-21 facility have been zero for the past three years. It remains to treat the remaining water inventory of about 60,000 gallons, and then place the facility in cold standby until decommissioned.

Figure B-4



B.2 Effluent Quality

The TA-50 RLWTF discharges treated waters to Mortandad Canyon through Outfall #051; the TA-53, transuranic RLW, and TA-21 facilities have no discharges. For TA-50, treated waters must meet standards imposed by the DOE and the EPA, and has voluntarily committed to meeting five other discharge standards (tritium, perchlorate, nitrate, fluoride, and total dissolved solids).

As discussed and illustrated in the below sections, RLWTF effluent quality has improved markedly since 1999. For the past 84 months, there have been no violations of NPDES discharge standards. Additionally, TA-50 effluent has met NMED groundwater standards for all but two weeks during the last seven years, and has met DOE discharge standards for 82 of the last 84 months.

EPA Discharge Standards: Table B-1 lists the number of violations for Outfall #051 since 1991. For added perspective, data is also included for the entire Laboratory. This information is compiled by ENV-WQH, and is reported in the annual Environmental Surveillance Reports. The data illustrate that the TA-50 RLWTF has not had an NPDES violation for seven consecutive years. Since approximately 50 samples are taken annually of RLWTF, this means that no violations have occurred during the last 350 samples.

Table B-1
NPDES Violations 1991-2006

Year	LANL			RLWTF *	
	No. of Outfalls	No. of Samples	No. of Violations	No. of Samples	No. of Violations
1991	139	2,096	24	52	0
1992	139	2,294	21	52	0
1993	140	2,267	19	52	1
1994	124	2,199	28	52	0
1995	124	1,917	22	52	0
1996	97	1,724	34	52	2
1997	88	1,281	7	52	1
1998	88	1,164	8	52	2
1999	65	1,250	16	52	10
2000	21	1,323	0	52	0
2001	21	1,219	4	52	0
2002	21	1,213	3	52	0
2003	21	1,096	5	52	0
2004	21	1,283	2	52	0
2005	21	1,075	1	52	0
2006	21	1,185	1	52	0

* More than 20 parameters (discharge standards) per sample

DOE Discharge Standards: DOE Order 5400.5 was published in February 1990 and established guidelines for permissible discharges to the environment. For discharges of more than a single isotope, as is the case for the TA-50 RLWTF, the discharge standard is actually expressed as "the sum of ratios must be less than or equal to 1.00" This requires the calculation of a ratio for each isotope (discharge concentration of an isotope divided by the discharge standard for that isotope), and then the summation of ratios for all isotopes. Figure B-5 shows that RLWTF discharges have met this standard on a yearly basis since membrane treatment was installed.

NMED Groundwater Standards: The NMED has proposed that TA-50 discharges meet standards for groundwater quality for fluoride, nitrates, and total dissolved solids. These standards have not been officially imposed because the NMED has not approved the RLWTF Groundwater Discharge Plan Application that was submitted in August 1996. Nevertheless, the RLWTF has operated since mid-1999 as though these standards were in force. Table B-2 compares discharge data for the past seven years to the proposed discharge standards.

Figure B-5

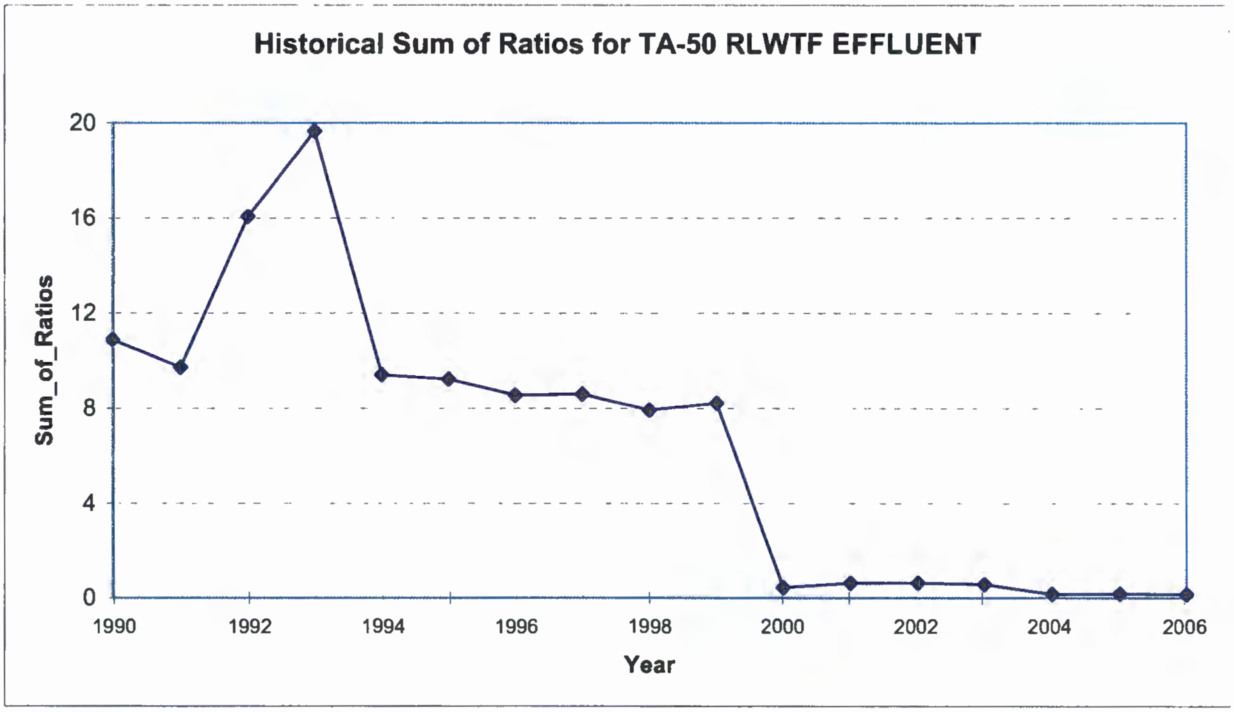


Table B-2
Discharges vs. Proposed NMED Standards

Year	No. of Samples	Compliant Samples[A]	Fluoride (1.6 mg/L)		Nitrate (10 mg/L)		TDS (1000 mg/L)	
			Avg. (mg/L)	Max. (mg/L)	Avg. (mg/L)	Max. (mg/L)	Avg. (mg/L)	Max. (mg/L)
1999	25	--	1.1	3.0	24.3	92.3	528	880
2000	50	50	0.3	0.7	2.5	7.5	306	578
2001	43	43	0.7	1.1	3.9	6.6	410	576
2002	51	51	0.5	1.0	0.4	1.3	280	750
2003	49	47[B]	0.4	2.1	0.6	4.4	131	338
2004	49	49	0.2	0.4	3.0	7.2	75	200
2005	48	48	0.2	0.4	1.6	6.9	182	375
2006	48	48	0.07	0.33	0.56	2.10	127	460

A. Numbers indicate weekly composite samples that meet proposed NMED standards.
B. Two weekly composite samples had values of 2.07 and 1.64 mg/L during 2003. (Watkins and Worland, March 2004, p.30.)

B.3 Wastes

Table B-3 shows solid waste generation at the TA-50 RLWTF since 1990. During the last three years, quantities of all types of solid wastes (LLW, mixed LLW, chemical, and transuranic waste) were all lower than typical annual quantities.

Table B-3
Solid Wastes Generated at the TA-50 RLWTF [A]

	Chemical (kg)	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
1990	2,241	124	68	11.0	0
1991	3,681	151	57	2.0	0
1992	1,017	126	41	0.0	0
1993	1,905	154	18	3.0	0
1994	4,372	140	8	0.0	0
1995	92	177	35	0.0	0
1996	347	196	1.2	0.0	0
1997	159	488	0.8	0.0	4.2
1998	747	120	0.0	1.0	1.0
1999	201	175	3.2	0.0	5.0
2000	384	132	2.5	16.1	0.0
2001	208[B]	158	2.6	0.4	4.4
2002	1,143	195	3.7	1.9	0.2
2003	70	390	2.7	0.0	2.7
2004	95	173	0.0	0.0	0.0
2005	7	108	0.0	0.0	0.0
2006	1	92	0.0	0.0	0.0

A: Data sources: Site-Wide Environmental Impact Statement, Environmental Yearbooks, and TA-54 waste database.

B: Another 68,584 kilograms of chemical wastes, in addition to the 208 kilograms reported in the table, were generated during the installation of a security gate (four dump trucks of soil and asphalt).

B.4 Radioactive Parameters

As shown in Figure B-5, effluent did not meet DOE discharge standards until the year 2000. The sum-of-ratios for that year decreased to less than 0.7 from values of 8-9 during the latter half of the 1990s. The improvement resulted from installation of the membrane processes in March 1999, coupled with initiation of the practice of sampling every tank of effluent prior to discharge. Discharges of the three major alpha-emitting radionuclides (Pu-238, Pu-239, and Am-241), which account for more than 95% of alpha activity in the effluent, are presented in Figure B-6. Discharges of tritium, which have historically accounted for more than 90% of beta activity in the effluent, are shown in Figure B-7.

Figure B-6

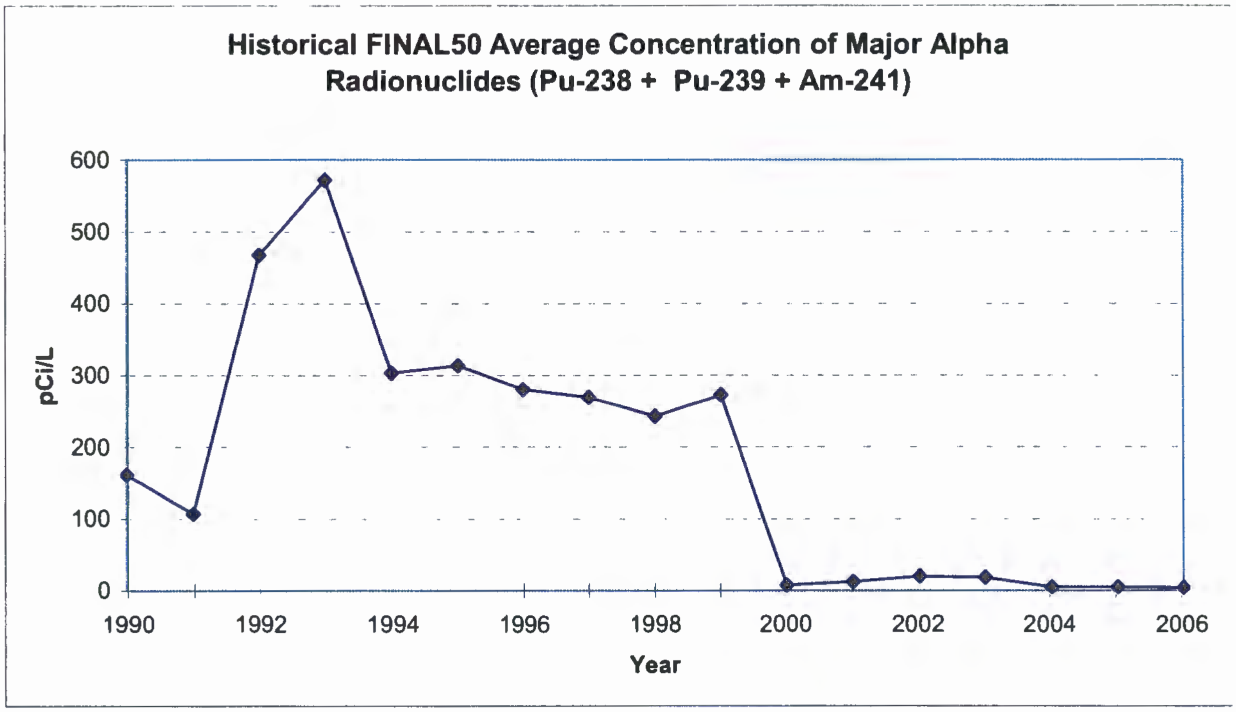
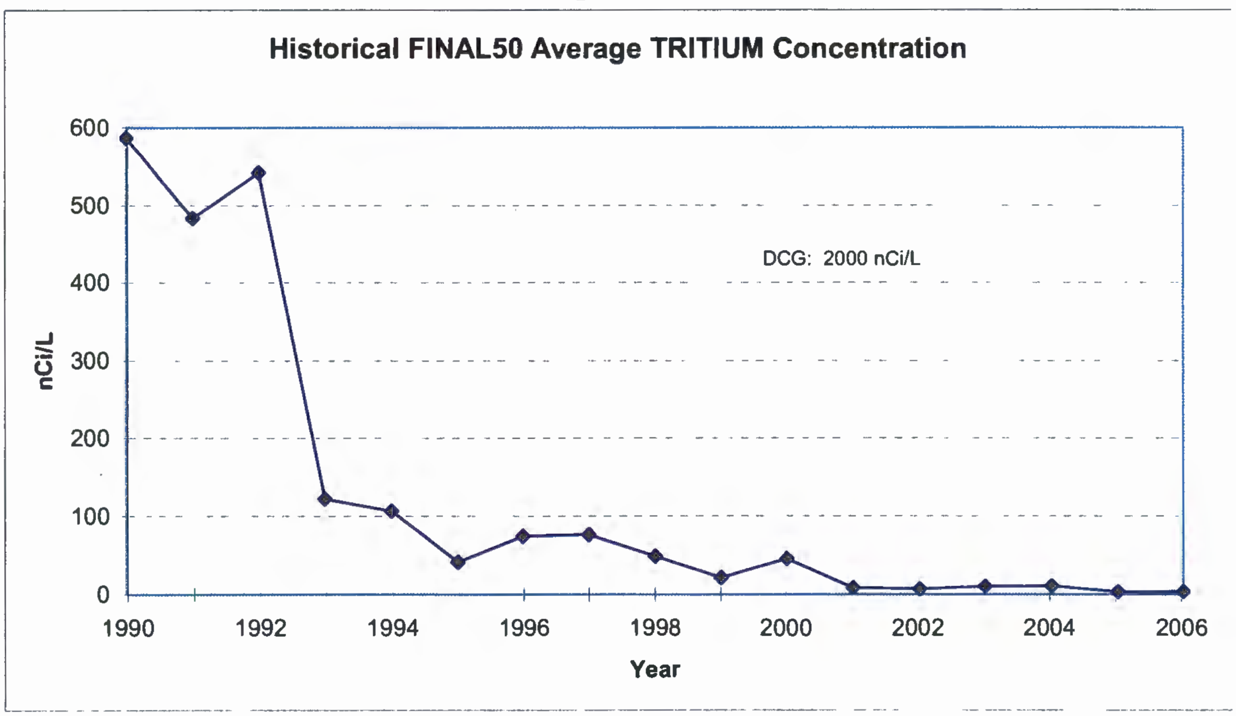


