Los Alamos National Laboratory

Environment, Safety, and Health Division
P.O. Box 1663, Mail Stop K491
Los Alamos, New Mexico 87545
(505) 667-4218 / FAX: (505) 665-3811

Date: December 23, 1998
Refer to: ESH-DO:98-358

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

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

Dear Ms. Doremus:

In our November 20, 1998 letter, Los Alamos National Laboratory provided you with a short-term operational plan for discharges from the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. The plan identified several interim programs for achieving compliance with the New Mexico Water Quality Control Commission (WQCC) ground water standard for nitrate until a new, long-term, treatment process can be installed.

As a follow-up to our November 20th letter, please note that the Laboratory has selected mechanical evaporation as the preferred process for the long-term treatment of the reverse osmosis (RO) reject stream. Mechanical evaporation of RO reject stream will, in addition to removing nitrate, provide the Laboratory with a means of removing other salts, a necessary step towards the Laboratory's long-term goal of zero liquid discharge. The Laboratory is proceeding with engineering design and scheduling for the mechanical evaporation project. It is our goal to have a mechanical evaporator operational within 18 months. The Laboratory will continue to update you as the project progresses through detailed engineering, procurement, and startup.

The Phase I upgrades (ultrafiltration and reverse osmosis) have been installed and tested on non-radioactive water and are expected to begin operation with radioactive water in late February or March, 1999. This delay from January, 1999, is due to the need to complete further safety documentation and readiness assessment in accordance with Department of Energy nuclear facility safety requirements.

To ensure compliance with the N.M. WQCC ground water standard for nitrate during the interim period from March 21, 1998, until the mechanical evaporator becomes operational, the Laboratory will implement the programs identified in the short-term operational plan submitted to you under the November 20th letter. The Laboratory proposes to submit quarterly reports to NMED, starting with the first quarter of 1999, with effluent and monitor well analytical results as well as progress updates on the evaporator project and interim compliance activities.

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

Sincerely,

for Dennis J. Erickson
Division Director

Sincerely,

Kenneth M. Hargis for

Thomas Baca
Environmental Management Program

DJE/mm

Cy: J. Davis, NMED SWQB, Santa Fe, NM
B. Garcia, NMED HRMB, Santa Fe, NM
D. Gurule, DOE LAAO, MS A316
J. Vozella, AAME, LAAO, MS A316
R. Burick, DIR, MS A100
B. Stine, ALDNW, MS F629
B. Matthews, NMT-DO, MS E500
S. Gibbs, NW-MM, MS A102
S. Rae, (ESH-18/WQ&H:98-0437), ESH-18, MS K497
B. Beers, ESH-18, MS K497
ESH-DO File, MS K491
WQ&H File, MS K497
CIC-10, MS A150

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PS Form **3800**, April 1995

State of New Mexico
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Ground Water Quality Bureau
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Santa Fe, New Mexico 87502
(505) 827-2918 phone
(505) 827-2965 fax

MARK E. WEIDLER
Secretary

IED LETTER - RETURN RECEIPT REQUIRED

P.O. Box 9855
Santa Fe, New Mexico 87504

RE: Discharge Plan (DP-1132) for Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility

Dear Ms. Diane:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) received a request for public hearing from you, December 16, 1996, for the proposed discharge from the Los Alamos National Laboratory (LANL), Radioactive Liquid Waste Treatment Facility (RLWTF). In addition to your request, The Pueblo of San Ildefonso also requested a public hearing. However, the Pueblo of San Ildofonso withdrew their request for public hearing on April 27, 1998. The NMED has not been able to contact you by phone and would like to discuss with you the current status of the groundwater discharge plan and your current interest in a public hearing.

The following provides a response to the questions that were submitted with your request for a public hearing.

1. Q. *Does the plan eliminate the discharge of radionuclides and bring the release of nitrates to within acceptable levels?*

   A. LANL has proposed discharge limitations for both radionuclides and nitrates in their permit application. Phase I of the upgrades to the RLWTF will include Tubular Ultrafiltration ro removal of radionuclides followed by reverse osmosis. LANL states in the discharge plan application that the Phase I upgrades will ensure that treated effluent to be discharged will be below the Derived Concentration Guidelines (DCG's) for radionuclides set forth in DOE Order 5400.5.

:01242

Nitrate will be removed from the waste stream by reverse osmosis. Long term compliance with WQCC Regulation 3103 standards will be achieved by evaporating off reverse osmosis reject waste water with a mechanical evaporator. Short term compliance with WQCC Regulation 3103 standards will be achieved by containerizing the reverse osmosis waste stream and returning it to the clean water waste stream at a rate that will not cause effluent concentrations to be above any WQCC Regulation 3103 standard. This includes nitrate.

If treated wastewater does not meet the numerical discharge limitations, LANL has proposed to retain and recirculate treated wastewater at the treatment plant until it meets discharge limitations.

2. Q. *Does the plan address the extent of past contamination and possible remediation efforts?*

A. The original discharge plan application submitted August 1996 includes information on past contamination in the alluvial aquifer. In addition to the original discharge plan application, LANL has produced the Work Plan for Mortandad Canyon which provides details on a groundwater investigation for Mortandad Canyon. The work plan is describes the actions LANL will take to determine the extent of past contamination in Mortandad Canyon. Without knowing the extent of current contamination, remediation requirements have not been determined. When information on the extent of past contamination becomes available, LANL will be required to propose and implement corrective actions.

3. Q. *Have adequte waste stream characterizations been performed for liquid volumes coming into RLWTF?*

A. The influent quality data that has been submitted to the GWQB is composite and not specific to an upstream waste water generator. The data is more representative of the wastewater that is treated at the ROWTF. The GWQB has reviewed data for influent quality and has requested updated comprehensive influent data to the RLWTF. The data will be reviewed prior to issuing the permit to insure that effluent monitoring requirements are adequate. In addition to water quality data, the original discharge plan application contains the waste acceptance criteria that waste generators must follow. The waste acceptance criteria sets limits on concentrations of constituents that can be discharged to the RLWTF.

4. Q. *What volumes of radioactive sludge are being projected for future burial at TA-54, Area G?*

A. The groundwater discharge plan application does not address the volumes of sludge to be disposed at TA-54. For further regulatory information on the disposal of sludge, contact the NMED, Hazardous and Radioactive Material Bureau (HRMB).

Please contact Phyllis Bustamante of the GWQB, Pollution Prevention Section (PPS) at 827-0166 by March 12, 1999 to discuss the status of the discharge plan application and your current concerns. Based on your current concerns, the NMED will make a decision on holding a public hearing by mid March.

Sincerely,

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

DMD/PAB/pab

xc: James Bearzi, District Manager, NMED District II

:01245

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PS Form **3800**, April 1995

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Ground Water Quality Bureau
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1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2918 phone
(505) 827-2965 fax

MARK E. WEIDLER
Secretary

ED LETTER - RETURN RECEIPT REQUIRED

Rte 5 Box 298
Santa Fe, New Mexico 87501

RE: Discharge Plan (DP-1132) for Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility

Dear Ms. Natesway:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) received a request for public hearing from you, December 17, 1996, for the proposed discharge from the Los Alamos National Laboratory (LANL), Radioactive Liquid Waste Treatment Facility (RLWTF). In addition to your request, The Pueblo of San Ildefonso also requested a public hearing. However, the Pueblo of San Ildofonso withdrew their request for public hearing on April 27, 1998. The NMED has not been able to contact you by phone and would like to discuss with you the current status of the groundwater discharge plan and your current interest in a public hearing.

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Sincerely,

Dale M. Doremus

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

DMD/PAB/pab

xc: James Bearzi, District Manager, NMED District II

State of New Mexico
ENVIRONMENT DEPARTMENT
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Harold Runnels Building
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CERTIFIED LETTER - RETURN REC

February 19, 1999

Mr. David A. Gurule, Area Manager
Department of Energy
528 35th Street
Los Alamos, New Mexico 87544

RE: Discharge Plan Application, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132

Dear Mr. Todd:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) has reviewed the discharge plan application and subsequent material submitted to date for the Los Alamos National Laboratory (LANL), Radioactive Liquid Waste Treatment Facility (RLWTF), TA-50, DP-1132. Prior to approval of the discharge plan for the RLWTF, the GWQB will need additional information or clarification on the following items.

Operational Plan

The GWQB has reviewed the revised operational plan for the RLWTF, the dates for implementation of Phase I upgrades, and the changes to short and long term Phase II upgrades submitted in letters dated November 20, 1998 and December 23, 1998. In addition to the letters, representatives from the GWQB attended a presentation at LANL, January 25, 1999, on nitrate conversion technology which has been under consideration as a treatment method at the RLWTF. Prior to approval of the discharge permit, the NMED will need clarification on the following issues.

1. LANL has committed to discharging treated wastewater from the RLWTF that meets all Water Quality Control Commission (WQCC) Regulation 3103 standards by March 21, 1999. The short term method of achieving effluent limitations is by containerizing the reject water from the reverse osmosis (RO) unit and bleeding the RO reject water back into the permeate stream in quantities that will not cause effluent concentrations to exceed WQCC Regulation 3103 standards.

:01250

The date for implementing Phase I, which includes use of the RO unit, is stated to be late February or March of 1999. LANL has not submitted a method for achieving effluent limitations if Phase I has not been implemented by March 21, 1999.

Please submit clarification on how wastewater will be treated in order to meet effluent limitations by March 21, 1999 if Phase I has not been implemented. Will wastewater from the clarifloculators be treated by the RO unit, or will all treated wastewater be containerized? In addition, the GWQB requests that LANL contact the NMED, Surface Water Quality Bureau (SWQB) to insure that blending RO reject water back into the discharge to Effluent Canyon is in compliance with the National Pollutant Discharge Elimination System (NPDES) permit for the discharge from RLWTF to Effluent Canyon.

2. LANL's letter dated November 20, 1998, states that upstream generators are being identified and each generator of nitrogenous materials will use upstream controls such as waste minimization, product substitution, and temporary containerization to minimize the discharge of nitrogenous chemicals to the RLWTF. The letter did not state what the anticipated volumes of containerized nitrogenous chemicals will be, or how they will be treated and disposed of.

   Please submit the volume, treatment methods, and final disposal of nitrogenous chemicals that will be containerized at upstream sources. If the nitrogenous chemicals will eventually go through the RLWTF, any pre-treatment options such as the nitrate conversion technology should be submitted to NMED.