Figure B-7



B.5 Non-Radioactive Parameters

Figures B-8 through B-16 provide historical concentrations and quantities of the TA-50 RLWTF influent and effluent for some, but not all, regulated non-radiological components. Mercury has been selected, for example, because it has an extremely low NPDES discharge limit of 0.77 microgram per liter. The sequence of graphs is as follows:

- Dissolved and suspended solids
- nitrogen compounds (TKN, ammonia, nitrate, nitrite)
- parameters of primary regulatory concern (mercury, perchlorate, fluoride, copper)

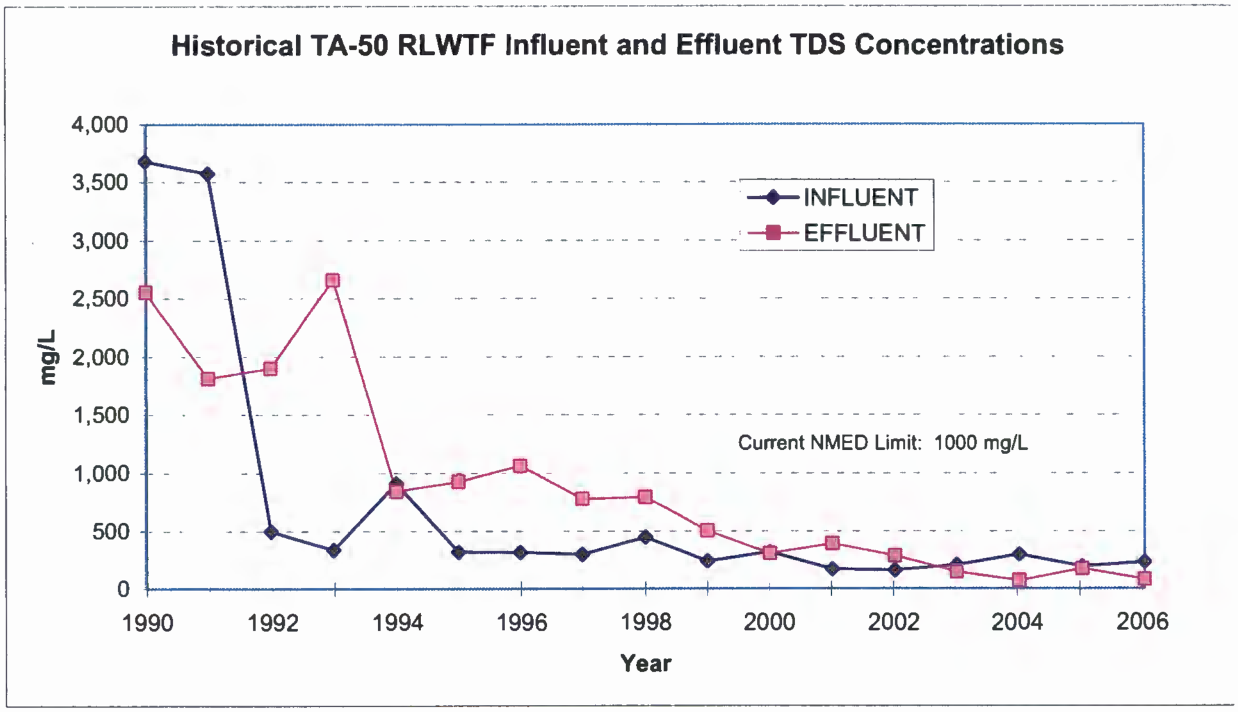
B.5.1 Dissolved and Suspended Solids

Figures B-8 and B-9 show concentrations and quantities of total dissolved and suspended solids in RLWTF influent and effluent since 1990.

- Figures B-8, Total Dissolved Solids: Quantities have been declining, as would be expected since influent volumes have been declining. But so, too, have concentrations been declining. Note that TDS concentration of *influent* has been less than the proposed NMED groundwater standard of 1,000 mg/L since 1992. As a result of declining flows and concentrations, far fewer dissolved solids are now being discharged to Mortandad Canyon. For example, 18,430 kilograms of dissolved solids were discharged in 1998, while just 430 kilograms, were discharged in 2006. The lower graph presents TDS data without the years 1990-1993, since TDS figures for the years 1990-1993 dwarf subsequent influent and effluent concentrations and quantities.

- Figure B-9, Total Suspended Solids: Influent concentrations illustrate a cyclic variation over the years, alternating between peaks and valleys. During the low years, in fact, influent concentrations are below the NPDES limit of 30 mg/L for discharges. RLWTF effluent has not historically carried appreciable concentrations or quantities of suspended solids, the peak being 150 kilograms in 1999. TSS levels in the effluent have been reduced to zero for the last four years.

Figure B-8


Historical TA-50 RLWTF Influent and Effluent TDS Concentrations
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
mg/L
INFLUENT
EFFLUENT
Current NMED Limit: 1000 mg/L
1990
1992
1994
1996
1998
2000
2002
2004
2006
Year

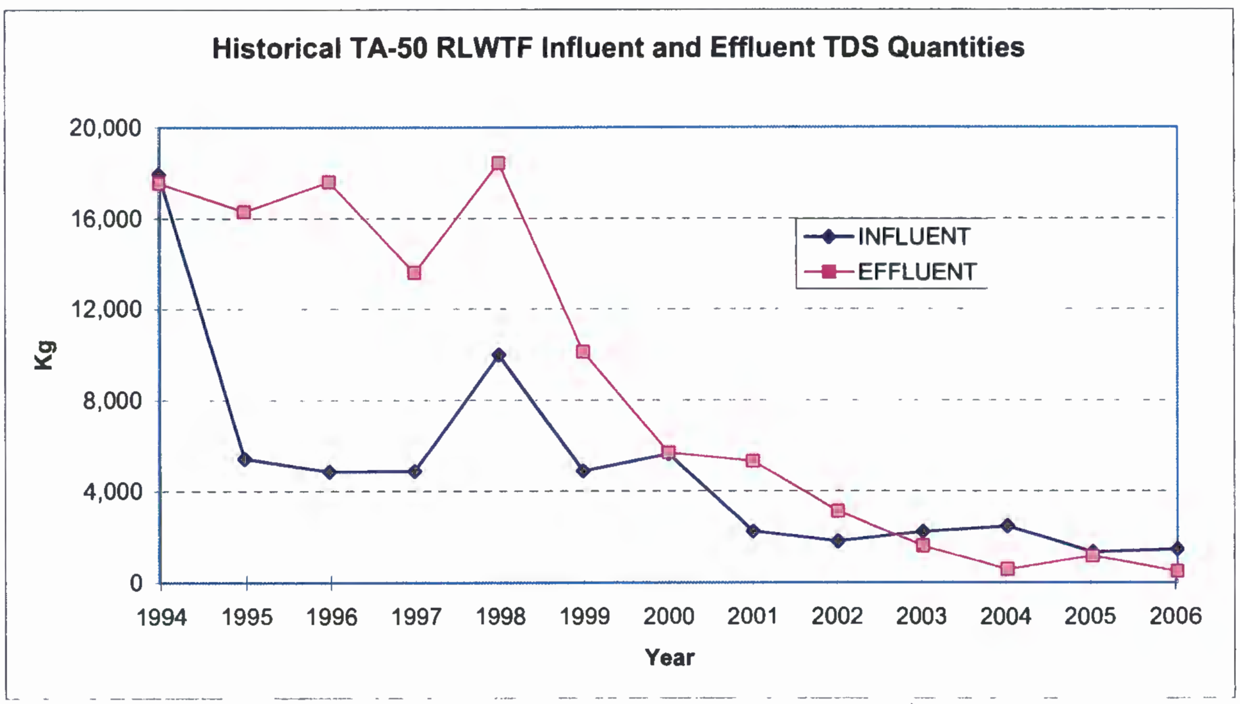
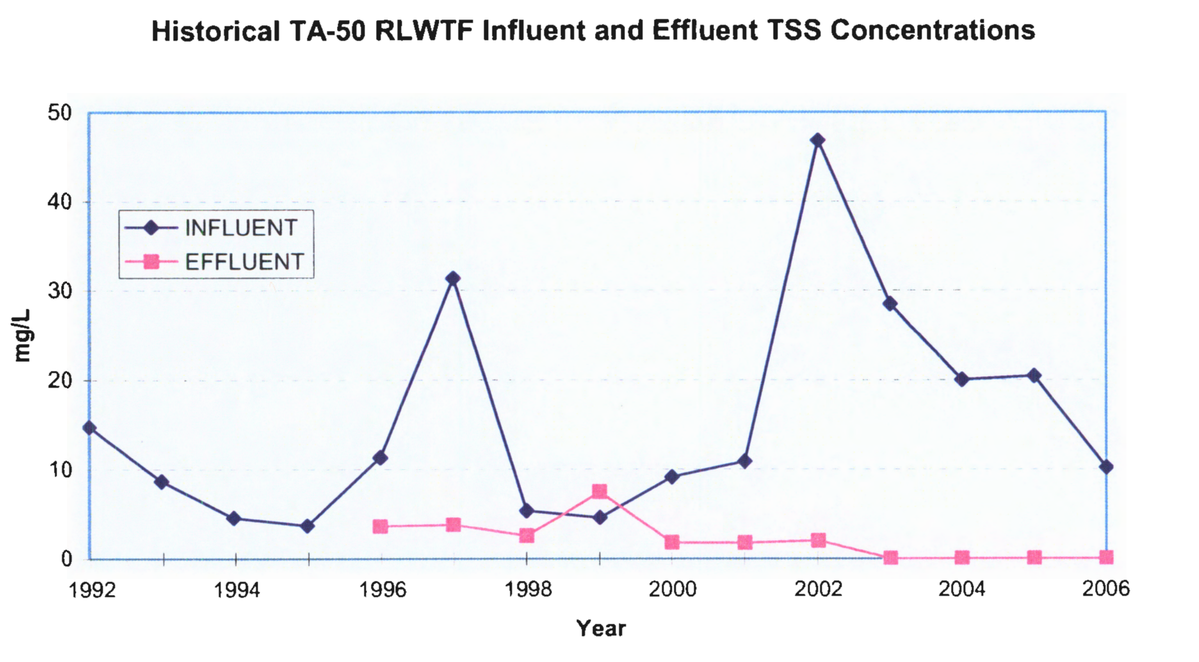
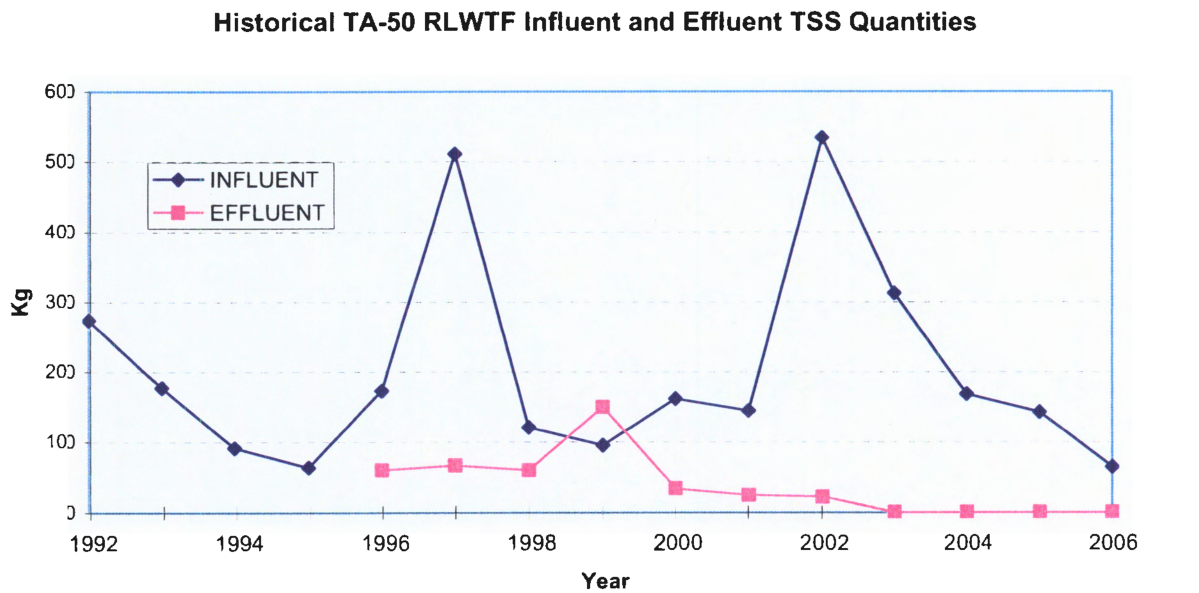

Historical TA-50 RLWTF Influent and Effluent TDS Quantities
20,000
16,000
12,000
8,000
4,000
0
Kg
INFLUENT
EFFLUENT
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Year

Figure B-9





Note: Effluent samples were first analyzed for TSS in June 1996.

B.5.2 Nitrogen Compounds

The next graphs, Figures B-10 through B-12, provide historical information about nitrogen compounds in RLWTF influent and effluent. Nitrogen discharges are of concern to the NMED Groundwater Bureau, which may impose limits for nitrates and/or total nitrogen.

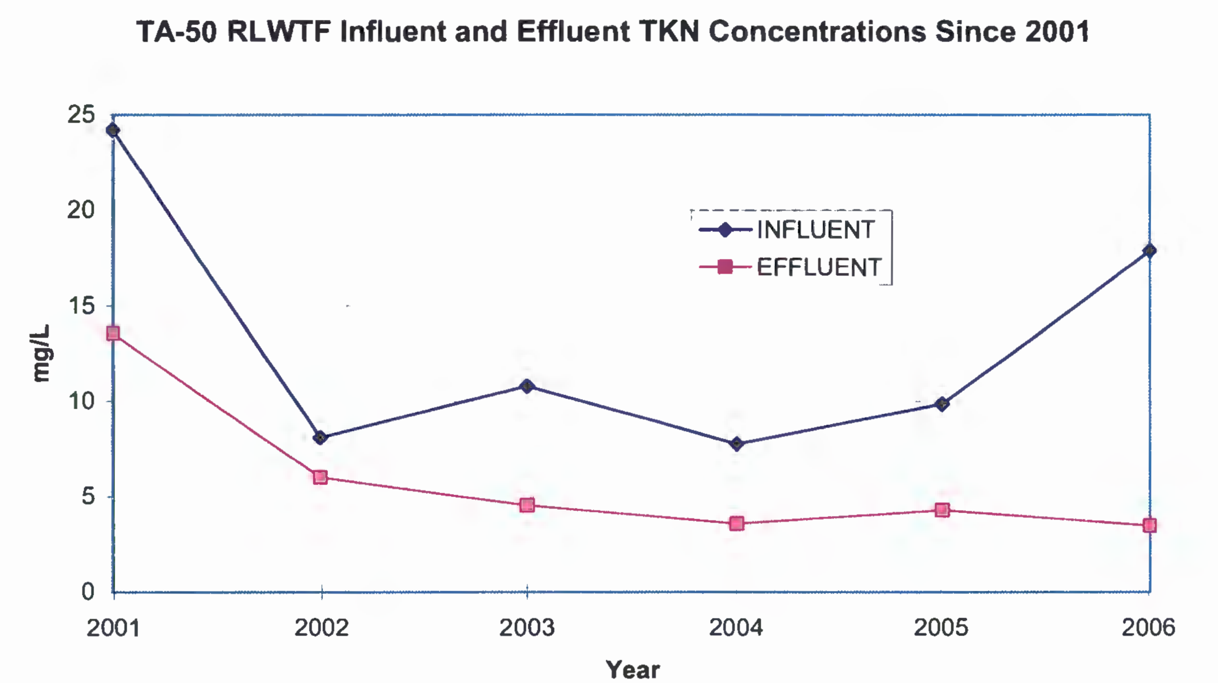
- Figure B-10, Total Kjedahl Nitrogen: TKN analyses began in 2001. The limited data show no trends toward increasing concentrations in influent or effluent from the RLWTF. Effluent concentrations are approximately half of influent concentrations. (There is currently no discharge standard for TKN.)

- Figure B-10, Nitrogen-as-Ammonia: Influent concentrations were steady from 1992-2003, hovering in the range of 3-6 mg/L. They have trended upward since 2003, however, and averaged 9 mg/L during 2006. The Main Treatment Process appears to have the ability to remove ammonia, as shown by comparing influent and effluent concentrations over the last three years. (There is currently no discharge standard for ammonia.)

- Figures B-11, Nitrogen-as-Nitrate: Two significant changes have been made to reduce nitrate discharges: improved treatment (i.e., reverse osmosis) and the side-streaming of small-volume, high-nitrate waste solutions (i.e., administrative control). Tremendous reductions in nitrate discharges have resulted, from 1550 kilograms in 1995 to less than 30 kilograms per year for each of the last four years, a 98% reduction. These results have been reflected in environmental sampling as well: groundwater wells in Mortandad canyon have been compliant with the NMED standard of 10 mg/L since June 2000. The lower graph presents nitrate data since 1998, since nitrate figures for earlier years dwarf subsequent influent and effluent concentrations.

- Figure B-12, Nitrogen-as-Nitrite: Two conclusions are evident. First, nitrite concentrations have historically been higher in effluent than in influent to the RLWTF. Second, both influent and effluent concentrations since 2004 have been the highest in the past 16 years. (There is currently no discharge standard for nitrite.)

Figure B-10


TA-50 RLWTF Influent and Effluent TKN Concentrations Since 2001
25
20
15
10
5
0
mg/L
INFLUENT
EFFLUENT
2001
2002
2003
2004
2005
2006
Year

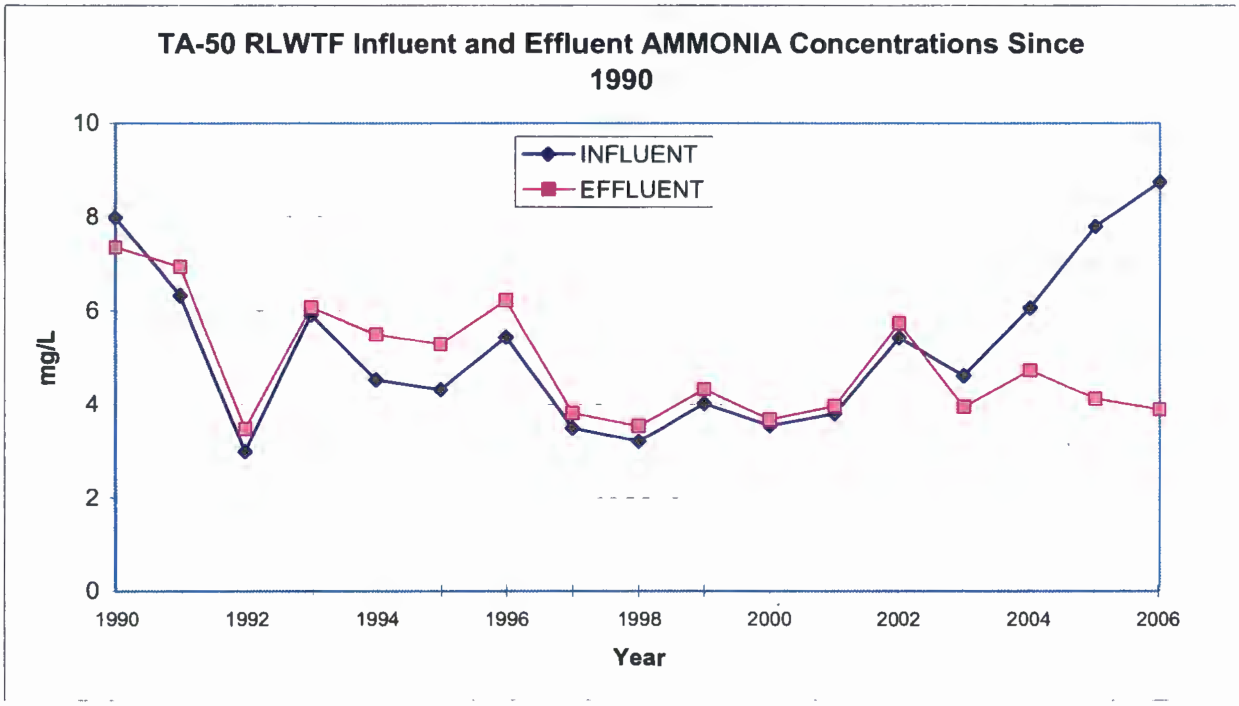
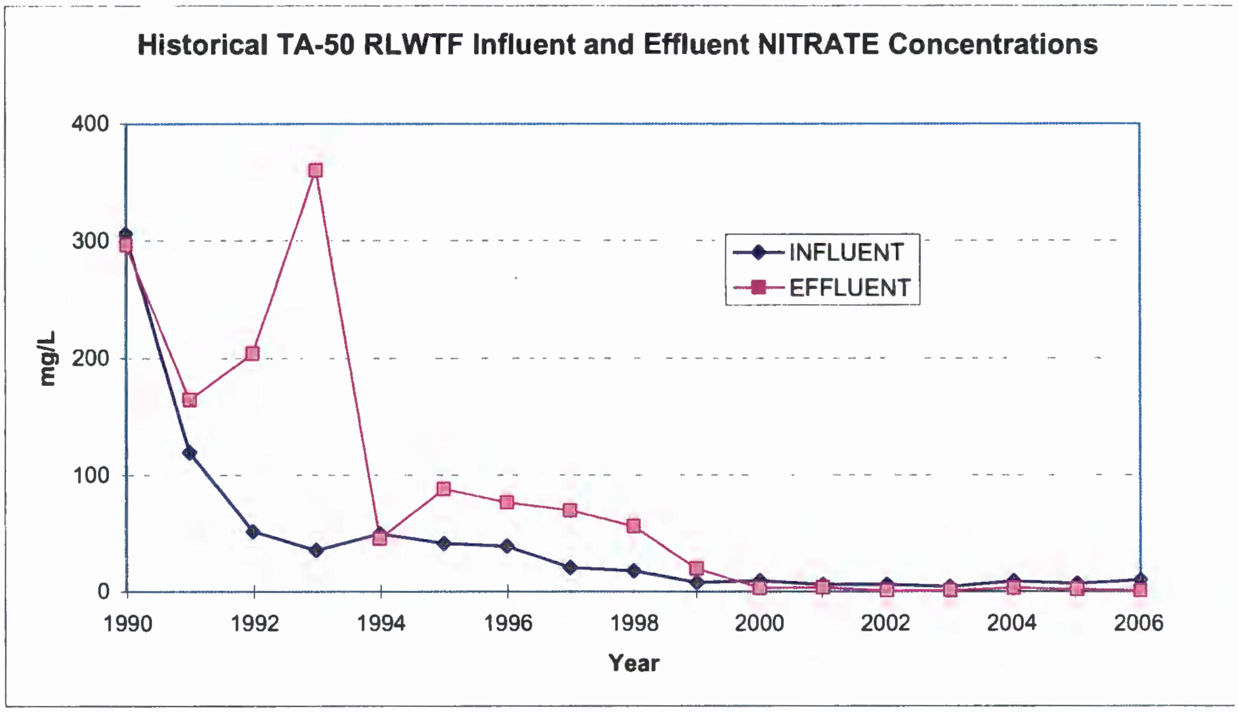

TA-50 RLWTF Influent and Effluent AMMONIA Concentrations Since 1990
10
8
6
4
2
0
mg/L
INFLUENT
EFFLUENT
1990
1992
1994
1996
1998
2000
2002
2004
2006
Year

Figure B-11



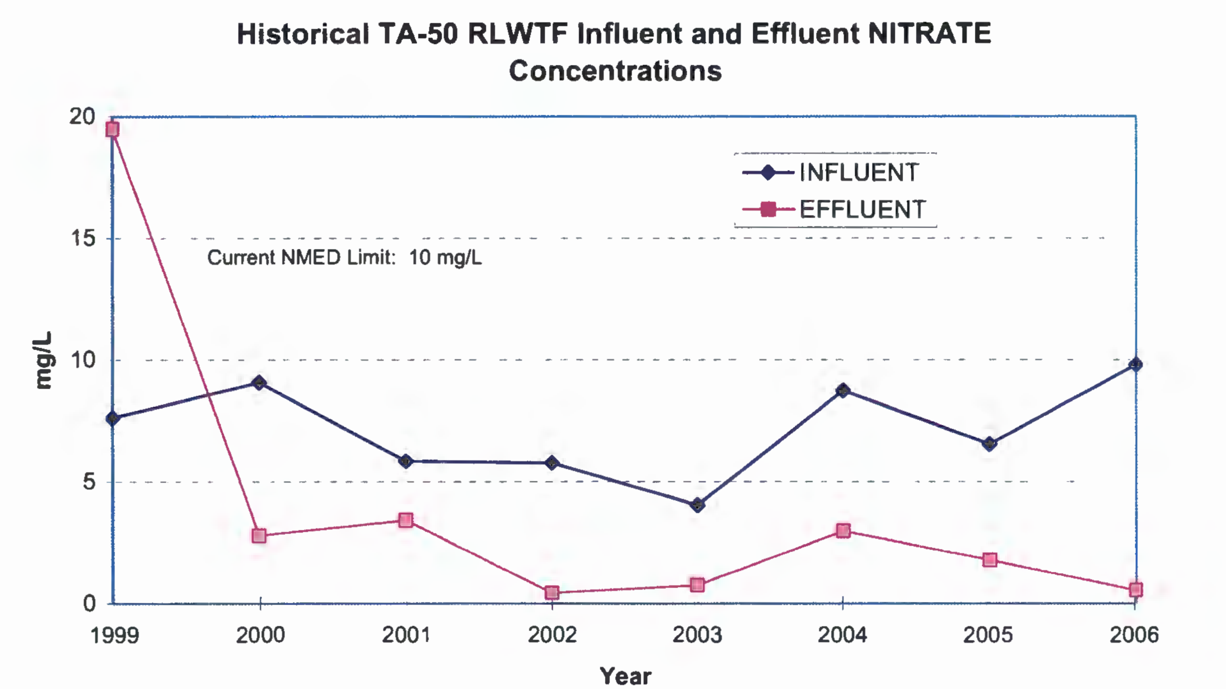


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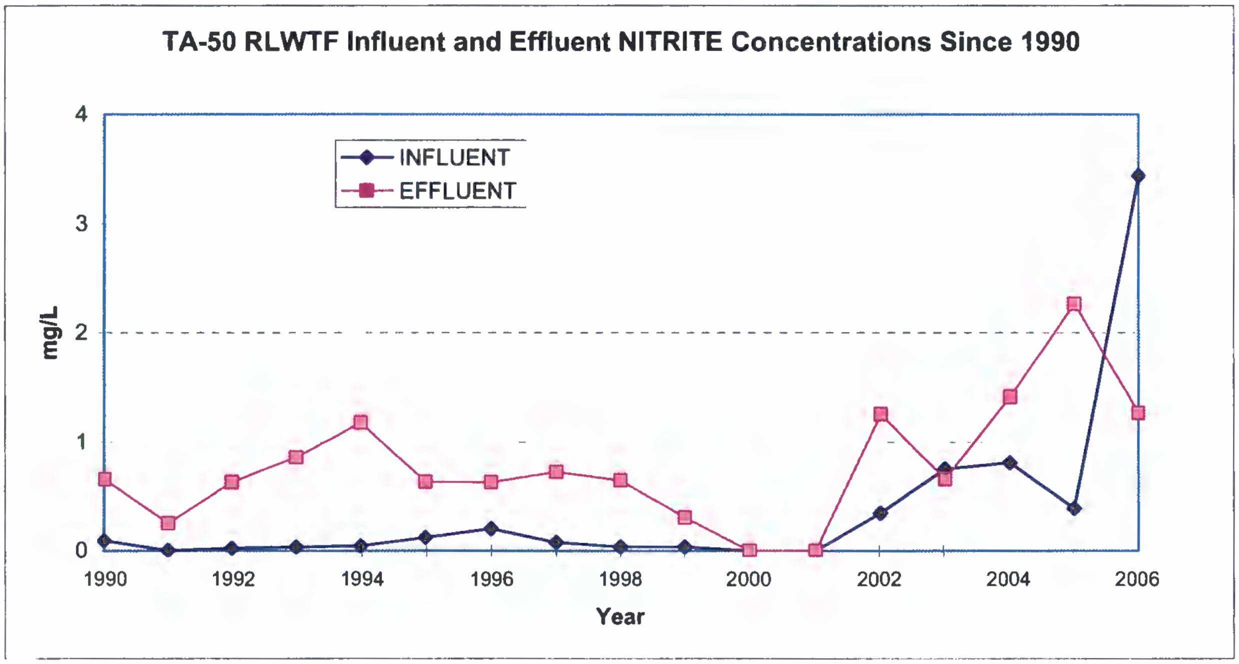
Figure B-12