3. LANL's letter dated November 20, 1998 included 2 attachments. One attachment provides the Estimated Quality of the Reverse Osmosis Concentration Stream (attachment 1) and the other provides Estimated Quality of the Reverse Osmosis Permeate Stream (attachment 2). The data submitted in the attachments seems to contradict each other. Attachment 1 indicates an increase in concentrations for all constituents as the percent of recovery increases. Attachment 2 indicates inconsistencies by various constituents increasing or decreasing as the percent of recovery increases.

   Please submit clarification on the data submitted in the attachments and if needed, a revised table of projected concentrations in the RO permeate stream by percent of recovery. In addition, please submit chemical concentrations for all WQCC Regulation 3103 constituents that may be in the reject waste stream.

4. The letter dated November 20, 1998 states that temporary storage of the RO concentrate (reject) will continue until the new treatment process for nitrate removal is fully operational. The letter dated December 23, 1999 states that a mechanical evaporator has been selected as the long term treatment and disposal method of the RO reject stream and that LANL's goal is to have a mechanical evaporator operational within 18 months. The December 23, 1999 letter did not provide a firm commitment to discontinue the blending of RO reject water with RO permeate water prior to the discharge to Effluent Canyon once the mechanical evaporator is operational.

NMED is requesting that LANL commit to discharging only RO permeate water to Effluent Canyon by June 30, 2000.

Monitoring Plan

General Water Quality Data Needs

1. The GWQB requested water quality data for metals, general chemistry, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). The information submitted, August 25, 1998 by LANL included some of the requested data. However the data was incomplete and may be incorrect. The following lists the data deficiencies and the concerns for the data submitted.

    a. The data submitted in attachment A, 1997 RLWTF Annual Report (draft), Appendix A does not provide the information needed on influent quality for general chemistry or metals. Raw concentrations do not include influent from TA-55. In order to adequately review influent quality, the concentrations must include all influent sources.

        Please submit water quality data that is representative of influent quality for metals and general chemistry for the past year.

    b. Some of the data submitted in attachment A, 1997 RLWTF Annual Report (draft), Appendix A does not seem to be accurate. The final concentrations for total dissolved solids (TDS) and other analytes are magnitudes less than expected concentrations and are not consistent with the NPDES Monitoring data for outfall 051 submitted in Attachment C of the August submittal.

        Please review the data and submit accurate analytical results for effluent quality for metals and general chemistry.

    d. The data submitted in attachment D provides data for a limited number of organic analytes

        Please submit influent and effluent water quality data for all organic compounds listed in WQCC Regulation 3103, and for any other analyte listed in WQCC 1101. TT. known to exist in influent to the RLWTF for the past year.

    Based on the water quality data to be submitted, the GWBQ will determine if the proposed monitoring for organics and other parameters will be adequate. The GWQB is working with the NMED Surface Water Quality Bureau (SWQB) to determine if the proposed monitoring will be adequate for monitoring discharges from RLWTF for both surface water and ground water protection.

2. In NMED's, April 21, 1997 letter, NMED requested water quality data for water in Effluent Canyon above the TA-50 outfall. LANL's response, June 23, 1997, stated that

no recent water quality data are available from above the TA-50 outfall. NMED will need this information for processing the DP application.

Please take water samples of the surface water in Effluent Canyon above the TA-50 outfall for analysis of all WQCC Regulation 3103 constituents. The results must be submitted to the NMED, GWQB.

3. In the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan for Mortandad Canyon, it is stated that ground water has been found in MCC-8.2 and MCO-13. NMED does not have current water quality data for these two wells.

   Please submit all water quality data for samples taken in MCC 8.2 and MCO-13 for the past two years. If current data is not available, please sample the wells for analysis of all WQCC Regulation 3103 constituents. The results must be submitted to NMED, GWQB.

4. In NMED's letter dated April 21, 1997, the GWQB requested water quality data for the regional aquifer. LANL's response dated June 23, 1997 stated extensive water quality data from the regional aquifer is provided to the NMED annually in the Laboratory's Environmental Surveillance Report. Water supply well PM-5 and main aquifer test well TW-8 are two wells within the vicinity of Mortandad Canyon. The data submitted in Appendix B, Draft Data Tables from the 1997 Environmental Surveillance Report (ESR), does not include any water quality data for TW-8, and the GWQB has not received adequate information to determine if discharges from the RLWTF has impacted regional ground water.

   NMED does not agree that the data submitted in the ESR is extensive. The data provided for regional water quality below Mortandad Canyon is very limited. The data submitted in the 1996 ESR for TW-8 does not provide valuable information on nitrate concentrations in the regional aquifer around TW-8. NMED's understanding is that the pump in TW-8 was set too far below the top of the aquifer to provide a sample that would be representative of water that may have been impacted from discharges from the RLWTF. As stated above, the 1997 ESR does not contain water quality from TW-8 at all.

   Please submit information on the status of the pump in TW-8 and the general condition of the well. Please submit all water quality data available for TW-8 for the past two years and submit the depth below the top of the aquifer that the samples were taken.

Alluvial Aquifer Monitoring Plan

5. In NMED's, April 21, 1997 letter, NMED requested that monitor well MCO-3 be repaired or replaced. LANL's response, June 23, 1997, stated that MCO-3 will be replaced. The response did not include a date for replacement.

   Please submit information on the status of MCO-3 and the date it was replaced or the date it will be replaced.

6. If groundwater intersects MCC-8.2 and MCO-13, these two wells should be included in monitoring of the alluvial aquifer.

   Please commit to sampling MCC-8.2 and MCO-13 for the same constituents, at the same frequency as wells MCO-4B, 6 and 7 as submitted in the Revised Monitoring Plan, June 1997.

Intermediate Aquifer Monitoring Plan

7. In the contingency section of NMED's, April 21, 1997 letter, NMED requested a commitment from LANL to incorporate monitoring of the intermediate aquifer if an intermediate aquifer exists in Mortandad Canyon. LANL's response, June 23, 1997, stated that the Laboratories Environmental Restoration (ER) Project is currently developing a RFI Work Plan for Mortandad Canyon that will further assess the potential for interconnections between ground water in alluvium, possible perched intermediate zones, and the regional aquifer. The GWQB has reviewed the RFI for Mortandad Canyon, but will need updated and additional information on the status of the investigation in Mortandad Canyon, and a commitment to monitor intermediate aquifers in Mortandad Canyon.

   Please commit to submitting a monitoring plan for NMED, GWQB approval for the monitoring of any saturated zones discovered in Mortandad Canyon between the alluvial aquifer and the regional aquifer. The monitoring plan shall be submitted to the GWQB within 30 days of receiving analytical data for ground water samples taken from the saturated zone or zones.

Regional Aquifer Monitoring Plan

8. In NMED's, April 21, 1997, NMED requested a commitment from LANL to incorporate monitoring of the regional aquifer into the monitoring plan. LANL's response, June 23, 1997, stated that TW-8 will be added to the monitoring plan. For reasons stated above, TW-8 may not provide adequate samples for regional aquifer monitoring.

   In addition to TW-8, please commit to quarterly sampling of all regional aquifer monitor wells R-13, R-14, and R-15 for analysis of nitrate as nitrogen (NO3), fluoride (Fl) and total dissolved solids (TDS). The list of analytes may change depending on water quality data from new monitor wells.

Contingency Plan

In NMED's April 21, 1997 letter, NMED requested information on corrective actions for spills, and information to determine if the corrective actions proposed in the discharge plan application were adequate to restore ground water to below WQCC ground water standards. Based on the response in LANL's June 23, 1997 letter and subsequent submittals, the following items on the investigation and corrective actions in Mortandad Canyon remain outstanding:

Alluvial Aquifer

1. In the April 21, 1997 letter, NMED requested a time frame in which additional corrective actions will be proposed if concentrations do not drop below WQCC 3103 numerical standards in the alluvial aquifer. LANL's response, June 23, 1997, stated that if concentrations do not drop below WQCC Regulation 3103 numerical standards by the end of the Discharge Plan term (5 years from the date of approval) then additional corrective actions will be proposed in the Renewal Application. According to the 1977 Purtyman, et.al. paper submitted with the discharge plan application, the turnover of water in the alluvial aquifer in Mortandad Canyon is approximately 1 year. Based on this information, NMED believes the proposed 5 year time frame is too extensive.

   In order for NMED to approve DP-1132, LANL will need to commit to submitting a corrective action plan to the NMED, GWQB for approval if concentrations of constituents in the alluvial aquifer that are not effective and enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act do not drop below WQCC 3103 numerical standards within two years of the discharge plan approval.

Intermediate Aquifers

2. The RCRA, RFI Work Plan for Mortandad Canyon, September 1997, proposes the installation of 2 intermediate Bandelier Tuff wells, MCOBT- 4.4 and 8.5. In the January 20, 1999, Groundwater Annual Status Summary Report for Fiscal Year 1998, a schedule was provided with the installation dates for R-13 and R-14. Information on the Bandelier Tuff wells was not included.

   Please submit an update on the location and dates for the installation of the Bandelier Tuff wells to be drilled in Mortandad Canyon. The update should include well installation within 2 years of the discharge plan approval. If ground water is discovered in the wells, samples must be taken within 30 days of completion of the wells.

   LANL will need to commit to submitting a corrective action plan for NMED, GWQB approval if water quality data from either of the Bandelier Tuff wells indicates that concentrations of constituents in the intermediate aquifer(s) that are not effective and enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act exceed WQCC 3103 numerical standards.

Regional Aquifer

3. The Mortandad Canyon Work Plan, RFI, September 1997, proposes the installation of 3 regional aquifer wells, R-15, R-13, and R-14. The January 20, 1999, Groundwater Annual Status Summary Report for Fiscal Year 1998, provided an update and the status of the R-15 well and a schedule for the installation of the R-13 and R-14 wells. The NMED, GWQB recognizes that the sequence of well installation is part a larger Hydrogeologic Work Plan. However, the timing of the installation of R-13 and R-14 may not be appropriate if water quality data from the R-15 well indicates that WQCC Regulation 3103 standards have been exceeded.

LANL will need to commit to submitting a corrective action plan for NMED, GWQB approval if water quality data from any R wells indicates that concentrations of constituents in the regional aquifer that are not effective and enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act exceed WQCC 3103 numerical standards.

Please note, the RCRA, RFI Work Plan for Mortandad Canyon has been submitted as part of the discharge plan application in response to the GWQB's April 21, 1997 letter. RCRA, RFI Work Plan documents may be submitted to the GWQB for corrective actions under the discharge plan (DP-1132). However, the corrective actions shall be consistent to WQCC Regulation 3107.A.10. The corrective actions must include an investigation to define the nature and extent of ground water contamination and a proposed abatement option for ground water that does not meet WQCC Regulation 3103 numerical standards for constituents that are not effective and enforceable pursuant to the Hazardous Waste Management Regulations, or the Atomic Energy Act.

Please submit a thorough written response to this letter by March 12, 1999. If there are questions in developing a response to any of the above issues, please contact the GWQB for information or direction on the response.

Sincerely,

Phyllis Bustamante

Phyllis Bustamante
Ground Water Quality Bureau
Pollution Prevention Section

xc: Steven Rae, Group Leader, ESH-18, Mail Stop K497, Los Alamos National Laboratory, Los Alamos, New Mexico 87545
Barbara Hoditschek, SWQB
Ralph Ford-Schmid, DOE-OB
John Young, HRMB

:01257

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PS Form **3800**, April 1995

State of New Mexico

NVIRONMENT DEPARTMENT

Ground Water Quality Bureau

Harold Runnels Building

1190 St. Francis Drive, P.O. Box 26110

Santa Fe, New Mexico 87502

(505) 827-2918 phone

(505) 827-2965 fax

MARK E. WEIDLER

Secretary

ED LETTER - RETURN RECEIPT REQUIRED

Rt. 5 Box 442-B
San Ildefonso Pueblo
Española, New Mexico 87532

RE: Discharge Plan (DP-1132) for Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility

Dear Ms. Sanchez:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) received a request for public hearing from you, December 17, 1996, for the proposed discharge from the Los Alamos National Laboratory (LANL), Radioactive Liquid Waste Treatment Facility (RLWTF). In addition to your request, The Pueblo of San Ildefonso also requested a public hearing. However, the Pueblo of San Ildofonso withdrew their request for public hearing on April 27, 1998. The NMED has not been able to contact you by phone and would like to discuss with you the current status of the groundwater discharge plan and your current interest in a public hearing.

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   A. LANL has proposed discharge limitations for both radionuclides and nitrates in their permit application. Phase I of the upgrades to the RLWTF will include Tubular Ultrafiltration ro removal of radionuclides followed by reverse osmosis. LANL states in the discharge plan application that the Phase I upgrades will ensure that treated effluent to be discharged will be below the Derived Concentration Guidelines (DCG's) for radionuclides set forth in DOE Order

5400.5.

Nitrate will be removed from the waste stream by reverse osmosis. Long term compliance with WQCC Regulation 3103 standards will be achieved by evaporating off reverse osmosis reject waste water with a mechanical evaporator. Short term compliance with WQCC Regulation 3103 standards will be achieved by containerizing the reverse osmosis waste stream and returning it to the clean water waste stream at a rate that will not cause effluent concentrations to be above any WQCC Regulation 3103 standard. This includes nitrate.

If treated wastewater does not meet the numerical discharge limitations, LANL has proposed to retain and recirculate treated wastewater at the treatment plant until it meets discharge limitations.

2. Q. *Does the plan address the extent of past contamination and possible remediation efforts?*

A. The original discharge plan application submitted August 1996 includes information on past contamination in the alluvial aquifer. In addition to the original discharge plan application, LANL has produced the Work Plan for Mortandad Canyon which provides details on a groundwater investigation for Mortandad Canyon. The work plan is describes the actions LANL will take to determine the extent of past contamination in Mortandad Canyon. Without knowing the extent of current contamination, remediation requirements have not been determined. When information on the extent of past contamination becomes available, LANL will be required to propose and implement corrective actions.

3. Q. *Have adequte waste stream characterizations been performed for liquid volumes coming into RLWTF?*

A. The influent quality data that has been submitted to the GWQB is composite and not specific to an upstream waste water generator. The data is more representative of the wastewater that is treated at the ROWTF. The GWQB has reviewed data for influent quality and has requested updated comprehensive influent data to the RLWTF. The data will be reviewed prior to issuing the permit to insure that effluent monitoring requirements are adequate. In addition to water quality data, the original discharge plan application contains the waste acceptance criteria that waste generators must follow. The waste acceptance criteria sets limits on concentrations of constituents that can be discharged to the RLWTF.

4. Q. *What volumes of radioactive sludge are being projected for future burial at TA-54, Area G?*

A. The groundwater discharge plan application does not address the volumes of sludge to be disposed at TA-54. For further regulatory information on the disposal of sludge, contact the NMED, Hazardous and Radioactive Material

Bureau (HRMB).

Please contact Phyllis Bustamante of the GWQB, Pollution Prevention Section (PPS) at 827-0166 by March 12, 1999 to discuss the status of the discharge plan application and your current concerns. Based on your current concerns, the NMED will make a decision on holding a public hearing by mid March.

Sincerely,

Dale M Doremus

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

DMD/PAB/pab

xc: James Bearzi, District Manager, NMED District II

Los Alamos National Laboratory

Environment, Safety, and Health Division
P.O. Box 1663, Mail Stop K491
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(505) 667-4218 / FAX: (505) 665-3811

Date: March 12, 1999
Refer to: ESH-DO:99-046

working copy

RECEIVED
MAR 17 1999
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
Pollution Prevention Section
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: RESPONSE TO NMED GWQB REQUEST FOR ADDITIONAL INFORMATION, GROUND WATER DISCHARGE PLAN APPLICATION FOR THE TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, DP-1132

Dear Ms. Bustamante:

Enclosed, please find the Laboratory's response to your February 19, 1999, letter to Mr. David A. Gurule, U. S. Department of Energy, Los Alamos Area Office, requesting additional information for the Laboratory's Ground Water Discharge Plan Application (DP-1132) for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. The Laboratory is providing this information on behalf of the U.S. Department of Energy, Los Alamos Area Office, and Los Alamos National Laboratory. Please note that Attachment 3.0, Description of the Chemical Denitrification Process, is confidential and proprietary information and has been provided for your internal review only.

In the enclosed response and Attachments (1.0-11.0), the Laboratory has endeavored to provide comprehensive, detailed answers to the nineteen questions posed in your February 19, 1999, letter. In several instances the information you requested was not available at this time. This was noted in the response and a commitment was made to provide that information as soon as it becomes available. Please do not hesitate to contact the Laboratory if you find that additional information or clarification is required.

We would like to take this opportunity to provide you with a progress report on the RLWTF's Long-Term Operational Plan. As stated in the Laboratory's December 23, 1998, letter (ESH-DO:98-358) to the NMED GWQB, it is our goal to achieve nearly total salt removal from the RLWTF effluent through mechanical evaporation within 18 months. On Monday, March 15, 1999, the Laboratory will be opening bids for the installation of a mechanical evaporator. This off-the-shelf evaporator will serve as an interim bridge until a permanent mechanical evaporator, designed and constructed specifically for application at the RLWTF, can be installed. Based on the bids received and the delivery times specified, the Laboratory will confirm no later than March 19, 1999, that our goal of 18 months for installation and start-up of the mechanical evaporator can be achieved.

In our November 20, 1998, letter (ESH-DO:98-349) to the NMED GWQB, the Laboratory presented its Short-Term Operational Plan for ensuring that the RLWTF's effluent is in compliance with NM WQCC numerical standards on March 21, 1999. One key component of the Short-Term Operational Plan, the Nitrate Restriction Program, will control the discharge of nitrogenous wastes into the RLWTF collection system. We would like to report that the Laboratory is on-schedule for implementing the Nitrate Restriction Program for the NMED GWQB's March 21, 1999, compliance date. Initial reports indicate that the Nitrate Restriction Program is successful at reducing the concentration of nitrates in the RLWTF's influent and effluent.

After March 21, 1999, the Laboratory is committed to ensuring that each batch of RLWTF effluent discharged to Mortandad Canyon will meet NM WQCC 3103 numerical standards. However, until the Laboratory's long-term goals of evaporation and of zero-liquid discharge are complete, the RLWTF remains vulnerable to receiving unexpected high nitrate influent. This could result in some individual batches of effluent exceeding the nitrate limit of 10 mg/L (NO3-N). However, these will be balanced by batches that are expected to have low levels of nitrates, and on average the effluent will fully comply with the NM WQCC 3103 numerical standards. Therefore, the Laboratory proposes that for a limited period while the Short-Term Operational Plan is in effect, compliance of the RLWTF's effluent with NM WQCC 3103 numerical standards be based upon a quarterly average rather than a single sample.

The revised Table 3.0 Monitoring Plan, enclosed in Attachment 10.0 of this submittal, shows that all effluent monitoring, with the exception of Radium 226 & 228, will consist of flow-proportioned composite samples from each batch of effluent discharged to Mortandad Canyon. The Laboratory proposes to average both the weekly sampling results (12 samples per quarter) and the monthly sampling results (3 samples per quarter) to obtain a quarterly average for each parameter. It is our understanding that an exceedance of a quarterly average for a NM WQCC 3103 numerical standard would require that the Laboratory submit a corrective action plan within 30 days.

In closing, the Laboratory would like to provide you with the analytical results from recent sampling of four monitoring wells in Mortandad Canyon, MCO-3, MCO-4B, MCO-6, and MCO-7, for nitrates (NO3-N), fluoride (F), and total dissolved solids (TDS). Table 2, in Attachment 9.0 of this submittal, contains the analytical results from sampling conducted in October 1998, December 1998, and February 1999 at the above wells. These wells are being sampled on a more frequent schedule in order to closely track the effects of the forthcoming improvements in the quality of the RLWTF's effluent.

If you would like additional information concerning this response, please contact Bob Beers of the Laboratory's Water Quality and Hydrology Group at 667-7969. As promised, the Laboratory will provide the NMED GWQB with quarterly progress reports beginning in April, 1999.