B.5.3 Parameters of Regulatory Concern

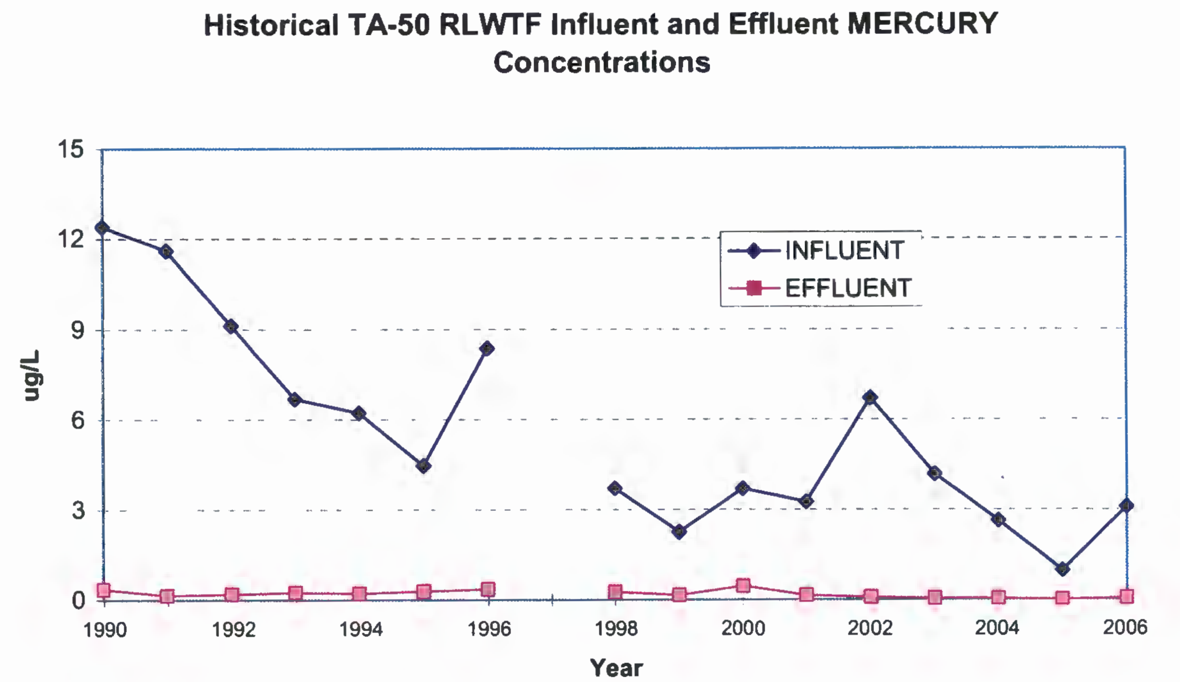
The final graphs provide historical information about influent and effluent concentrations for parameters of regulatory concern.

- Figure B-13, Mercury: At just 0.77 µg/L, or less than one part per billion, mercury has the most restrictive NPDES discharge standard. Influent concentrations have been decreasing for the past 15 years, which likely reflects declining use of mercury in research activities at LANL. Effluent concentrations have always been less than half the discharge standard, however, regardless of influent concentrations. Effluent concentrations have been less than 0.1 µg/L for the last four years.

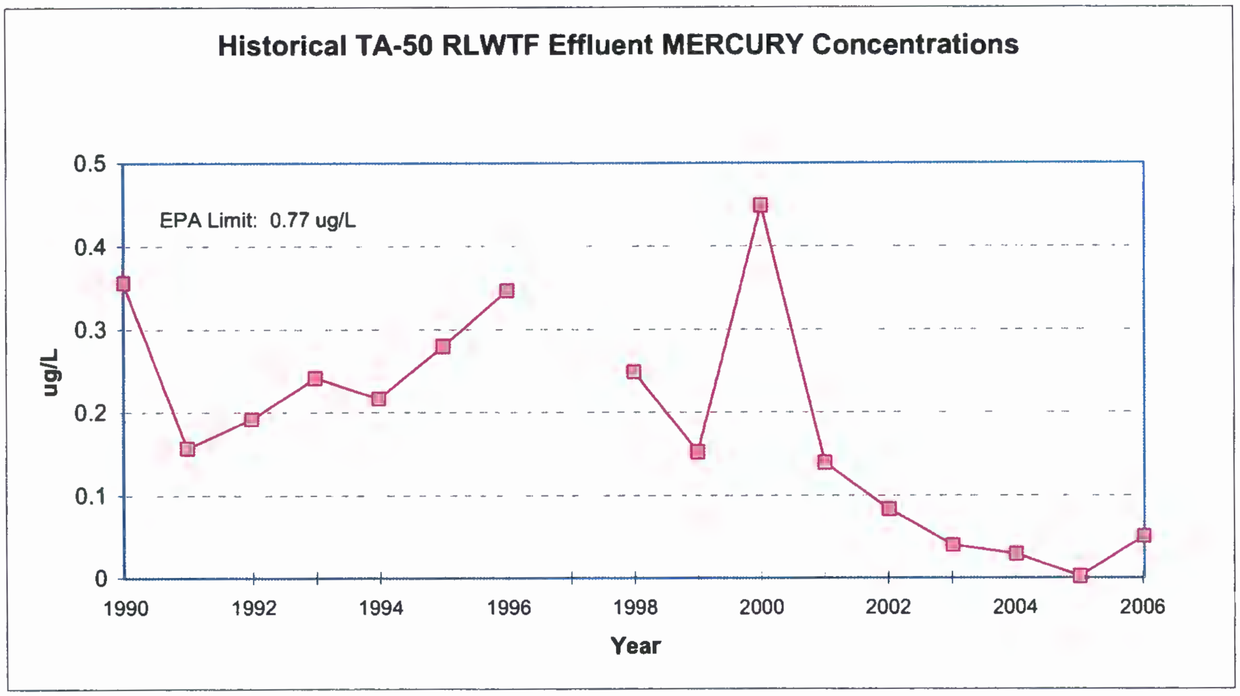
- Figure B-14 charts perchlorate concentrations and quantities since 2001, the first year in which samples were analyzed for this parameter. The proposed EPA standard for perchlorates is just 4 µg/L, which gives perchlorate the second most restrictive discharge standard, after mercury. The disappearance of perchlorates from RLWTF effluent in 2002 mirrors the installation of ion exchange treatment columns, which were installed in anticipation of future regulation of this water contaminant.

- Figure B-14, Fluoride: The proposed NMED groundwater standard is 1.6 mg/L. While influent concentrations have held steady in the range of 0.6 – 2.6 mg/L since 1992, effluent concentrations have been declining for the past 15 years. Coupled with declining RLW volumes, this has resulted in reductions in fluoride in the effluent, from 72 kilograms in 1991 to just less than 10 kilograms in any of the last four years.

Figure B-13

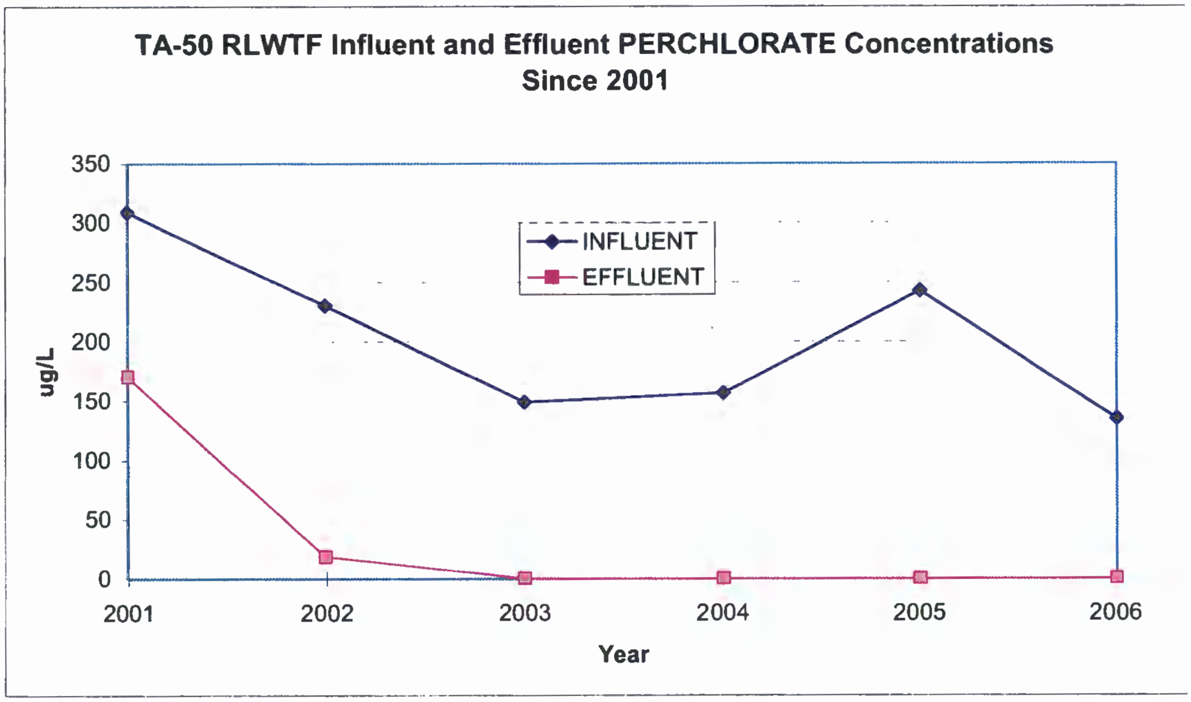


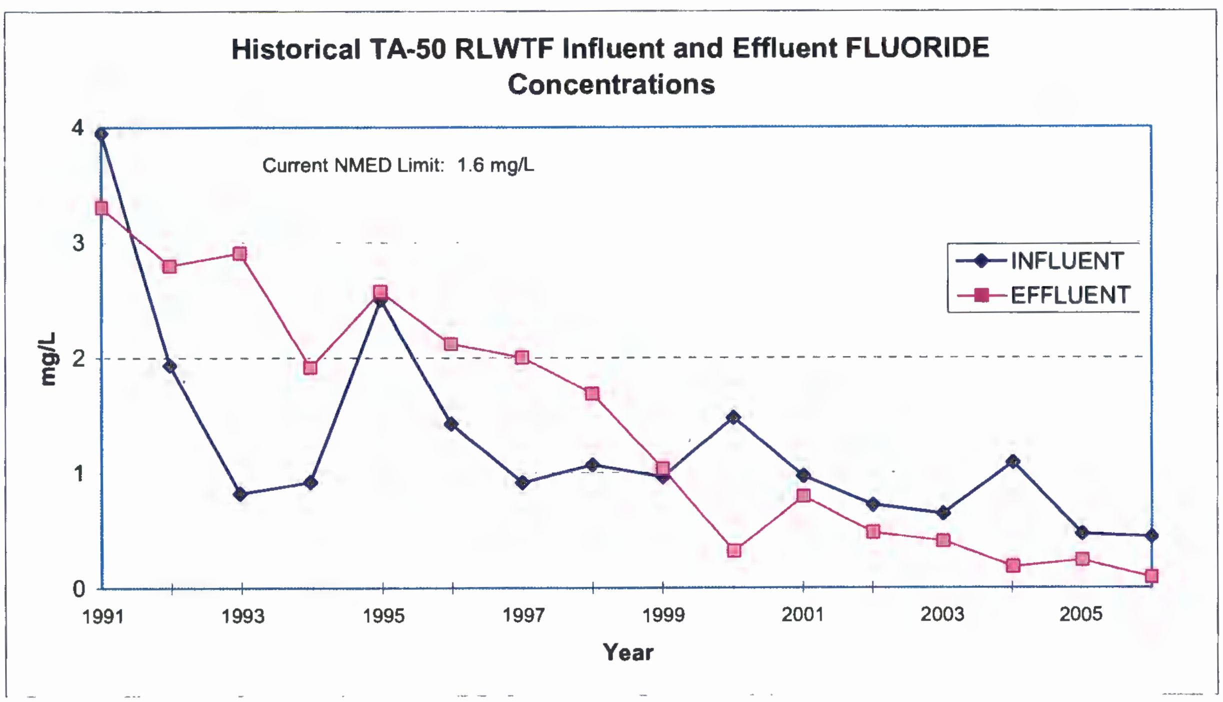
Data for 1997: Influent averaged 382 µg/L; Effluent averaged 50 µg/L.



Effluent averaged 50 µg/L in 1997.

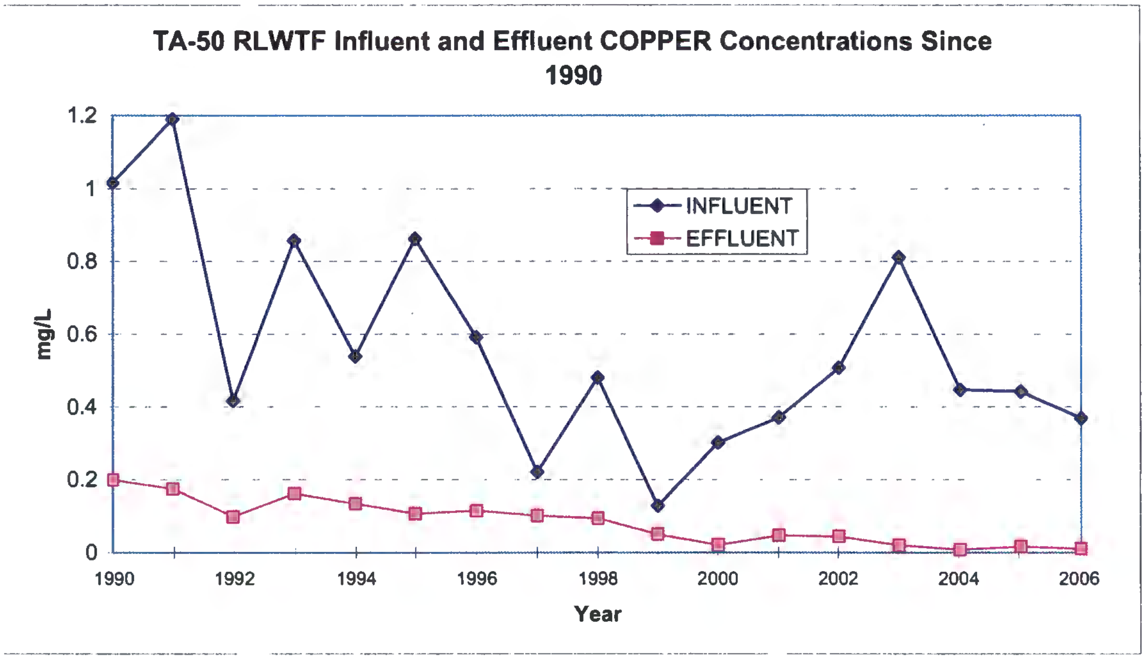
Figure B-14

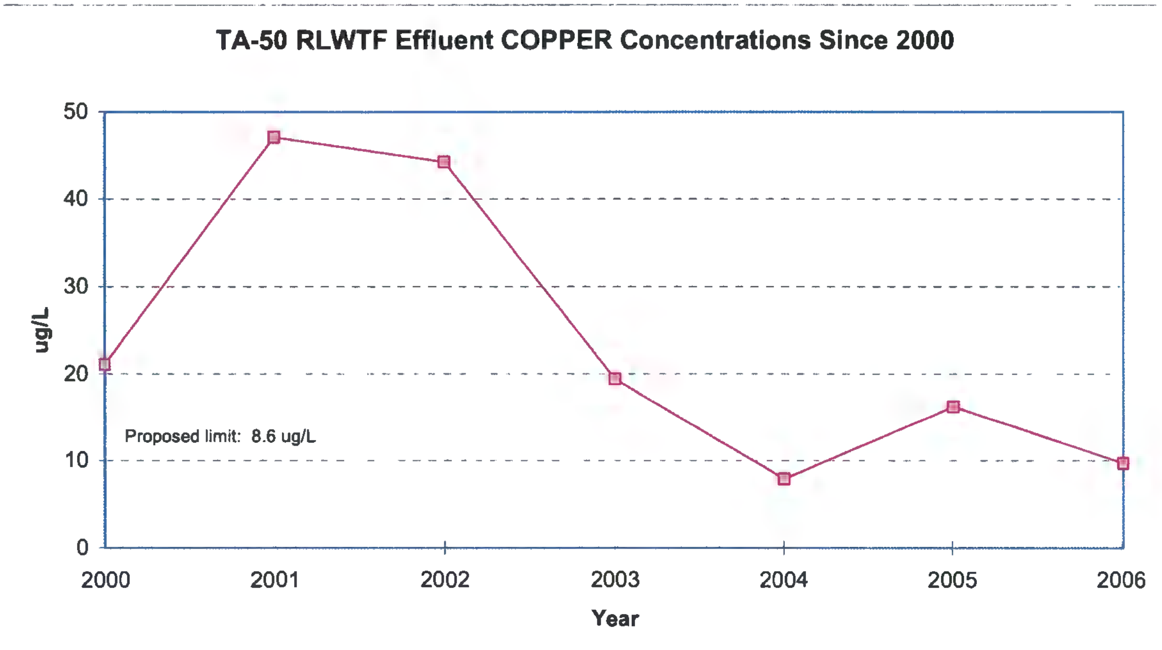

TA-50 RLWTF Influent and Effluent PERCHLORATE Concentrations Since 2001
350
300
250
200
150
100
50
0
ug/L
INFLUENT
EFFLUENT
2001
2002
2003
2004
2005
2006
Year


Historical TA-50 RLWTF Influent and Effluent FLUORIDE Concentrations
Current NMED Limit: 1.6 mg/L
4
3
2
1
0
mg/L
INFLUENT
EFFLUENT
1991
1993
1995
1997
1999
2001
2003
2005
Year

- Figure E-19, Copper: The existing discharge standard for copper is 1.4 milligrams per liter, but the standard proposed in the draft NPDES permit is just 8.6 μg/L, lower by a factor of 160. Effluent concentrations since the membranes were installed have ranged from 9-47 μg/L, which shows the need to install additional treatment. The draft NPDES Permit allows three years to achieve compliance with the lower discharge standard.

Figure B-15





B.6 Facility Modifications

The TA-50 RLWTF is beyond its design life. Because of this, problems have been experienced in the facility during operations, and have been identified by self-assessment and external assessments. In order to address and correct the problems, a large number of repair, replace, and/or upgrade projects have had to be executed. A list of recent facility modification projects is summarized in Table B-4 below, and a brief description of each appears in the text that follows.

Table B-4
Recent RLWTF Facility Modifications

Completed	K$	Project
1993	400	1. Repair neutralization chamber
1995	520	2. Install emergency generator, new transformer, other electrical
1995	100	3. Replace acid tank in WM-66
1996	600	4. Repair 25K influent tank
1997	1,430	5. Replace waste lines, TA-55 to TA-50
1997	500	6. Consolidate stacks (only one CAM)
1997	500	7. De-scale clarifiers and piping
1997	??	8. Building 50-248 and additional tank storage
1999	5,200	9. TA-53 treatment facilities *
2000	450	10. Effluent tank clean and repair
2001	60	11. Closure of the TA-21 cross-country line
2003	575	12. Effluent manifold tie-in to cross-country line
2003	800	13. CGR ventilation upgrades
2003	500	14. Sludge tank cleanout

* All other projects took place at TA-50.

1. Neutralization chamber: This 30-year-old grit chamber had developed a leak. Completed in 1993 at a cost of $400,000.

2. Emergency generator and new transformer: This project resulted from a failure mode analysis performed by the DOE. The generator (1250 kilowatts) can handle the entire RLWTF electrical load in case of outage. The transformer pad, switchgear housing, and conduit were designed to incorporate a secondary transformer. In addition, Motor Control Center "A" was replaced. Completed in 1995 at a cost of $520,000.

3. Acid tank: This project resulted from an evaluation of the structural integrity of this 30-year-old tank. Completed in 1995 at a cost of $100,000.

4. 25K influent tank: This corrective action was performed in response to Tiger Team (1992-1993) and EPA (1993) audits. A 17,000-gallon steel vessel was inserted into the 25,000-gallon underground concrete cell, thus providing secondary containment and leak detection capability. Completed in 1996 at a cost of $600,000.

5. Waste lines from TA-55: A three-foot bow had developed in the valve pit at TA-50. The entire length of PVC pipe, both primary and secondary piping, was replaced. Completed in 1997 at a cost of $1,430,000.

6. Stack consolidation: Requirements of the Clean Air Act would have required that eight stacks at the RLWTF be outfitted with air samplers and continuous air monitoring. To avoid this expense, these and three other stacks were consolidated into a single stack equipped with an air sampler and CAM. Completed in 1997 at a cost of $ 500,000.

7. De-scale clarifiers and piping: Radioactive liquids were seeping through clarifier walls. Internal surfaces were de-scaled, then re-coated with an epoxy-based paint. Completed in 1997 at a cost of $500,000.

8. Building 50-248: Four 20,000-gallon tanks, and 3,000-gallon transfer tank were installed in a new building located adjacent to Building 50-02.

9. TA-53 treatment facility: The solar evaporation ponds at TA-53 had developed leaks, and the underground tanks did not meet RCRA requirements for containment and leak detection. The new facility has two lift stations, three holding tanks, and two above-ground solar evaporation basins.

10. Effluent tank clean and repair: The high quality of permeate from the TUF and RO membrane units caused radioactivity to leach from the walls of the below-grade concrete effluent tanks. One of the effluent tanks also had developed a leak. To correct these items, tank walls were sandblasted clean, then coated with an impermeable epoxy paint. Completed in 2000 at a cost of $450,000.

11. Closure of the TA-21 cross-country line: This single-walled pipe, approximately two miles in length, was flushed, drained, and capped. Transfers of treated RLW from TA-21 have since been accomplished by truck.

12. Effluent manifold tie-in to cross-country line: The high quality of permeate from the RO unit caused radioactivity to leach from the walls of the effluent line to Mortandad Canyon. Effluent piping, therefore, was routed through the cross-country line that formerly brought pre-treated waters from TA-21 to the TA-50 influent tanks.

13. CGR ventilation upgrades: Existing fans and continuous air monitors were connected to the RS View process control system to allow remote monitoring and control capabilities in the event personnel could not safely report to the facility (e.g., during a wildfire). In addition, ductwork was patched and sealed (Diepolder, August 2003).

14. Sludge tank cleanout: The sludge tank is a 25,000-gallon, in-ground, single-walled, cement tank. The structural integrity of the tank was compromised at the 80% level, and it was removed from service in 2001. (There were no leaks to the environment.) . Cleanout, performed as preparation for ultimate closure, used a remote mechanism with a rotating, high-pressure nozzle. Completed in 2003 at a cost of $500,000.

B.7 Process Modifications

Discharge standards periodically become more stringent. In 2001, for example, the NPDES permit for Outfall #051 was revised. Improvements to the process are also continually sought. There are economic and environmental benefits from changing process equipment and/or flows. A list of recent process modification projects is summarized in Table B-5 below, and a brief description of each appears in the text that follows.

Table B-5
Recent RLWTF Process Modifications

Completed	K$	Project
1996	800	1. Replace old PDP 1144 computer control system
1997	1,200	2. Install four above-ground storage tanks (Bldg 50-248)
1999	200	3. Electrochemical denitrification
1999	4,050	4. Membrane processes (TUF, CUF, RO)
1999	350	5. Electrodialysis reversal
2000	1,400	6. Interim evaporator
2001	300	7. TUF upgrades and valve replacement
2001	6	8. Use of gravity filter effluent for clarifier chemicals
2001	20	9. Permanganate pre-oxidation
2002	300	10. Ion exchange for perchlorate removal
2003	150	11. Replace old G2 computer control system
2005	0	12. Recycle of reverse osmosis concentrate

* All other projects took place at TA-50.

1. Computer control system: Computer hardware and software are soon outdated. This project replaced the old (PDP 1144) with a newer (G2) control system. Completed in 1996 at a cost of $800,000.

2. Above-ground storage tanks: This corrective action was performed in response to Tiger Team (1992-1993) and EPA (1993) audits. Four above-ground steel tanks (20,000 gallons each) were installed within a concrete basin, thus providing secondary containment and leak detection capability. Completed in 1997 at a cost of $1,200,000.

3. Electrochemical Denitrification: This pilot-scale unit was installed for the treatment of small-volume RLW streams that have high nitrate concentrations. Completed in 1999 at a cost of $200,000.

4. Membrane processes: The tubular ultrafilter, centrifugal ultrafilter, and reverse osmosis unit operations were installed in order to produce high-quality discharge waters that met State of New Mexico limits for nitrates and DOE guidelines for radioactivity. Completed in 1999 at a cost of $4,050,000.

5. Electrodialysis reversal: This unit operation was installed to concentrate the reject waste stream from the new reverse osmosis unit. Completed in 1999 at a cost of $350,000.

6. Interim evaporator: This unit operation was installed to concentrate the reject stream from the electrodialysis reversal unit. Completed in 2000 at a cost of $1,400,000.

7. TUF upgrades and valve replacement: A total of 50 air-actuated control valves are used in the spongeball cleaning system. Low-quality valves developed leaks shortly after the TUF started up in 1999. Poor design prevented the replacement of any single valve without taking the entire TUF unit off line, and without removing the header to all 50 valves. Valves were replaced and the piping manifold re-designed to allow access to and replacement of individual valves. In addition, TUF capacity was enhanced by increasing the number of membrane tubes from 300 to 350. Completed in 2001 at a cost of $300,000.

8. Use of gravity filter effluent for clarifier chemicals: This process modification was a recommendation of the Secondary Stream Study. Industrial water had previously been used for the dissolution of lime and ferric sulfate. Use of gravity filter effluent reduced secondary waste generation by six gallons per minute or about 2,000 gallons per operating day. This modification resulted in pollution prevention awards from LANL and DOE/HQ.

9. Permanganate pre-oxidation: This process modification was a recommendation of the Secondary Stream Study. Use of permanganate both oxidizes plutonium and americium to higher valence states that are less soluble, and also creates a micro-flocculation effect that enhances settling and particle filtration.

10. Ion exchange for perchlorate removal: Pending EPA regulations for perchlorate discharges led to research into treatment methods. Ion exchange was successfully pilot-tested in 2002, and six full-scale columns subsequently installed. Completed in 2002 at a cost of $300,000.

11. Computer control system: Computer hardware and software are soon outdated. This project replaced the seven-year-old G2 system with a newer RS View control system. Completed in 2003 at a cost of $150,000.

12. Recycle of reverse osmosis concentrate: The RO concentrate stream had historically been drawn out of the main treatment process for subsequent treatment as a secondary waste stream. The process change was accompanied by a six-week plant test to assess impacts of the change. The test showed that up to 70% of the RO concentrate could be recycled. attendant savings include reduced evaporation costs, reduced transportation of bottoms for solidification, and reduced bottoms solidification costs.