Sincerely,

Dennis J. Erickson
Division Director
Environment, Safety, and Health Division

Thomas Baca
Program Director
Environmental Management Program

DJE/amt

Enclosures: a/s

Cy: M. Leavitt, NMED, GWQB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED, SWQB, Santa Fe, New Mexico, w/enc.
B. Garcia, NMED, HRMB, Santa Fe, New Mexico, w/enc.
B. Stine, ALDNW, w/enc., MS F629
R. Michelotti, CST-7, w/enc., MS E525
D. Gurule, DO/ LAAO, w/enc., MS A316
J. Vozella, DOE/LAAO, w/enc., MS A316
R. Burick, DLD-OPS, w/enc., MS A100
T. Gunderson, DLD-OPS, w/enc., MS A100
D. Broxton, EES-1, w/enc., MS D462
S. Hanson, EM/RLW, w/enc., MS E518
D. Moss, EM/RLW, w/enc., MS E518
P. Worland, EM/RLW, w/enc., MS E518
K. Hargis, EM/WM, w/enc., MS J591
S. Rae, ESH-18, (ESH-18\WQ&H:99-0092) w/enc., MS K497
B. Beers, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
N. Williams, ESH-18, w/enc., MS K497
D. Woitte, LC/GL, w/enc., MS A187
B. Matthews, NMT-DO, w/enc., MS E500
S. Gibbs, NW-MM, w/enc., MS A102
S. Schriber, NMT-2, w/enc., MS E511
S. Yarbro, NMT-2, w/enc., MS E511
ESH-DO File, w/enc., MS K491
WQ&H File, w/enc., MS K497
CIC-10, w/enc., MS A150

1. **NMED Request**: *Please submit clarification on how wastewater will be treated in order to meet effluent limitations by March 21, 1999 if Phase I has not been implemented.*

   LANL Response: If the RLWTF's Phase I upgrades (TUF and RO) are not operational by March 21, 1999, then wastewater will be treated by the following methods to ensure that effluent meets NM WQCC 3103 ground water standards:

   1. Upstream controls will restrict the discharge of nitrogenous wastes into the RLWTF collection system through waste minimization, product substitution, and containerization;

   2. Nitrogenous wastes containerized by generators will be treated by Chemical Denitrification (See Attachment 3.0 for a description of the Chemical Denitrification Process) at the RLWTF or disposed of through alternative disposal methods at approved facilities;

   3. The Room 60 Process acid stream from TA-55, which contains highly concentrated nitrogenous wastes, will be temporarily stored until the NARS Project is operational in June, 1999; and

   4. Batch treatment of the remaining RLWTF influent using the current treatment process of chemical flocculation, precipitate settling, filtration, and solidification for radionuclide removal.

2. **NMED Request**: *The GWQB requests that LANL contact the NMED, Surface Water Quality Bureau (SWQB) to insure that blending RO reject water back into the discharge to Effluent Canyon is in compliance with the National Pollutant Discharge Elimination System (NPDES) permit for the discharge from RLWTF to Effluent Canyon.*

   LANL Response: The Laboratory has re-evaluated its proposed plan (Short-Term Operational Plan, November 20, 1998, ESH-DO:98-349) to blend the RO reject stream into the RO permeate stream. In order to maintain the highest quality effluent possible, RO reject water will not be blended with RO permeate water. Figure 1.0, of Attachment 2.0, is a schematic of the RLWTF's treatment process for the interim operating period (prior to the installation of the Electrodialysis Reversal [EDR] and the Mechanical Evaporator). Figure 1.0 shows that all RO reject water will be (1) temporarily stored in Clarifier No. 1 (25,000 gallons) or WM-90 (100,000 gallons), or (2) returned to the RLWTF's headworks for further treatment.

As shown in Figure 1.0, when the permeate stream from the Tubular Ultrafilter (TUF) meets NM WQCC and CWA requirements then it will be discharged directly into the effluent tank and will not be treated by the RO unit. Operational monitoring of the TUF permeate stream will determine when treatment by the RO unit is required.

Figure 2.0, of Attachment 2.0, is a schematic of the RLWTF's treatment process after installation of the Electrodialysis Reversal (EDR) and the Mechanical Evaporator. The Laboratory's goal is to have these upgrades operational within 18 months (Please see the cover letter for further information). The Laboratory will continue to provide the NMED GWQB with routine progress reports on these upgrades.

The NMED Surface Quality Bureau is being notified of the reject water handling procedures through this response and through other documentation.

3. **NMED Request**: *Please submit the volume, treatment methods, and final disposal of nitrogenous chemicals that will be containerized at upstream sources. If the nitrogenous chemicals will eventually go through the RLWTF, any pre-treatment options such as the nitrate conversion technology should be submitted to NMED.*

LANL Response: On March 1, 1999, the Laboratory instituted a Nitrate Restriction Program to reduce the discharge of nitrogenous wastes into the RLWTF collection system. The program contains the following three components: (1) waste minimization; (2) product substitution; and (3) segregation and containerization of concentrated nitrogenous wastes. A survey of waste generators to the RLWTF estimated that approximately 440 liters per month (116 gallons per month) of concentrated nitrogenous wastes require segregation and containerization. Containerized wastes will be disposed of by one of the following methods:

1. Chemical Denitrification at the RLWTF, or

2. Alternative disposal at an approved disposal facility.

Chemical Denitrification is a process to pre-treat small volumes of highly concentrated nitrogenous wastes. Treated water from the Chemical Denitrification Process will be discharged into the headworks of the RLWTF. Figure 1.0, of Attachment 2.0, shows how the Chemical Denitrification Process fits into the RLWTF's operations. Attachment 3.0 is a detailed description of how the Chemical Denitrification Process works. Please note that Attachment 3.0 contains confidential and proprietary information and has been provided for your internal review only.

Alternative disposal will consist of storing the containerized waste at the Laboratory's TA-54 Area L with final disposition and disposal at an approved disposal facility.

4. **NMED Request:** *Please submit clarification on the data submitted in the attachments [LANL letter, November 20, 1998] and if needed, a revised table of projected concentrations in the RO permeate stream by percent of recovery. In addition, please submit chemical concentrations for all WQCC Regulation 3103 constituents that may be in the reject waste stream.*

LANL Response: On November 20, 1998, the Laboratory submitted to the NMED GWQB the following: Attachment 1, *Estimated Quality of the Reverse Osmosis Concentrate Stream*, and Attachment 2, *Estimated Quality of the Reverse Osmosis Permeate Stream* (ESH-DO:98-349). In February 1999, at the request of the NMED GWQB staff, the Laboratory reviewed Attachments 1 and 2 for accuracy. No errors were found in Attachment 1. The following error was found in Attachment 2: The permeate concentration for iron (Fe) at an 80% recovery (for all 3 temperatures) should be 0.0047 mg/L, not 0.4675 mg/L as originally indicated. Attachment 1 and a corrected version of Attachment 2 have been enclosed as Attachment 4.0.

The reason the data in Attachments 1 and 2 show different trends (e.g., Attachment 2, nitrate concentrations increase at higher recovery rates while boron concentrations decrease at higher recovery rates) is that two different methods were used to calculate the RO permeate and reject stream compositions. The data for salts (nitrate, Ba, Cl, F, sulfate, and TDS) were generated using a *DOW Chemical Company* computer model called *ROSA* (Reverse Osmosis System Analysis). The data for metals (Al, As, B, Cd, Cr, Cu, CN, Fe, Pb, Hg, Se, U, and Zn), however, were not generated by the *ROSA* model. The *ROSA* model would not account for metals so the Laboratory used industry standard removal efficiencies to calculate the concentrations of metals in the permeate and reject streams. Below is a detailed explanation as to why the data in the Attachments 1 and 2 follow opposing trends.

The permeate stream concentrations for salts increase as the recovery rate increases. This is due to the fact that at higher recoveries a greater volume of recycle is used to keep a minimum velocity across the membranes. At higher flows, the efficiency of the membrane to reject the salts is reduced. The *ROSA* model is programmed to adjust membrane efficiency for the rejection of salts depending upon the temperature of the water and the rate of flow across the membrane.

In contrast, the permeate stream concentrations for metals decreases as the recovery rate increases, a trend opposite that of salts. The *ROSA* model would not account for metals so the Laboratory used a fixed percent as the removal rate for metals (i.e., removal efficiency did not change with temperature or flow rate). Since the removal rates are independent of recovery rates, the mass of contaminant in the permeate stream is constant. As the volume of the permeate stream increases (due to increased recovery rates), the concentration of the contaminant decreases due to dilution.

For example, a removal rate of 70% was selected for boron. If we assume an influent concentration of 10 mg/L and a flow rate of 1,000 L/day, then the amount of boron through the RO is 10,000 mg/day. At a removal rate of 70%, 3,000 mg/day (30%) will be in the permeate stream. If the recovery rate is 70%, then the permeate flow rate is 700 L/day which gives a boron concentration of (3,000/700) = 4.29 mg/L. If the recovery rate is 90%, then the permeate flow rate is 900 l/day which gives a boron concentration of (3,000/900) = 3.33 mg/L.

5. **NMED Request:** *NMED is requesting that LANL commit to discharging only RO permeate water to Effluent Canyon by June 30, 2000.*

LANL Response: As indicated previously, the Laboratory will not blend RO reject water into the RO permeates stream. In addition to RO permeate water, the Laboratory will discharge two other process streams into the effluent tank for discharge to Mortandad Canyon: (1) the TUF permeate stream when it meets NM WQCC and CWA requirements (See Figure 1.0, Attachment 2.0); and (2) the distillate stream from the mechanical evaporator once it becomes operational (See Figure 2.0, Attachment 2.0).

6. **NMED Request:** *Please submit water quality data that is representative of influent quality for metals and general chemistry for the past year.*

LANL Response: See Attachment 5.0 for a copy of the 1997 RLWTF Annual Report. Chapter 5, Mineral Summary, presents the average, maximum, and minimum concentrations of metals in the RLWTF's influent (RAW) and effluent (FINAL) for CY1997. A copy of the 1998 RLWTF Annual Report will be provided to the NMED GWQB as soon as it becomes available in late 1999.

7. **NMED Request:** *Please review the data and submit accurate analytical results for effluent quality for metals and general chemistry.*

LANL Response: Please replace the draft 1997 RLWTF Annual Report submitted to the NMED GWQB on August 25, 1998, (ESH-18/WQ&H:98-0289) with the final version of the 1997 RLWTF Annual Report in Attachment 5.0. The data included in the final 1997 RLWTF Annual Report has been quality assured (QA) and validated.

8. **NMED Request:** *Please submit influent and effluent water quality data for all organic compounds listed in WQCC Regulation 3103, and for any other analyte listed in WQCC 1101. TT. known to exist in influent to the RLWTF for the past year.*

LANL Response: The RLWTF collects weekly influent samples and analyzes them for volatile (VOC) and semi-volatile (SVOC) compounds. On August 25, 1998, the Laboratory submitted to the NMED GWQB a summary table of SVOC and VOC analytical results for RLWTF influent for 1997 (ESH-18/WQ&H:98-0289, Attachment D). The analytical results presented in Attachment D represent all SVOC and VOC detections (analytical results greater than the laboratory's Reporting Limit) for 1997. Non-detect results were not presented in Attachment D. Enclosed in Attachment 6.0 are the analytical reports for one week's SVOC and VOC monitoring of RLWTF influent in 1997. This is being presented as a sample of the SVOC and VOC analysis conducted weekly at the RLWTF. The remaining 51 weekly analytical reports for 1997 are available upon request.

The analytical reports from the RLWTF's SVOC and VOC influent monitoring for 1998 are also available upon request. A summary table of SVOC and VOC detections for 1998 is not currently available and will be submitted to the NMED GWQB by June 1, 1999.

In May 1998, the Laboratory submitted to the EPA Region 6 a NPDES Permit Re-Application (NPDES Permit No. NM0028355). As part of the re-application process, the Laboratory was required to sample the RLWTF's effluent in order to characterize the quality and identify contaminants of concern. Enclosed in Attachment 6.0 is a copy of the Laboratory's NPDES Permit Re-Application Form 2C, with supporting documentation, which characterizes the quality of the RLWTF's effluent at NPDES Outfall 051. Form 2C provides water quality data for organics, metals, and general chemistry.

9. **NMED Request:** *Please take water samples of the surface water in Effluent Canyon above the TA-50 outfall for analysis of all WQCC Regulation 3103 constituents. The results must be submitted to the NMED, GWQB.*

LANL Response: Attachment 7.0 presents the analytical results from the February 25, 1999, sampling of Effluent Canyon, an ephemeral tributary to Mortandad Canyon, approximately 100 yards above the TA-50 outfall. Please note that this sample was taken from snowmelt and may not be representative of this discharge during other runoff events.

10. **NMED Request:** *Please submit all water quality data for samples taken in MCC 8.2 and MCO-13 for the past two years. If current data is not available, please sample the wells for analysis of all WQCC Regulation 3103 constituents.*

LANL Response: Please note that MCC 8.2 was plugged and abandoned in 1989. The Laboratory proposes that MCO-8.2, an alluvial monitoring well completed in 1961, be used in lieu of MCC-8.2. Attachment 8.0 presents the geologic logs and construction data for MCO-8.2 and MCO-13.

No water quality data is available for MCO-8.2 or MCO-13 for 1996, 1997, 1998, or 1999. The table below presents all of the water levels measurements taken by the Laboratory at MCO-8.2 and MCO-13 since 1996. The Laboratory will monitor both MCO-13 and MCO-8.2 quarterly. Samples will be collected when sufficient water is present.

Monitoring Well	Year	Date of Measurement	Status
MCO-8.2	1996	11/13/96	Dry
MCO-8.2	1997	NA	NA
MCO-8.2	1998	5/7/98	Dry
MCO-8.2	1998	8/4/98	Dry
MCO-8.2	1999	3/2/99	Dry
MCO-13	1996	NA	NA
MCO-13	1997	NA	NA
MCO-13	1998	5/7/98	Dry
MCO-13	1998	8/4/98	Dry
MCO-13	1999	3/2/99	Dry

11. **NMED Request:** *Please submit information on the status of the pump in TW-8 and the general condition of the well. Please submit all water quality data available for TW-8 for the past two years and submit the depth below the top of the aquifer that the samples were taken.*

LANL Response: During 1997, the pump in TW-8 failed and no ground water sample was collected. In March 1998, a new pump was installed in TW-8. The pump was set approximately 14 feet below the top of the aquifer in a screened interval. Video logs of TW-8 were taken on February 27, 1998, and on March 9, 1998, prior to the pump's installation. The video logs show the well to be in good condition. Copies of the video logs are available for viewing upon request. Two groundwater samples were collected from TW-8 on September 2, 1998. The analytical results, presented in Table 2 of Attachment 9.0, are below NM WQCC 3103 numerical standards.

12. **NMED Request:** *Please submit information on the status of MCO-3 and the date it was replaced or the date it will be replaced.*

    LANL Response: The Laboratory's Environmental Restoration Project Work Plan for Mortandad Canyon (LA-UR-97-3291) recommends that MCO-3 be replaced because the well does not meet RCRA standards. Replacement of the well has been proposed for inclusion in the FY2000 Budget and will be completed by September 30, 2000. Access to Mortandad Canyon for drilling operations is limited to the summer months due to weather conditions and endangered species concerns (i.e., nesting of the Mexican Spotted owl). Until the well is replaced, the existing well will continue to be sampled. New sampling procedures using a peristaltic pump have shown to be an effective method for collecting a sample.

13. **NMED Request:** *If groundwater intersects MCC-8.2 and MCO-13 then please commit to sampling MCC-8.2 and MCO-13 for the same constituents, at the same frequency as wells MCO-4B, 6 and 7 as submitted in the Revised Monitoring Plan, June 1997.*

    LANL Response: The Laboratory will sample MCO-8.2 (Note: MCC-8.2 was plugged and abandoned in 1989) and MCO-13 at the same frequency as MCO-4B, 6, and 7. Attachment 10.0 presents a revised Table 3.0, *Proposed Monitoring Plan for the RLWTF Ground Water Discharge Plan Application,* showing the inclusion of MCO-8.2 and MCO-13. Please note that samples can be collected only when sufficient water is present.

    Additionally, the Laboratory would like to substitute Mortandad Canyon monitoring well MCO-7A for the plan's current well, MCO-7. MCO-7A is located adjacent to MCO-7 and has the benefit of being a compliance well for the Laboratory's RCRA Permit. Geologic log and construction information for MCO-7A have been included in Attachment 8.0. A revised map showing the location of monitoring wells in Mortandad Canyon (Map 4.0 from the original Ground Water Discharge Plan Application) has been enclosed in Attachment 1.0. This map also reflects the monitoring plan changes requested by your agency to-date.

14. **NMED Request:** *Please commit to submitting a monitoring plan for NMED, GWQB approval for the monitoring of any saturated zones discovered in Mortandad Canyon between the alluvial aquifer and the regional aquifer. The monitoring plan shall be submitted to the GWQB within 30 days of receiving analytical data for ground water samples taken from the saturated zone or zones.*

LANL Response: The Laboratory will develop and submit to the NMED GWQB a monitoring plan for intermediate zones that may exist in Mortandad Canyon within 30 days of completing the following activities:
1. The well to the main aquifer (R-15) has been drilled to TD (total depth);
2. All water quality data has been received and validated; and
3. The well and its hydrogeologic setting have been fully characterized.

The Laboratory will submit validated data from the monitoring of ground water produced during the drilling of Mortandad Canyon monitoring wells to the NMED GWQB as soon as it is available. In addition, the Laboratory invites the NMED GWQB to continue to participate in the quarterly meetings that the Laboratory and the NMED HRMB routinely conduct on the Monitoring Well Project.

15. **NMED Request:** *In addition to TW-8, please commit to quarterly sampling of all regional aquifer monitor wells R-13, R-14, and R-15 for analysis of nitrate as nitrogen (NO3), fluoride (F) and total dissolved solids (TDS). The list of analytes may change depending on water quality data from new monitor wells.*

LANL Response: The Laboratory will sample R-13, R-14, and R-15 for nitrate as nitrogen (NO3-N), fluoride (F), and total dissolved solids (TDS) on a quarterly basis once each well is drilled to its total depth (TD), characterized, and equipped for routine sampling.

16. **NMED Request:** *In order for NMED to approve DP-1132, LANL will need to commit to submitting a corrective action plan to the NMED, GWQB for approval if concentrations of constituents in the alluvial aquifer that are not effective and enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act do not drop below WQCC 3103 numerical standards within two years of the discharge plan approval.*

LANL Response: The Laboratory will submit a corrective action plan for NMED GWQB approval if the concentration of constituents in the Mortandad Canyon alluvial aquifer exceed NM WQCC numerical standards within two years of the discharge plan approval. Compliance with this requirement will be based upon ground water samples collected from the following wells: MCO-3, MCO-4B, MCO-5, MCO-6, MCO-7A, MCO-7.5, MCO-8.2, and MCO-13. The corrective action plan will take into consideration the repeatability of exceedances and the presence of trends. Contaminants exceeding NM WQCC 3103 numerical standards that are enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act will be addressed and mitigated under these programs.

17. **NMED Request**: *Please submit an update on the location and dates for the installation of the Bandelier Tuff wells [MCOBT- 4.4 and 8.5] to be drilled in Mortandad Canyon. The update should include well installation within 2 years of the discharge plan approval. If ground water is discovered in the wells, samples must be taken within 30 days of completion of the wells.*

    LANL Response: The Laboratory's Environmental Restoration Project Work Plan for Mortandad Canyon (LA-UR-97-3291) has recommended that two Bandelier Tuff characterization wells, MCOBT-4.4 and MCOBT-8.5, be drilled. Attachment 11.0 shows the proposed locations for MCOBT-4.4 and MCOBT-8.5. These two wells have been proposed for inclusion in the FY2001 Budget and will be completed by September 30, 2001. Access to Mortandad Canyon for drilling operations is limited to the summer months due to weather conditions and endangered species concerns (i.e., nesting of the Mexican Spotted owl).

18. **NMED Request:** *LANL will need to commit to submitting a corrective action plan for NMED, GWQB approval if water quality data from either of the Bandelier Tuff wells indicates that concentrations of constituents in the intermediate aquifer(s) that are not effective and enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act exceed WQCC 3103 numerical standards.*

    LANL Response:
    The Laboratory will submit a corrective action plan for NMED GWQB approval if the Mortandad Canyon monitoring wells MCOBT-4.4 and MCOBT-8.5 confirm that the concentration of constituents in the intermediate aquifer(s) exceed NM WQCC 3103 numerical standards two years after completion of the well. The corrective action plan will take into consideration the repeatability of exceedances and the presence of trends. Contaminants exceeding NM WQCC 3103 numerical standards which are enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act will be addressed and mitigated under these programs.

19. **NMED Request:** *LANL will need to commit to submitting a corrective action plan for NMED, GWQB approval if water quality data from any R wells indicates that concentrations of constituents in the regional aquifer that are not effective and enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act exceed WQCC 3103 numerical standards.*

    LANL Response: The Laboratory will commit to submitting a corrective action plan for NMED GWQB approval if the Mortandad Canyon monitoring wells R-13, R-14, and R-15 confirm that the concentration of constituents in the regional aquifer exceed NM WQCC 3103 numerical standards two years after completion of the well. The corrective action plan will take into consideration the repeatability of exceedances and the presence of trends. Contaminants exceeding NM WQCC 3103 numerical standards which are enforceable pursuant to the Hazardous Waste Act or the Atomic Energy Act will be addressed and mitigated under these programs.

:01274

MEMORANDUM OF MEETING OR PHONE CONVERSATION

[X] Telephone [ ] Meeting | Time 10:30 | Date 3-16-99

Individuals Involved

Kathy Sandez
(505) 747-7100 Piowe

P. Bostamante

Subject TA-50 DP-1132

Discussion Asked Kathy what her current concerns were for the discharge at TA-50 and if she was still interested in a hearing.* She said she was interested in a hearing. Asked her if she would be interested in coming in to discuss what LANL is proposing and discuss the various authorities that regulate the discharge and cleanup in Mortandad canyon. Gave her a brief explanation of the various Authorities and explained our limitations based on WQCC. Told her what we were able to regulate. Also mentioned that she could contact DOE to ask about regulation of radionuclides.