7-30-07

Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Protection Division
Water Quality & RCRA (ENV-RCRA)
P.O. Box 1663, Mail Stop K490
Los Alamos, New Mexico 87545
(505) 667-7969/FAX: (505) 665-9344

Date: July 23, 2007
Refer To: ENV-RCRA: 07-183
LA-UR: 07-4740

Mr. Robert George, Domestic Team Leader
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: GROUND WATER DISCHARGE PLAN QUARTERLY REPORT, SECOND QUARTER 2007, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (DP-1132)

Dear Mr. George:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the second quarter (April, May, and June) of 2007. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at four Mortandad Canyon alluvial wells, MCO-3, MCO-4B, MCO-6, and MCO-7, during the second quarter of 2007. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

At Mortandad Canyon alluvial well MCO-6, nitrate (as nitrogen) was measured at 241 mg/L. The result was close to the total dissolved solids (TDS) value of 308 mg/L, and is 24 times the NM Groundwater Standard of 10 mg/L. The source of this high value is likely a field preservation error using nitric acid. The field duplicate results (2.01 mg/L) and those from a reanalyzed unpreserved sample (1.45 mg/L) were consistent with earlier data from MCO-6; the average nitrate (as nitrogen) concentration in six samples collected between February 2006 and March 2007 was 1.77 mg/L with a maximum value of 2.05 mg/L. The field data collection teams have implemented corrective actions to prevent repetition of this type of error.

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Laboratory's Water Quality Database (http://wqdbworld.lanl.gov/).

RLWTF Effluent Monitoring Results
Table 2.0 presents the analytical results from the weekly composite sampling of the RLWTF's effluent for the period April through June, 2007. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during a 7-day period. Samples are submitted to GEL and Severn Trent Analytical Laboratories, Inc. for analysis. All of the FWC results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen, fluoride, and total dissolved solids.

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen, perchlorate (ClO_4, by Method 314.0, Ion Chromatography), fluoride, and total dissolved solids for the second quarter of 2007. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen, fluoride, and total dissolved solids.

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & RCRA (ENV-RCRA) Group

BB/lm

Enclosures: a/s

Cy: Marcy Leavitt, NMED/SWQB, Santa Fe, NM
Steve Yanicak, NMED/DOE/OB, Santa Fe, NM
Matthew Johansen, LASO/EO, MS A316
Gene Turner, LASO/EO, MS A316
Michael Mallory, PADOPS, MS A102
Richard S. Watkins, ADESHQ, MS K491
Tori George, ENV-DO, MS J591
Mike Saladen, ENV-RCRA, MS K490
Bob Beers, ENV-RCRA, MS K490
Daniel Cox, EWMO-DO, MS J910
Craig Douglass, RLW, MS E518

Cy. Cont:

Pete Worland, EWMO-RLW, MS E518
Chris Del Signore, EWMO-RLW, MS E518
David Moss, RLW, MS E518
ENV-RCRA File, MS K490
IRM-RMMSO, MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, 2nd Quarter, 2007.

Sampling Location	Sample Date	Perchlorate by LC/MS/MS[1] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	6/20/2007	1.26	2.17	0.17	<0.03	276J	0.41
MCO-4B	5/3/2007	24.7J	4.03JN-	0.42	0.09	326	0.83
MCO-6	5/2/2007	19.4J	241J[3]	0.19	<0.03	308	1.07
MCO-6, Reanalysis	5/2/2007		1.45H,J				
MCO-6, Field Duplicate[2]	5/2/2007	19.7J	2.01J	0.12	<0.03	300	1.05
MCO-7	5/2/2007	23.5J	2.46J	0.09J	<0.03	287	1.36
NM WQCC 3103 Ground Water Standards		*NA* [4]	*10 mg/L* [5]	*NA* [4]	*NA* [4]	*1000 mg/L*	*1.6 mg/L*

Notes:

[1]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[2]LANL collects duplicate samples as part of its QC program.

[3]The elevated NO3+NO2-N in this sample is attributed to incorrect field acidification with nitric acid.

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

[5]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

J means that the analyte is classified as detected but the reported value is expected to be more uncertain than usual.

JN- means that there is presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.

H means that the analytical holding time was exceeded.

All samples filtered.

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, 2nd Quarter, 2007.

Monitoring Period	Sample Composite Date	RLWTF Final Weekly Composite Results[1]			
		NO_3+NO_2-N (mg/L)	ClO_4 (ug/L)	Fluoride (mg/L)	TDS (mg/L)
March, 2007	3/19/2007	4.23	0.30	0.08J	62
	3/26/2007	3.94	0.95J-	0.08J	69
April, 2007	4/2/2007	3.26	0.62	0.07J	81
	4/9/2007	4.21	0.52J-	0.07J	53
	4/16/2007	3.01	0.35	0.09J	98
	4/16/07 duplicate	2.91	0.35	0.08J	99
	4/23/2007	2.19	0.42J-	0.09J	70
	4/30/2007	No discharge	No discharge	No discharge	No discharge
May, 2007	5/7/2007	No discharge	No discharge	No discharge	No discharge
	5/14/2007	0.81	0.23	0.09J	72
	5/21/2007[2]	0.18[2]	0.45J[2]	<0.10[2]	40[2]
	5/30/2007	0.25	0.57	0.10	88
June, 2007	6/4/2007	0.02J-	0.89	0.01J	74
	6/11/2007	0.89	1.07	0.11	104
	6/18/2007	No discharge	No discharge	No discharge	No discharge
	6/25/2007	Results pending	Results pending	Results pending	Results pending
2nd Quarter 2007 Averages[3] (mg/L)		**2.16**	**0.56**	**0.09**	**76**
NM WQCC 3103 Ground Water Standards		*10 mg/L[4]*	*NA[5]*	*1.6 mg/L*	*1000 mg/L*

Notes:

[1]All analyses by General Engineering Laboratories, Inc. unless otherwise noted.

[2]Analysis by Severn Trent Laboratories, Inc.

[3]2nd quarter 2007 averages include the results from March 2007.

[4]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

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

J means the reported value is greater than the Method Detection Limit (MDL) but less than the Reporting Limit (RL).

J- means that the analyte is classified as detected but the reported value is expected to be more uncertain than usual with a negative bias.

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 2nd Quarter, 2007.

Monitoring Period	RLWTF FMC Results[1]			
	NO3-N (mg/L)	Perchlorate by IC[2] (ug/L)	TDS (mg/L)	F (mg/L)
April, 2007	1.0	<1	75	<0.01
May, 2007	0.23	<1	90	0.11
June, 2007	0.30	<1	105	<0.01
NM WQCC 3103 Ground Water Standards	*10 mg/L*	*NA*[3]	*1000 mg/L*	*1.6 mg/L*

Notes:

[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.

[2]IC means EPA Method 314.0, perchlorate analysis by Ion Chromatography.

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

DRAFT ENCLOSURE 1.0

Aug 15, 2007 (?)

New Mexico Environment Department
Ground Water Quality Bureau

Ground Water Quality Bureau – Pollution Prevention Section Notice of Intent

1. Name and Address of person making discharge:

Los Alamos National Laboratory
Attn: Bob Beers
P.O. Box 1663, Mail Stop K490
Los Alamos, NM 87545

Phone: 505-667-7969 (office)
505-665-9344 (fax)

2. Location of discharge (give township, range, section, ¼ section, miles from closest town and street address, if applicable):

Los Alamos National Laboratory
Technical Area (TA)-52. See Enclosure 2.0.
35° 51' 37"N, 106° 16' 57"W (NAD27), USGS Frijoles (NM) Quadrangle

3. Type of operation generating the discharge:

Treated effluent evaporation tanks (3)

4. Description of the source of the discharge:

Treated effluent from TA-50 RLWTF treatment unit operations

5. Estimated concentration of contaminants in the discharge:

Effluent quality is documented in the following reports submitted to the NMED in 2006-07:

- NPDES Monthly Discharge Monitoring Reports (DMRs) submitted to NMED, Surface Water Quality Bureau,
- RLWTF Annual Operating Reports submitted to the NMED, Ground Water Quality Bureau (the 2006 RLWTF Annual Report was submitted on June 11, 2007; ENV-RCRA: 07-0135, LA-UR-07-3447), and
- Discharge Permit DP-1132 quarterly reports submitted to the NMED, Ground Water Quality Bureau.

6. Means of the discharge (to a lagoon, watercourse, septic tank/leachfield, etc.):

Treated effluent will be transferred from the TA-50 RLWTF to the evaporation tanks via a pipeline.

7. Estimated daily flow rate of the discharge:

Evaporation Tanks Design Basis: 13.6 million liters per year (3.6 million gallons per year).

8. Estimated depth to ground water:

Approximately 1260 ft to regional ground water.

Signature: ______________________ **Title:** ______________

Printed name: ______________________ **Date:** ______________

Providing additional information such as maps, plans and specifications, laboratory analyses, and/or a detailed description of the discharge will help NMED to process this NOI in a more timely manner. Please return this form to:

NMED Ground Water Quality Bureau
P.O. Box 26110
Santa Fe, New Mexico 87502

Telephone: 505-827-2900
Fax: 505-827-2965

- may cause leachate
- exclusion A - can't prove they dont have contaminants

Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Protection Division
Water Quality & RCRA (ENV-RCRA)
P.O. Box 1663, Mail Stop K490
Los Alamos, New Mexico 87545
(505) 667-0666/FAX: (505) 667-5224

Date: September 28, 2007
Refer To: ENV-RCRA: 07-184
LA-UR: 07-4794

Mr. William C. Olson, Bureau Chief
Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502-6110

DRAFT

SUBJECT: NOTICE OF INTENT TO DISCHARGE, EVAPORATION TANKS, TA-50 RADIOACTIVE LIQUID WASTE TREAMENT FACILITY

originally proposed 4? 9.28.06 meeting

Dear Mr. Olson:

This letter and enclosures constitute a Notice of Intent (NOI) pursuant to 20.6.2.1201 NMAC regarding Los Alamos National Laboratory's (Laboratory) plan to construct three evaporation tanks. The above-ground tanks would receive part or all of the treated effluent from the Laboratory's TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). The evaporation of treated effluent at these tanks would significantly reduced or, at times, eliminate discharges at NPDES Outfall 051. The RLWTF discharge is into Mortandad Canyon, pursuant to NPDES Permit NM0028355. It is the Laboratory's view that a groundwater discharge permit will not be required for this project because there is no reasonable probability or likelihood that liquid contained in the evaporation tanks will move into groundwater, either through a leak or by overflow. Additional information is presented below. Enclosure 1.0 is completed NMED-Ground Water Quality Bureau NOI form. Enclosure 2.0 is a location map.

Conceptual Tank Design

Each of the three evaporation tanks will have an area of approximately 0.7 to 1.0 acres providing a total evaporation area of 2.1 to 3.0 acres. The total depth of each basin will be approximately 4 ft. Multiple modeling scenarios using conservative input parameters show that the actual operating depth will range from approximately 1.4 to 2.2 ft depending upon the volume of effluent discharged to the tanks, precipitation, and the final tank sizes selected; these operating depths will provide a minimum freeboard of approximately 1.8 ft. The tanks will be constructed with reinforced-concrete walls and floors, and with the water surface open to the atmosphere. The concrete tanks will be sealed with a curing compound and all joints will be watertight. A liner system will be installed in each concrete tank consisting of primary and secondary geomembrane liners separated by a geosynthetic drainage material for leak detection. The wall of the tanks will be self-supporting. Depth to regional groundwater at the project site is approximately 1260 ft.

Quality of Effluent

All effluent discharged to the evaporation tanks will be fully treated by RLWTF treatment operations and will comply with all applicable NPDES permit limits and all of the listed numerical standards of 20.6.2.3103 NMAC. Effluent discharged to the evaporation tanks will receive the same level of treatment and will be of equal quality to that effluent discharged to Mortandad Canyon at NPDES Outfall 051. The quality of the RLWTF's effluent is routinely reported to the NMED through the following documents:

These are only submitted pending permit

1. NPDES Monthly Discharge Monitoring Reports (DMRs) submitted to NMED, Surface Water Quality Bureau;
2. RLWTF Annual Operating Reports submitted to the NMED, Ground Water Quality Bureau (the 2006 RLWTF Annual Report was submitted on June 11, 2007; ENV-RCRA: 07-0135, LA-UR-07-3447); and
3. Discharge Permit DP-1132 quarterly reports submitted to the NMED, Ground Water Quality Bureau.

For the reasons indicated above, we believe that no groundwater permit is required. As explained above, there is no reasonable probability that liquid in the evaporation tanks will move directly or indirectly into groundwater [*See* Amended Final Order, In the Matter of: No Discharge Plan Required McKinley Paper Co. (July 13, 1993) (determining no discharge permit required for discharges to closed-loop, zero discharge system comprised of U-drains, lift stations and piping)]. Further, even if the discharges to the tanks were considered a discharge subject to the permitting requirements of 20.6.2.3104 NMAC, as discussed above, the effluent meets all of the listed numerical standards of 20.6.2.3103 NMAC, has a total nitrogen concentration of 10 mg/L or less, does not contain any toxic pollutant, and is therefore exempt from the permitting requirements under 20.2.3105.A NMAC.

We are sending this NOI well in advance of beginning construction as we want to complete all regulatory requirements in a timely fashion so that the environmental benefits of this project will not be delayed. Detailed plans and specifications will be submitted to your agency once they become available.

We look forward to receiving your response to this NOI. Please contact Bob Beers (505-667-7969) if you have any questions or need any additional information.