Conclusions She will call back ~~within~~ to set up a time & date to discuss Discharge plan. Told her it needs to be soon.

Distribution

Initialed

8/89

MEMORANDUM OF MEETING OR PHONE CONVERSATION

[X] Telephone	[ ] Meeting	Time 9:45	Date March 18, 99

Individuals Involved

Bob Beers — P. Bostamante

Subject: Status of Phase I and Phase II

Discussion: Asked Bob what the status on implementing phase I & II are. He said Phase I will not be on line by Monday most likely midweek & phase II (WQCC compliance) will all be handled by upstream controls and containerization at generators. Asked Bob about flouride and TDS in waste stream if they will be using clarifloculator. He said they are aware of the problem but they think they might meet standards. Told him we would not get a permit out by Monday but ~~the~~ we expect them to comply with what they have committed to do (meet WQCC by Monday). Told him we

Conclusions: are still working ~~on~~ on public interests for this discharge. Told him we would work out public interest issues in the next couple of weeks. Also told him we will probably have comments on their response.

Distribution: ______ Initialed: ______

8/89

:01277

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

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

CERTIFIED LETTER - RETURN RECEIPT REQUIRED

March 19, 1999

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

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

Dear Mr. Gurule:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) has received the information submitted by the Department of Energy (DOE) and the Los Alamos National Laboratory (LANL) dated March 12, 1999 in response to the Request for Additional Information sent to you by the NMED dated February 19, 1999. The NMED, GWQB is currently reviewing the response to determine if it will provide the information required to approve the proposed discharge from the Radioactive Liquid Waste Treatment Facility (RLWTF).

Due to the time required for review of the information submitted, and the pending determination for holding a public hearing, the NMED is extending the time in which LANL may discharge without an approved discharge permit for an additional 20 days. Beginning on March 21, 1999 and until NMED approves DP-1132, LANL shall only discharge wastewater from TA-50 that meets all Water Quality Control Commission (WQCC) Regulation 3103 standards as LANL has committed to in letters dated November 20, 1998 and March 12, 1999.

If you have any questions pertaining to this decision, please contact Phyllis Bustamante of the GWQB Pollution Prevention Section (GWPPS) at 827-0166 or me at 827-2945.

Sincerely,

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

DMD/PAB/pab

MEMORANDUM OF MEETING OR PHONE CONVERSATION

[X] Telephone [ ] Meeting	Time 10:15	Date March 22, 99

Individuals Involved

Suzanne Westerly — P. Bustamante

Concerned Citizens for Nuclear Safety

Subject: Public Hearing

Discussion: Asked her if she would like to come in to discuss their concerns and allow us to provide them with information on the WQCC and what authority we have over the discharge ~~at~~ from TA-50. Told her we were concerned that some of the issues may not be WQCC issues and that we needed to make those determination before ~~--~~ we decide whether or not we have a public hearing. She said she would check with two others from her group to see when they would be available to come in. Told her it needed to be within

Conclusions: the next two weeks. She will call back.

Distribution:

Initialed: PAB

8/89

:01282

3/29/99
Joey Nattaway - Tewa Women United   Kathy Sanchez   Ron Rundstrom
Gilbert Sanchez - Tribal Env. Watch Alliance   Theresa Juarez

Los Alamos National Laboratory Radioactive Liquid Waste Treatment Facility
Discharge Plan Application

Introduction

- Intent of Meeting - provide concerned citizens with adequate information to determine if concerns on the discharge from the RLWTF are Water Quality Control Commission issues and determine if a public hearing is needed to resolve issues that are under the authority of the WQCC
  - Discuss the Act and Regulations that the GWPPS administers for the discharge permit
  - Discuss other regulatory authorities for the RLWTF and the discharge to Mortandad Canyon
  - Discuss the Hydrogeologic Workplan and the Workplan for Mortandad Canyon and the authorities for the workplans
  - Discuss concerns for discharge from RLWTF as they relate to the WQCC
  - Determine if group still requests a public hearing

Water Quality Act - 1978

- Water Quality Control Commission
  - Permits and Certifications - commission may require persons to obtain from a constituent agency designated by the commission a permit for the discharge of any water contaminant or for the disposal or re-use of septage or sludge
  - Permits under WQCC Regulations Part 3 - 3101. PURPOSE.

A. The purpose of this Subpart controlling discharges onto or below the surface of the ground is to protect all ground water of the state of New Mexico which has an existing concentration of 10,000 mg/l or less TDS, for present and potential future use as domestic and agricultural water supply, and to protect those segments of surface waters which are gaining because of ground water inflow, for uses designated in the New Mexico Water Quality Standards. This Subpart is written so that in general: [2-18-77]

1. if the existing concentration of any water contaminant in ground water is in conformance with the standard of Section 3103 of this Part, degradation of the ground water up to the limit of the standard will be allowed; and [2-18-77]

2. if the existing concentration of any water contaminant in ground water exceeds the standard of Section 3103, no degradation of the ground water beyond the existing concentration will be allowed. [2-18-77]

B. Ground water standards are numbers that represent the pH range and maximum concentrations of water contaminants in the ground water which still allow for the present and future use of ground water resources. [2-18-77]

C. The standards are not intended as maximum ranges and concentrations for use, and nothing herein contained shall be construed as limiting the use of waters containing higher ranges and concentrations. [2-18-77]

- Definition of Water Contaminant - XX. "water contaminant" means any substance that could alter if discharged or spilled the physical, chemical, biological or radiological qualities of water. "Water contaminant" does not mean source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954; [9-3-72, 12-1-95]

- Definitions of source, special nuclear or by-product

- (e) The term "byproduct material" means (1) any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material, and (2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

- (z) The term "source material" means (1) uranium, thorium, or any other material which is determined by the Commission pursuant to the provisions of section 2091 of this title to be source material; or 2) ores containing one or more of the foregoing materials, in such concentration as the Commission may by regulation determine from time to time.

- (aa) The term "special nuclear material" means (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of section 2071 of this title, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing, but does not include source material.

- DOE Order 5400

Clean Water Act

- Other Exemptions - 3105.F. - NPDES regulated constituents - must be effective and enforceable

Resource Conservation and Recovery Act

- Under HSWA Module VIII of RCRA Permit required to do an investigation in canyons
  - Hydrogeologic Workplan
  - Mortandad Canyon Workplan

Send copies of DOE order 5400

Park Service Bulletin 38

TCP - Traditional Cultural Properties

01285

Los Alamos National Laboratory

Environment, Safety, and Health Division
P.O. Box 1663, Mail Stop K491
Los Alamos, New Mexico 87545
(505) 667-4218 / FAX: (505) 665-3811

Date: March 23, 1999
Refer to: ESH-DO:99-51

RECEIVED
MAR 29 1999
GROUND WATER BUR

Ms. Phyllis Bustamante
Ground Water Quality Bureau
Pollution Prevention Section
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: INSTALLATION OF MECHANICAL EVAPORATOR, GROUND WATER DISCHARGE PLAN APPLICATION FOR THE TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, DP-1132

Dear Ms. Bustamante:

In our March 12, 1999, letter (ESH-DO:99-046) we reported to you that it is the Laboratory's goal to have a mechanical evaporator operating at the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 within 18 months. Additionally, we informed you that on March 19, 1999, after bids for the mechanical evaporator were opened, the Laboratory would then be able to confirm whether or not the 18 month goal was achievable.

On March 15, 1999, the Laboratory received six bids for an evaporator system. Delivery times for the evaporator systems range from two months to seven months after placement of the order. The Laboratory has formed a team of 24 individuals to evaluate the bids and select the most appropriate evaporator treatment technology. In addition to reviewing the bid packages submitted by each vendor, evaluation team members will visit proposed treatment units at their current sites. On April 5th and 6th, vendors are scheduled to make presentations to the evaluation team at the Laboratory. Final selection of an evaporator system is scheduled for April 7, 1999.

Once a vendor has been selected and a delivery date for the evaporator has been established, the Laboratory will complete a detailed Critical Path Schedule for the installation and start-up of the selected equipment. The project schedule will account for: (1) facility modifications required for installation of the evaporator and related treatment equipment; (2) environment, safety, and health (ESH) permitting and documentation requirements; (3) operational testing and check-out; (4) a DOE Readiness Assessment (RA); and (5) other DOE requirements for nuclear facilities.

On April 14, 1999, the Laboratory will submit to you a detailed project schedule with a commitment to a final completion date for an operational evaporator at the RLWTF at TA-50.

On a related matter, we would like to bring to your attention a problem with one of the attachments in the March 12, 1999, letter referred to previously. Attachment 3.0, *Description of Chemical Denitrification Process*, was erroneously stamped "Confidential" when it should have been labeled "For Official Use Only". Please return the "Confidential" copy of Attachment 3.0 to Bob Beers of the Laboratory's Water Quality and Hydrology Group and replace it with the attached "For Official Use Only" copy. Thank you for your cooperation in this matter.

If you would like additional information concerning this response, please contact Bob Beers of the Laboratory's Water Quality and Hydrology Group at 667-7969.

Sincerely,

J. M. Graf for

Dennis J. Erickson
Division Director
Environment, Safety, and Health Division

Sincerely,

Thomas E. Baca
Division Director
Environmental Management Division

DJE:TEB:RB/em

Attachments: a/s

Cy: M. Leavitt, NMED/GWQB, Santa Fe, New Mexico, w/att.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/att.
B. Garcia, NMED/HRMB, Santa Fe, New Mexico, w/att.
D. Gurule, DOE/LAAO, w/att., MS A316
J. Vozella, DOE/LAAO, w/att., MS A316
R. Burick, DLD-OPS, w/att., MS A100
T. Gunderson, DLD-OPS, w/att., MS A100
B. Stine, ALDNW, w/att., MS F629
R. Michelotti, CST-7, w/att., MS E525
D. Broxton, EES-1, w/att., MS D462
S. Hanson, EM/RLW, w/att., MS E518
D. Moss, EM/RLW, w/att., MS E518
P. Worland, EM/RLW, w/att., MS E518
K. Hargis, EM/WM, w/att., MS J591
S. Rae, (ESH-18/WQ&H:99-0105) ESH-18, w/att., MS K497
B. Beers, ESH-18, w/att., MS K497
M. Saladen, ESH-18, w/att., MS K497
N. Williams, ESH-18, w/att., MS K497
D. Woitte, LC/GL, w/att., MS A187

Cy: (Continued)

B. Matthews, NMT-DO, w/att., MS E500
S. Schriber, NMT-2, w/att., MS E511
S. Yarbro, NMT-2, w/att., MS E511
S. Gibbs, NW-MM, w/att., MS A102
H. Ruppel, ALDSSR, w/att., MS B260
CIC-10, w/att., MS A150
ESH-DO File, w/att., MS K491
WQ&H File, w/att., MS K497

ATTACHMENT 3.0

(REVISED MARCH 18, 1999)

Description of Chemical Denitrification Process

FOR OFFICIAL USE ONLY

Enclosure

UPSTREAM TREATMENT OF NITRATE WASTE

A non-thermal chemical denitrification process which converts nitrate ions to nitrogen gas has recently been developed at Los Alamos National Laboratory. The waste streams to the radioactive liquid waste collection system which contain the highest concentration of nitrates will be collected at points of generation in plastic carboys, transferred to TA-50-1 Room 34, and treated prior to discharge to the headworks of the RLWTF. The following diagram shows the nitrate waste treatment train.

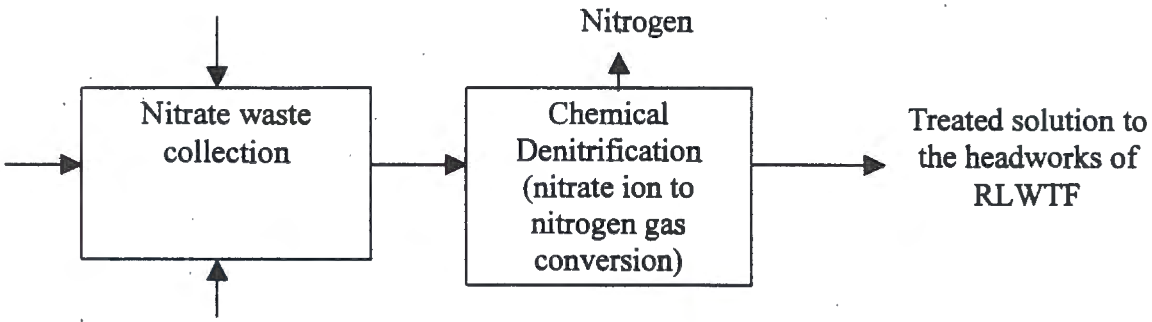


Figure 1. Nitrate Waste Treatment Train.

During the nitrate conversion, process nitrate waste will be introduced to a 20 gallon agitated tank containing a metal slurry (cadmium or zinc). An amide reagent (sulfamic acid) will be added to the reactor tank and reduce the nitrate ions to nitrogen gas. The metal will oxidize to M^{+2} in this process. The denitrified waste will then be transferred to an electrochemical cell where the metal reagent will be recovered and returned to the reactor tank. In the initial implementation stage of this technology, sodium hydroxide will be used to neutralize the acid generated in the electrochemical cell. In a later stage of implementation, a membrane electrochemical cell will be used to recover this acid. Residual cadmium in the treated water will be removed by a polishing column composed of iron filings. The polishing column will be regenerated every 5 – 6 months by dissolving its contents in the acid and recovering the cadmium metal by an electrolysis process. If zinc is used, the polishing column is not expected to be required. The denitrified stream will be collected in a tank and analyzed before discharging to the headworks of the RLWTF. Figure 2 shows the flow diagram for the chemical denitrification system.

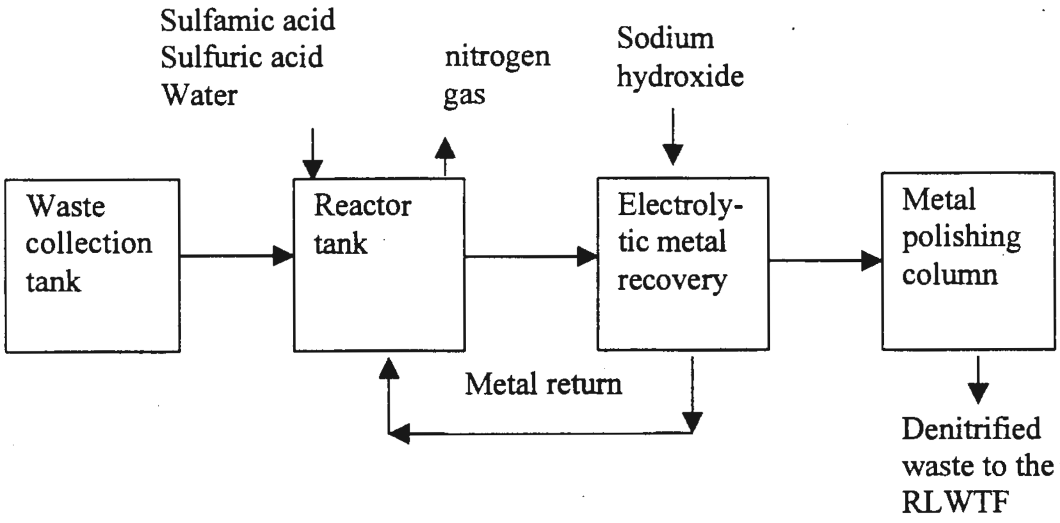


Figure 2. Chemical Denitrification Flow Diagram.

The following part shows the average input and output flow streams as well as the chemical use. These streams were calculated based on the survey of the main nitrate waste generators (other than TA-55) described in the Draft Radioactive Liquid Waste Survey Report, by Benchmark Environmental Corporation, December, 1998.

INPUT (per week)

Volume: 110 L
Nitrate content: 477 g/L NO_3^- (or 108 g/L N)
Composition: 40 % Nitric Acid (HNO_3)
Total N: 11.8 kg
Total nitrate: 52 kg

OUTPUT

Volume: 700 L*
Nitrate content: 742 mg/L NO_3^- (or 168 mg/L N)
Composition: $NaNO_3$, 742 mg/L
Na_2SO_4 195 g/L
Total N: 118 g
Total nitrate: 522 g

* Water will be added to the process due to the high nitric acid concentration in the input. Otherwise, at these high concentrations the resulting salts would precipitate.

CHEMICAL USE (per week):

Sulfamic acid (H_2NSO_3H) 82 kg
Sodium hydroxide (NaOH) 68 kg
Sulfuric acid (H_2SO_4) 4 kg

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: April 9, 1999
In Reply Refer To: ESH-18/WQ&H:99-0138
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
1190 St. Francis Drive
Santa Fe, New Mexico 87502

SUBJECT: NMED SAMPLING AND ANALYSIS OF EFFLUENT FROM THE LABORATORY'S RADIOACTIVE LIQUID WASTE TREATMENT FACLITY AT TA-50

Dear Ms. Bustamante:

As we have discussed on the telephone during this past week, there are several safety issues regarding your request to obtain effluent samples from Los Alamos National Laboratory's (Laboratory) Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 and submit them for analysis at the SLD laboratory in Albuquerque. I would like to take this opportunity to review two of these issues with you.

First, the Laboratory is concerned that the SLD laboratory in Albuquerque is Certified/Approved to analyze water samples with the level of radioactivity which the RLWTF effluent samples may contain. In order to ensure that the RLWTF samples do not violate any SLD Certifications/Approvals, I would like to request that the NMED provide the Laboratory with written documentation from SLD confirming their capability to analyze radioactive samples from the RLWTF. The RLWTF's Annual Report for 1997 can serve as guide for determining the anticipated levels of radioactivity and the radioisotopes present in the RLWTF's effluent.

And second, the Laboratory is also concerned that the RLWTF effluent samples do not violate any Department of Transportation (DOT) regulations while you are transporting them from TA-50 to the SLD laboratory in Albuquerque. DOT regulations contain numerical limits for both radioactivity and pH. Samples preserved with an acid may exceed DOT limits. I would like to request written confirmation from the NMED that all water samples from the RLWTF will be transported in accordance with DOT regulations.

Thank you for your attention to these matters. Please contact me at 667-7969 if we may be of assistance in resolving these concerns.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

RB/py

Cy: B. Enz, RD Enz, Inc., Santa Fe, New Mexico
D. Moss, EM-RLW, MS 518
S. Rae, ESH-18, MS K497
M. Saladen, ESH-18, MS K497
J. Vozella, DOE/LAAO, MS A316
WQ&H File, MS K497
CIC-10, MS A150

NMED SITE VISIT @ RLWTF

April 13, '99

NAME	GROUP	PHONE
Bob Beers	ESH-18	7-7969
Steve Hanson	EM-RLW	7-4301
Terry Connors	EM-RLW	5-3872
Roy Michelotti	CST-7	5-7444
Tom Gudeim	DLD-OPS	70079
Tony Stanford	FMU-84	5-6658
Steve Rae	ESH-18	665-1859
Chris Murnane	DOE LAAO	5-8774
Bob Enz		982-4030
Wm David Moss	EM-RLW	667-4301
[illegible]	[illegible]	[illegible]
Bob Weeks	NMED DOE OB	827-1536
Phyllis Bustamante	NMED GWQB	827-0166
Ken Hargis	EM/WM	667-2347
Rick Alexander	EM/RLW	667-4301

Tour of the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50

NMED Ground Water Quality Bureau
and
DOE Oversight Bureau

April 13, 1999

AGENDA

8:30 am - 9:30 am

Short Presentations on the Following:

TUF eff tank
Centrifugal

1) Nitrate Restriction Program and Nitrate Compliance by Rick Alexander (RLWTF),
2) Phase I Upgrades (TUF/RO) by Dave Moss (RLWTF),
3) Mechanical Evaporator Project and Completion Schedule by Steve Hanson (RLWTF),
4) Chemical Denitrification by Roy Michelotti (CST-7), and
5) Status of Ground Water Discharge Plan Application by Bob Beers (ESH-18).

9:30 am- 10:00 am

Sample Collection at the RLWTF Effluent Tank by Dave Moss.

10:00 am - Noon

Tour of the RLWTF by Steve Hanson.