Sincerely,

Anthony R. Grieggs
Group Leader
Water Quality & RCRA (ENV-RCRA) Group

ARG:BB/lm

Enclosures: a/s

Cy: Tracy Hughes, NMED/OGC, Santa Fe, NM
Marcy Leavitt, NMED/SWQB, Santa Fe, NM
Robert George, NMED GWQB, Santa Fe, NM
Jake Knutson, NMED GWQB, Santa Fe, NM
Lisa Cummings, NNSA/LASO, MS A316
George Rael, LASO/EO, MS A316
Gene Turner, LASO/EO, MS A316
Michael B. Mallory, PADOPS, MS A102
Richard S. Watkins, ADESHQ, MS K491
Tori George, ENV-DO, MS J978
Mike Saladen, ENV-RCRA, MS K490
Bob Beers, ENV-RCRA, MS K490
Holly Wheeler-Benson, ENV-RCRA, MS K490
Marc Bailey, ENV-RCRA, MS K490
Pete Worland, EWMO-RLW, MS E518
Ed Artiglia, PE-DO, MS E554
Martin Price, PP-EM, MS E554
Craig Douglas, RLW, MS E0518
Phil Wardwell, LC-LESH, MS A187
ADESHQ Files, MS K491
LC Fileroom, MS A187
LC/LESH File, MS A187
ENV-RCRA File, MS K490
IRM-RMMSO, MS A150

DRAFT
ENCLOSURE 2.0

Proposed RLWTF Effluent Evaporation Tanks
LA-UR-07-4794

1-31-06

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NATIONAL LABORATORY
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GROUND WATER

OCT 27 2006

BUREAU

Environmental Protection Division
Water Quality & RCRA (ENV-RCRA)
P.O. Box 1663, Mail Stop K490
Los Alamos, New Mexico 87545
(505) 667-7969/FAX: (505) 665-9344

Date: October 23, 2006
Refer To: ENV-RCRA: 06-084
LA-UR: 06-7335

Mr. Christopher F. Vick
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
Harold Runnels Building, Room N2250
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: GROUND WATER DISCHARGE PLAN QUARTERLY REPORT, THIRD QUARTER 2006, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (DP-1132)

Dear Mr. Vick:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the third quarter (July, August, and September) of 2006. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at four Mortandad Canyon alluvial wells, MCO-3, MCO-4B, MCO-6, and MCO-7, during the third quarter of 2006. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Laboratory's Water Quality Database (http://wqdbworld.lanl.gov/).

RLWTF Effluent Monitoring Results
Table 2.0 presents the analytical results from the weekly composite sampling of the RLWTF's effluent. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during a 7-day period.
Samples are submitted GEL for analysis. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride, and total dissolved solids.

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen (NO_3-N), perchlorate (ClO_4, by Method 314.0, Ion Chromatography), fluoride, and total dissolved solids for the third quarter of 2006. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride, and total dissolved solids. All perchlorate results obtained were well below the federal Drinking Water Equivalent Level (DWEL) of 24.5 µg/L.

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & RCRA Group

BB/tag

Cy: M. Leavitt, NMED/SWQB, Santa Fe, NM
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, NM
M. Johansen, NNSA/LASO, MS A316
G. Turner, NNSA/LASO, MS A316
J. A. Van Prooyen, PADOPS, MS A102
R. S. Watkins, ADESHQ, MS K491
D. Cox, EWMO-DO, MS J910
P. Worland, EWMO-RLW, MS E518
B. McClenahan, EWMO-RLW, MS E518
C. Del Signore, EWMO-RLW, MS E518
T. George, ENV-DO, MS J978
J. Dewart, LWSP, MS M992
T. Sandoval, ENV-RCRA, MS K490
M. Saladen, ENV-RCRA, MS K497
C. Douglass, RLW, MS E518
D. Moss, RLW, MS E518
ENV-RCRA, File, MS K490
IRM-RMMSO, MS A150

GROUND WATER

OCT 27 2006

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Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, Analytical Results, 3rd Quarter, 2006.

Sampling Location	Sample Date	Perchlorate by LC/MS/MS[2] (ug/L)	Perchlorate by IC[3] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	8/18/2006	2.25	<4.0	0.87	0.56	0.02J	253	0.53
MCO-4B	8/18/2006	18.5	17.2	1.88	0.32	0.02J	271	0.88
MCO-6	8/8/2006	21.7	20.9	2.05	0.19	0.02J	320	1.08
MCO-7	8/16/2006	27.5	25.7	1.98	<0.01	0.02J	293	1.38
MCO-7, field duplicate[4]	8/16/2006	27.9	25.4	1.96	<0.01	0.012J	289	1.40
NM WQCC 3103 Ground Water Standards (mg/L)		*NA*[5]	*NA*	*10*[1]	*NA*	*NA*	*1000*	*1.6*

Notes:

[1]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

[2]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[3] IC means the EPA Method 314, perchlorate analysis by Ion Chromatography.

[4]LANL collects duplicate samples as part of its QC program.

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

J indicates an estimated value. The result was less than the reporting limit, but greater than the detection limit.

All analyses by General Engineering Laboratories, Charleston, SC.

All samples filtered.

23662

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, Analytical Results, 3rd Quarter, 2006.

Monitoring Period	Sample Composite Date	RLWTF Final Weekly Composite Results (mg/L)		
		NO3+NO2-N[1] (mg/L)	Fluoride[1] (mg/L)	TDS[1] (mg/L)
June, 2006	6/20/2006	1.41	0.24	293
	6/27/2006	1.05	0.25	297
July, 2006	7/5/2006	0.79	0.19	247
	7/10/2006	0.58	0.19	223
	7/16/2006	0.25	0.28	327
	7/31/2006	0.35	0.13	102
August, 2006	8/7/2006	1.89	0.13	128
	8/14/2006	0.88	0.06	33
	8/21/2006	0.49	<0.03	33
	8/28/2006	0.35	<0.03	23
September, 2006	9/5/2006	0.62	0.045J	35
	pending[4]	pending	pending	pending
	pending	pending	pending	pending
	pending	pending	pending	pending
3rd Quarter 2006 Averages (mg/L)[3]		**0.79**	**0.14**	**158**
NM WQCC 3103. Ground Water Standards (mg/L)		*10[2]*	*1.6*	*1000*

Notes:

[1]Analysis by General Engineering Laboratories, Inc., Charleston, SC

[2]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

[3]3rd quarter averages include results from June 2006.

[4]Pending means the samples have been submitted to the General Engineering Laboratories, but the analytical results have not yet been reported to LANL.

J means the reported value is greater than the Method Detectio Limit (MDL) but less than the Reporting Limit (RL).

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 3rd Quarter, 2006.

	RLWTF FMC Results[1]			
Monitoring Period	**NO3-N (mg/L)**	**Perchlorate by IC (ug/L)**	**TDS (mg/L)**	**F (mg/L)**
July, 2006	0.4	0 +/-1	160	0.24
August, 2006	0.3	0 +/-1	50	0.20
September, 2006	0.3	0 +/-1	pending	ND
NM WQCC 3103. Ground Water Standards (mg/L)	*10*	*NA*	*1000*	*1.6*

__Notes:__
[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.
ND means the analytical result was non-detect.

GROUND WATER

OCT 2 9 2007

BUREAU

Los Alamos
NATIONAL LABORATORY
EST.1943

Environmental Protection Division
Water Quality & RCRA (ENV-RCRA)
P.O. Box 1663, Mail Stop K490
Los Alamos, New Mexico 87545
(505) 667-7969/FAX: (505) 665-9344

Date: October 30, 2007
Refer To: ENV-RCRA-07-248
LA-UR: 07-7028

Mr. Robert George, Domestic Team Leader
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: GROUND WATER DISCHARGE PLAN QUARTERLY REPORT, THIRD QUARTER 2007, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (DP-1132)

Dear Mr. George:

This letter is intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) Report for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) for the third quarter (July, August, September) of 2007. Since the first quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Quarterly Monitoring Results, Mortandad Canyon Alluvial Ground Water Wells
Table 1.0 presents the analytical results from sampling conducted at four Mortandad Canyon alluvial wells, MCO-3, MCO-4B, MCO-6, and MCO-7, during the third quarter of 2007. Samples are submitted to General Engineering Laboratories (GEL), Charleston, SC, for analysis. All of the analytical results were below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

It should be noted that the analytical results for NO3+NO2-N, TKN, and NH3-N at MCO-4B are pending at this time; GEL, in error, canceled these analyses shortly after receiving the samples. However, since GEL had archived the samples, the analyses are still being performed and the results will be reported in the fourth quarter 2007 report.

Analytical results from the sampling of intermediate and regional aquifer wells in Mortandad Canyon can be accessed online at the Laboratory's Water Quality Database (http://wqdbworld.lanl.gov/).

RLWTF Effluent Monitoring Results

Table 2.0 presents the analytical results from the weekly composite sampling of the RLWTF's effluent for the period July through September, 2007. The final weekly composite (FWC) samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during a 7-day period. Samples are submitted to GEL for analysis. In addition, the TA-50 RLWTF's analytical laboratory analyzes duplicate FWC samples as part of their operational monitoring program.

All of the FWC results for the third quarter of 2007 were below the NM WQCC ground water standards for fluoride and total dissolved solids. The combined NO_3+NO_2-N concentration in the September 2, 2007, FWC sample was 12.1 mg/L. The NM WQCC ground water standard is for NO_3-N only. Separate NO_3-N and NO_2-N analyses are not performed by GEL due to the short analytical hold-time (48 hrs). However, the analytical laboratory at the TA-50 RLWTF performs individual NO_3-N and NO_2-N analyses on duplicate FWC samples as part of their operational monitoring program. Analytical results from these duplicate samples for the third quarter of 2007 are presented in the following table.

3rd Quarter 2007, FWC Operational Sampling Results, TA-50 RLWTF Analytical Laboratory

Composite Date	Sample ID Number	Units	NITRATE-N (NO_3-N)	NITRITE-N (NO_2-N)	Sum (NO_3+NO_2-N)
6/24/2007	7.71325	mg/L	0.5	0.9	1.4
7/1/2007	7.71326	mg/L	0.5	0.7	1.2
7/22/2007	7.71329	mg/L	0.6	1.7	2.3
7/29/2007	7.7133	mg/L	NA	NA	NA
8/26/2007	7.71334	mg/L	6.5	2.2	8.7
9/2/2007	7.71335	mg/L	6.1	5.9	12.0
9/9/2007	7.71336	mg/L	2.0	2.4	4.4

NA means that no data is available for that composite date.
Composite dates for weeks with no discharge are not listed.

Sample results from September 2, 2007, as presented in the above table, show a NO_3-N concentration of 6.1 mg/L and a NO_2-N concentration of 5.9 mg/L. The sum of these, 12.0 mg/L, is consistent with GEL's combined NO_3-N and NO_2-N result of 12.1 mg/L. Based upon these data, NO_3-N concentrations for the third quarter of 2007 were below the NM WQCC ground water standard of 10 mg/L.

Table 3.0 presents the final monthly composite (FMC) sample results for nitrate-nitrogen, perchlorate (ClO_4, by Method 314.0, Ion Chromatography), fluoride, and total dissolved solids for the third quarter of 2007. The FMC samples are flow-proportioned composite samples prepared from each tank of effluent generated by the RLWTF during the month. Analysis is by the TA-50 RLWTF analytical laboratory. All of the analytical results were below the NM WQCC Regulation 3103 standards for nitrate-nitrogen, fluoride, and total dissolved solids.

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & RCRA Group (ENV-RCRA)

BB/lm

Enclosures: a/s

Cy: Marcy Leavitt, NMED/SWQB, Santa Fe, NM
James Bearzi, NMED/HWB, Santa Fe, NM
Steve Yanicak, NMED/DOE/OB, J993
Matthew Johansen, LASO/EO, A316
Gene Turner, LASO/EO, A316
Michael Mallory, PADOPS, A102
Richard S. Watkins, ADESHQ, K491
Tori George, ENV-DO, J978
Mike Saladen, ENV-RCRA, K490
Bob Beers, ENV-RCRA, K490
Daniel Cox, EWMO-DO, J910
Craig Douglass, RLW, E518
Pete Worland, EWMO-RLW, E518
Chris Del Signore, EWMO-RLW, E518
David Moss, RLW, E518
ENV-RCRA, File, w/enc., K490
IRM-RMMSO, w/enc., A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Well Sampling, 3rd Quarter, 2007.

Sampling Location	Sample Field Prep (F/UF)	Sample Date	Perchlorate by LC/MS/MS[1] (ug/L)	NO_3+NO_2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	F[3]	9/14/2007	2.59	2.69	0.31	<0.03	227	0.43
MCO-3, Field Duplicate[2]	F	9/14/2007	2.51	2.65	0.43	<0.03	227	0.45
MCO-4B	F	8/13/2007	13.3J	results pending[6]	results pending[6]	results pending[6]	378	0.72
MCO-6	F	8/14/2007	25.0	1.72	0.14	<0.3	325	0.85
MCO-6, Field Duplicate[2]	F	8/14/2007	25.5	1.76	0.16	<0.3	325	0.88
MCO-7	F	8/28/2007	24.5	2.14	0.11	<0.03	275	1.25
NM WQCC 3103 Ground Water Standards			*NA [4]*	*10 mg/L [5]*	*NA [4]*	*NA [4]*	*1000 mg/L*	*1.6 mg/L*

Notes:

[1]LC/MS/MS means perchlorate analysis by Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.

[2]LANL collects duplicate samples as part of its QC program.

[3]F means the sample was filtered, UF means the sample was not filtered.

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

[5]The NMWQCC Regulation 3103 Ground Water Standard is for NO_3-N.

[6]These results will be reported in the 4th quarter 2007 DP-1132 report.

J means that the analyte is classified as detected but the reported value is expected to be more uncertain than usual.

Table 2.0. RLWTF Final Weekly Composite (FWC) Effluent Sampling, 3rd Quarter, 2007.

Monitoring Period	Sample Composite Date	RLWTF Final Weekly Composite Results[1]			
		NO_3+NO_2-N (mg/L)	Perchlorate by LC/MS/MS (ug/L)	Fluoride (mg/L)	TDS (mg/L)
June, 2007	6/24/2007	0.16	0.91J+	0.08J	97
July, 2007	7/1/2007	1.40	1.46	0.14	151
	7/8/2007	No Discharges	No Discharges	No Discharges	No Discharges
	7/15/2007	No Discharges	No Discharges	No Discharges	No Discharges
	7/22/2007	1.94	0.59	0.15	152
	7/29/2007	9.60	2.18J	0.30	317
Aug, 2007	8/5/2007	No Discharges	No Discharges	No Discharges	No Discharges
	8/12/2007	No Discharges	No Discharges	No Discharges	No Discharges
	8/19/2007	No Discharges	No Discharges	No Discharges	No Discharges
	8/26/2007	8.21	0.93	0.053J	95
Sept, 2007	9/2/2007	12.1[6]	1.07J-	0.16J+	155
	9/2/07--GEL QC duplicate	11.8[6]			
	9/9/2007	5.04	0.37	<0.03	64
	9/16/2007	Results Pending	Results Pending	Results Pending	Results Pending
	9/23/2007	Results Pending	Results Pending	Results Pending	Results Pending
3rd Quarter 2007 Averages[3] (mg/L)		**5.49**	**0.89**	**0.13**	**147**
NM WQCC 3103 Ground Water Standards		*10 mg/L[4]*	*NA[5]*	*1.6 mg/L*	*1000 mg/L*

Notes:

[1]All analyses by General Engineering Laboratories, Inc. unless otherwise noted.

[2]No Discharges means that the RLWTF did not discharge any effluent during the 7-day period precedeing the composite date.

[3]3rd quarter 2007 averages include the results from June 2007.

[4]The NM WQCC Regulation 3103 Ground Water Standard is for nitrate (NO_3-N).

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

[6]Analysis of a duplicte sample by the TA-50 RLWTF analytical laboratory showed a NO_3-N concentration of 6.1 mg/L.

J means the reported value is greater than the Method Detection Limit (MDL) but less than the Reporting Limit (RL).

J+ means that the analyte is classified as detected but the reported value is expected to be more uncertain than usual with a positive bias.

J- means that the analyte is classified as detected but the reported value is expected to be more uncertain than usual with a negative bias.

Table 3.0. RLWTF Final Monthly Composite (FMC) Effluent Sampling, 3rd Quarter, 2007.

	RLWTF FMC Results[1]			
Monitoring Period	**NO_3-N (mg/L)**	**Perchlorate by IC[2] (ug/L)**	**TDS (mg/L)**	**F (mg/L)**
July, 2007	2.7	<1	187	0.24
August, 2007	6.5	<1	112	<0.01
September, 2007	3.1	<1	40	<0.01
NM WQCC 3103 Ground Water Standards	*10 mg/L*	*NA [3]*	*1000 mg/L*	*1.6 mg/L*

Notes:

[1]Analyses by the Laboratory's TA-50 RLWTF analytical laboratory.

[2]IC means EPA Method 314.0, perchlorate analysis by Ion Chromatography.

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

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
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BILL RICHARDSON
Governor

DIANE DENISH
Lieutenant Governor

RON CURRY
Secretary

CINDY PADILLA
Deputy Secretary

GROUND WATER

OCT 30 2007

BUREAU

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

October 26, 2007

Donald L. Winchell, Jr., Manager
Los Alamos Site Office
Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, NM 87544

Richard S. Watkins, Associate Director
Environment, Safety, Health, & Quality
Los Alamos National Security, LLC
Los Alamos Research Park
4200 Jemez Road, Suite 400
Los Alamos, NM 87544

**RE: INFORMATION REQUEST REGARDING THE EXEMPTION STATUS OF THE TECHNICAL AREA 50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY
LOS ALAMOS NATIONAL LABORATORY (LANL)
EPA ID #NM0890010515**

Dear Messrs. Winchell and Watkins:

This information request is made pursuant to the New Mexico Hazardous Waste Act (HWA), NMSA 1978, §§ 74-4-1 to 74-4-14, and the federal Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 to 6992k. Los Alamos National Laboratory (LANL) is a national laboratory owned and operated by the United States Department of Energy (DOE). DOE is an agency of the United States. LANL is also operated by Los Alamos National Security, L.L.C. (LANS). Each of these entities, collectively the "Permittees", is a person who generates, stores, treats, transports, disposes of, or otherwise handles or has handled hazardous wastes within the meaning of the HWA and RCRA. NMSA 1978, § 74-4-3(K); 42 U.S.C. § 6903(15).

Section 74-4-4.3(A)(1) of the HWA provides that "[f]or the purposes of taking any corrective action or enforcing the provisions of the [HWA], . . . upon request of [the Department] any person who generates, stores, treats, transports, disposes of or otherwise handles or has handled hazardous wastes shall furnish information relating to such hazardous wastes." Likewise, section 3007(a) of RCRA provides that "[f]or purposes of enforcing the provisions of [RCRA], any person who generates, stores, treats, transports, disposes of, or otherwise handles or has handled hazardous wastes shall, upon request of . . . any duly designated officer, employee, or representative of a State having an authorized hazardous waste program, furnish information relating to such wastes." (42 U.S.C. § 6927(a)).

Furthermore, Condition I.D.7 of the Permittees' Hazardous Waste Facility Permit (No. NM0890010515), as modified, provides that the Permittees must furnish to the Department "any relevant information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit." In addition, Section III.P of the Compliance Order on Consent, dated March 1, 2005, provides that the Respondents shall, within a reasonable time after receipt of a request from the Department, "furnish information to the Department relating to hazardous wastes that are or have been managed at the [LANL] facility."

This letter requests information regarding the Permittees' claimed RCRA hazardous waste and hazardous waste permitting exemption(s) for the Technical Area 50 Radioactive Liquid Waste Treatment Facility (RLWTF). The Department understands that the Permittees claim a RCRA exemption for the RLWMF and will also claim an exemption when the RLWTF is converted to a zero-discharge unit. The Department therefore requests the following information:

1. Documentation demonstrating that LANL has sought an opinion on the exemption of the RLWTF or any predecessor facility from the Department or the U.S. Environmental Protection Agency (EPA);

2. Documentation identifying the New Mexico Hazardous Waste Management Regulation (HWMR) 20.4.1 NMAC citations that form the basis for the Permittees' current exemption;

3. Documentation identifying the HWMR regulatory citations that form the basis for an exemption for the planned zero-discharge RLWTF;

4. Documentation describing the Permittees' interpretation of how the above referenced regulatory citations apply to the RLWTF, to the wastes before they arrive at the facility, to wastes generated at the facility, and to wastes that exit the facility both through the National Pollution Discharge Elimination System (NPDES) permitted outfall and by other means;

5. A listing of all wastes transferred to the RLWTF from January 1, 2002, to the present. This list shall identify which wastes are hazardous wastes as defined in the HWMRs at the point of generation by identifying all applicable U.S. EPA Hazardous Waste Numbers associated with the individual wastes, and should include an unique identifier and

common reference name for each waste if available;

6. Applicable waste profile forms for the above referenced hazardous and non-hazardous wastes. If the waste profile forms for hazardous wastes do not include a description of how an associated waste could be considered incidental to laboratory operations as described in U.S. EPA correspondence dated July 1984 and February 1993 (Attachments 1 and 2) and 46 FR 56582 and 56587 (Nov. 17, 1981), provide this information;

7. Documentation identifying a definition of the term *laboratory* that LANL would utilize to qualify for the exemption at 20.4.1.200 NMAC (incorporating 40 CFR § 261.3(a)(2)(iv)(E));

8. Copies of records for the above referenced wastes identifying the date(s) the wastes were transferred to the RLWTF over the period from January 1, 2002, to the present, and the volume of those wastes;

9. A copy of existing LANL guidance for the characterization of waste streams going to the RLWTF;

10. A summary of the analytical data referenced in a document entitled "Documentation of Information Required to Comply with 40 CFR § 268.7(a)(7) (LA-UR-07-6624) in association with § 261.3(a)(2)(iv)(E)." This summary must identify all analytes measured and the maximum concentrations measured for each analyte;

11. A copy of the NPDES permit application referenced in LA-UR-07-6624.

12. A listing of all wastes generated at the RLWTF through the period January 1, 2002, to the present. This list shall identify the disposition methodology of the wastes and all applicable U.S. EPA Hazardous Waste Numbers associated with the individual wastes, and should include an unique identifier and common reference name for each waste if available;

Compliance with this information request by the Permittees is mandatory. Failure to respond fully and truthfully to this information request within the time specified herein, or adequately justify such failure to respond, may result in an enforcement action by the Department pursuant to section 74-4-10 of the HWA, or section 7002(a)(1)(A) of RCRA, 42 U.S.C. § 6972(a)(1)(A), or both. Both the HWA and RCRA provide for the imposition of civil penalties for noncompliance. Section 74-4-12 of the HWA provides that any person who violates any provision of the HWA "may be assessed a civil penalty not to exceed ten thousand dollars ($10,000) for each day during any portion of which a violation occurs." (*See also* NMSA 1978, § 74-4-10(A) and (B)). Section 3008(g) of RCRA provides that any person who violates any requirement of RCRA shall be liable for a civil penalty not to exceed $32,500 per day for each such violation. 42 U.S.C. § 6928(g). Both the HWA and RCRA also provide for criminal fines and imprisonment for knowingly omitting material information or making a false statement or representation in any document used for compliance with the HWA or RCRA NMSA 1978, § 74-4-11(A)(3); 42 U.S.C. § 6928(d)(3).

All requested information must be submitted within 30 days of receipt of this letter. If you have any questions please contact Steve Pullen of my staff at (505) 476-6044.

Sincerely,

James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:sp

cc: S. Pullen, NMED HWB
D. Cobrain, NMED HWB
J. Kieling, NMED HWB
Robert George, NMED GWQB
C. de Saillan, NMED OGC
L. Lovejoy
L. King, EPA 6PD-N
J. Ellvinger, LANS
S. Stiger, LANS
G. Rael, DOE LASO

file: Reading and file '07 LANL Permit - General

Attachment 1

9441.1984(22)

RCRA/SUPERFUND HOTLINE SUMMARY

JULY 84

7. A drum of listed wastes is dumped into an on-site wastewater treatment facility at a laboratory operation. Is this covered by the lab exclusion in §261.3(a)(iv)(E)?

This activity is not covered in the lab exclusion. §261.3(a)(iv)(E) was meant to cover small amounts of wastes added essentially unavoidably to large volumes of process wastewater. Examples include laboratory spills washed into a sink drain, and residues from the washing of glassware which are carried in the washwater into the sewer.

Source: Alan Corson
Research: Tom Gainer

Attachment 2

9441.1993(01)

United States Environmental Protection Agency
Washington, D.C. 20460
Office of Solid Waste and Emergency Response

February 23, 1993

Mr. Larry E. Perry, P.E.
Divisional Environmental Manager
Frito-Lay, Incorporated
P.O. Box 660634
Dallas, Texas 75266-0634

Dear Mr. Perry:

Thank you for your letter of December 31, 1992, in which you inquire about the proper disposal of silver nitrate and chloroform as laboratory chemicals. Specifically, you wished to know how the laboratory wastewater exclusion of 40 CFR 261.3(a)(2)(iv)(E) applies to your facilities.

As we understand your situation (based on your letter and telephone conversation between your company and my staff), you use silver nitrate and chloroform in quality control experiments in the laboratory. These laboratories have quality control (QC) functions incidental to production. However, the filtrate from use of these particular chemicals contains them at levels above the regulatory levels for chloroform and silver specified in 40 CFR 261.24 (the Toxicity Characteristic, or TC). In addition, you noted the presence of chloroform as a commercial chemical product, EPA Hazardous Waste No. U044, in your wastewater.

On December 22, 1992, Messrs. Abrams, Brandes, and Josephson of my staff confirmed to you that based on the information you provided, your facilities may qualify for the laboratory wastewater exclusion, but only if there is a listed waste involved. I would like, again, to stress several additional points to remember in qualifying for this exclusion:

1) This exclusion pertains only to listed hazardous wastes (that are designated as toxic (T)) from laboratory operations and only at the headworks of the wastewater treatment

facility. As we understand it, your facilities would only qualify for this exclusion if unused chloroform was disposed of in your laboratory sinks or drains (U044). Chloroform is not an F001 or F002 solvent, but is on the toxicity characteristic list and on the product list (40 CFR 261.33(f)). Chloroform used as a solvent and then disposed would not meet the listing description for U044.

2) The exclusion applies to incidental losses of listed hazardous wastes (in your case, unused chloroform) from laboratory operations, not deliberate bulk discharges of chemicals that are not part of laboratory operations.

3) This exclusion applies to wastewater discharges that are subject to regulation under either section 402 or 307(b) of the Clean Water Act. Many facilities receive indirect discharge permits based on the operational parameters of the local publicly-owned treatment works (POTW). The POTW, in turn, sets indirect discharge standards to avoid plant upsets, generation of hazardous sludges, health hazards to their employees, and violation of its own discharge permit.

4) The laboratory wastewater exclusion is based on the total quantity of listed wastes from laboratory operations. The introduction of other listed wastes into the plant wastewater system (outside the conditions set forth in 40 CRF 261.3(a)(2)(iv)(A) - (E) may void the exclusion for the facility.

5) If any of the wastes in the laboratory wastewater discharge are subject to the Land Disposal Restrictions (40 CFR 268), the facility must keep records showing their generation and disposition according to §268.7(a).

6) Your letter states that you have investigated

"specific representative cases." As you know, the exclusion at 40 CFR 261.3(a)(2)(iv)(E) must be met by each individual facility, and this letter should not be construed as a regulatory determination on any particular wastestream. EPA regulations at 40 CFR 262.11 require each generator of solid waste to determine if that waste is hazardous.

You note in your letter that 1) the total annualized average flow of laboratory wastewater is below one percent of total facility flow, and 2) the total laboratory chemical concentration based on facility purchase and inventory records is less than one part per million. A facility must meet one of these two criteria in order to qualify for the wastewater exclusion.

Laboratory wastes that are hazardous because they exhibit one of the characteristics of a hazardous waste (see 40 CFR 261 Subpart C) are not addressed by the exclusion in 40 CFR 261.3(a)(2)(iv)(E). Therefore, TC hazardous levels of silver and chloroform in your laboratory wastewater would be discharged to publicly owned treatment works (POTWs). However the pretreatment (before discharge to POTWS) of laboratory wastewaters could generate a sludge that would be under RCRA Subtitle C control if it exhibited any of the hazardous waste characteristics.

Your should be aware that, even if the facilities meet the terms of the laboratory wastewater exclusion according to Federal regulations, states may have more stringent hazardous waste regulations. Please check with the applicable state agency for further details on state regulations.

Thank you for your inquiry. If you have any questions, please contact Ron Josephson of my staff at (202) 260-4770.

Sincerely,
Sylvia K. Lowrance, Director
Office of Solid Waste

cc: Ken Gigliello, OWPE (OS-520); Mark Badalamente, OGC (LE-132S); Ron Josephson, OSW (OS-333)