Bob Beers
1)- TA- 48, 55, 59 ≅ 100 generators - Benchmark - small volume high concentration -
down to about 15 generations 8 mol up -
picked up on weekly basis clean denitrification
- TA 55 - storing
- Acid Process - storage until July -
will be treated TA-50

2) Phase I - Dave Moss
Thursday - TUF - & RO, operational - preliminary data
1000 pCi alpha
[illegible] effluent tanks - pCi with TUF

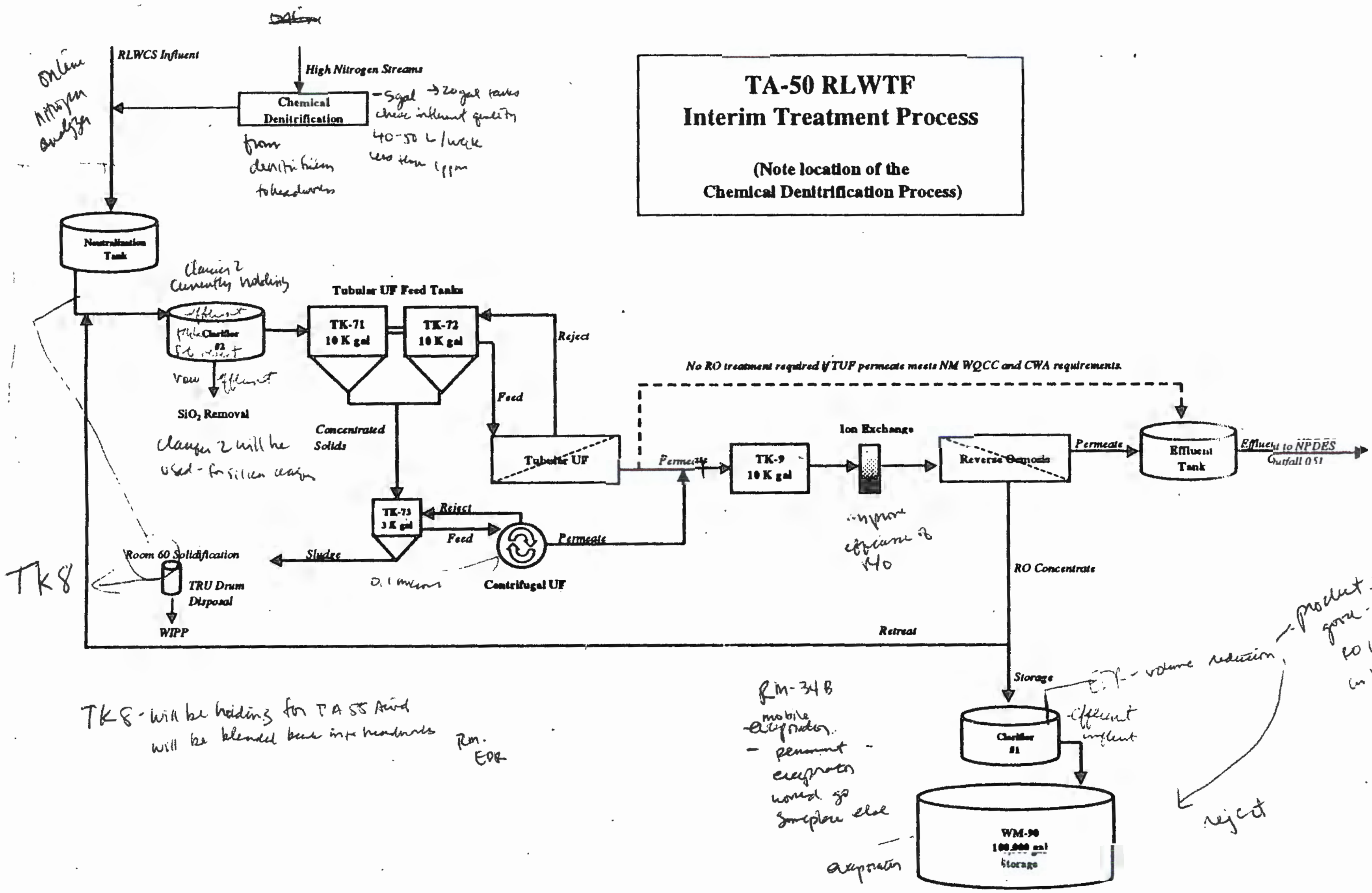
3) Terry Conners - evaporation Unit -
Benchmark env. - considered leader in treatment
- July - August - evaporation
- Room 34 0 - to house evaporator
- Bottoms out of evaporator - send to Kim Nuclear for treatment -
~~[illegible]~~

4) Roy michelotti - UP - still in trial
5 gall carboys - → 30 gal tank - add zinc.
8 Mol 96% reduction 2.5 ppm
Zinc Sulfate Substitution - 30 gal 1 molar sulfate

RO use based on NO_3, NPDES permit
TUF effluent sampled to determine
- decrease stored reject
- once evaporator up - no reason to
RO [illegible] not send all [illegible]

01298

Figure 1.0 ATTACHMENT

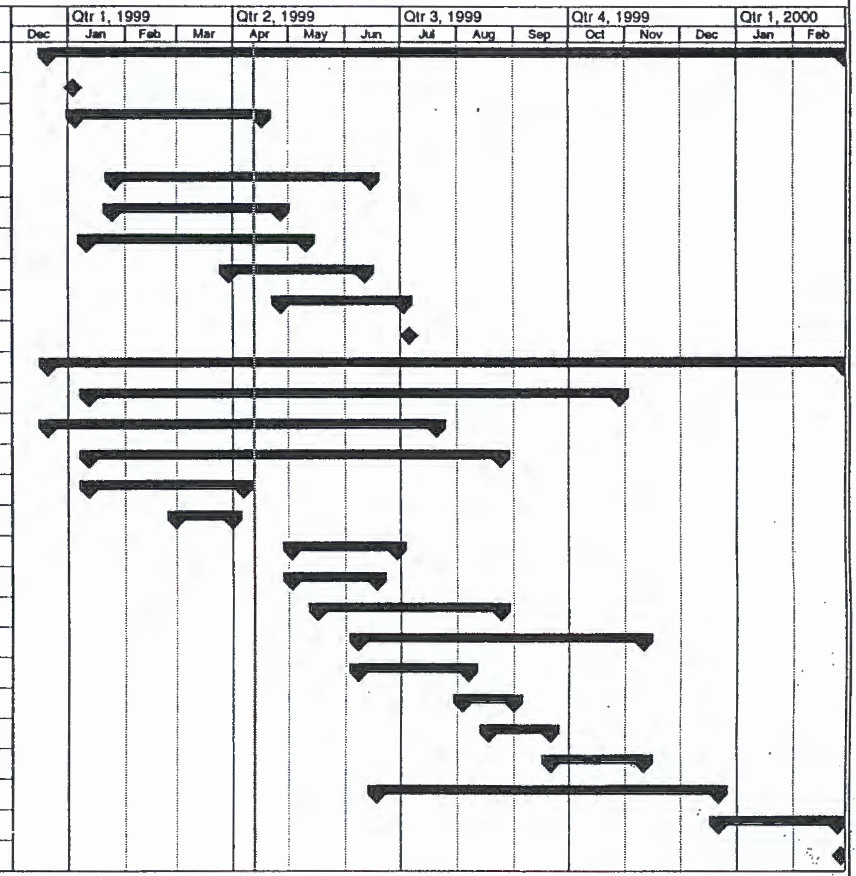


ESH-DO:99-48

4-13-99

INTERIM NITRATE COMPLIANCE PROJECT--EDR AND VOLUME REDUCTION EVAPORATOR--DETAILED PROJECT SCHEDULE

ID		Task Name	% Complete	Duration	Early Start	Early Finish
1		INTERIM NITRATE COMPLIANCE PROJECT	25%	287 days	Mon 12/21/98	Mon 2/28/00
2	✓	BEGIN PROJECT	100%	1 day	Mon 1/4/99	Mon 1/4/99
3		ZLD PRECONCEPTUAL DESIGN	49%	72 days	Tue 1/5/99	Fri 4/16/99
16		EDR PROJECT	26%	123 days	Mon 1/11/99	Tue 7/6/99
17		ES&H ACTIVITIES	23%	98 days	Tue 1/26/99	Mon 6/14/99
26		ENGINEERING ACTIVITIES (EDR)	45%	65 days	Mon 1/25/99	Mon 4/26/99
32		PROCUREMENT	50%	84 days	Mon 1/11/99	Mon 5/10/99
40		CONSTRUCTION	0%	53 days	Tue 3/30/99	Fri 6/11/99
62		EDR READINESS REVIEW	0%	48 days	Tue 4/27/99	Fri 7/2/99
71		READY TO RUN EDR	0%	1 day	Tue 7/6/99	Tue 7/6/99
72		VOLUME REDUCTION EVAPORATOR PROJECT	22%	287 days	Mon 12/21/98	Mon 2/28/00
73		ES&H ACTIVIITES	35%	202 days	Tue 1/12/99	Thu 10/28/99
86		PROCUREMENT	69%	141 days	Mon 12/21/98	Tue 7/20/99
100		ENGINEERING ACTIVITIES	16%	157 days	Tue 1/12/99	Tue 8/24/99
101		PROCURE ENGINEERING SUPPORT	76%	59 days	Tue 1/12/99	Tue 4/6/99
107		AVAILABLE FACILITY REVIEW	21%	23 days	Mon 3/1/99	Wed 3/31/99
114		ENGINEER EVAPORATOR INSTALLATION	0%	40 days	Mon 5/3/99	Mon 6/28/99
124		ENGINEER I&C	0%	33 days	Mon 5/3/99	Thu 6/17/99
135		ENGINEER VR EVAP FACILITY REQUIREMENTS	0%	70 days	Mon 5/17/99	Tue 8/24/99
142		CONSTRUCT/INSTALL SYSTEM	0%	109 days	Tue 6/8/99	Wed 11/10/99
143		TASK/MOBILIZE JCNNM (VRE)	0%	43 days	Tue 6/8/99	Fri 8/6/99
155		FACILITY CONSTRUCTION	0%	20 days	Wed 8/4/99	Tue 8/31/99
161		SYSTEM INSTALLATION	0%	23 days	Wed 8/18/99	Mon 9/20/99
167		I&C INSTALLATION	0%	36 days	Tue 9/21/99	Wed 11/10/99
172		READINESS REVIEW	0%	127 days	Fri 6/18/99	Tue 12/21/99
182		20% PROJECT CONTINGENCY	0%	40 days	Wed 12/22/99	Fri 2/25/00
184		BEGIN EVAPORATOR OPERATIONS	0%	1 day	Mon 2/28/00	Mon 2/28/00



evaporator unit in trailer
cyclone separator

bottom come out -
waste out of tk - 5,000 gallons - hauled
40,000 gallons →
- want to keep ~~below~~ 20% reduction or below RCRA levels
- may send back solids for final disposal

tentative - schedule - contract not in place

Roy - chemical Den

Project: RLW-EVAP Date: Mon 4/12/	Task		Progress		Summary		Rolled Up Critical Task		Rolled Up Progress		External Tasks	
	Critical Task		Milestone	◆	Rolled Up Task		Rolled Up Milestone	◇	Split		Project Summary	

013002

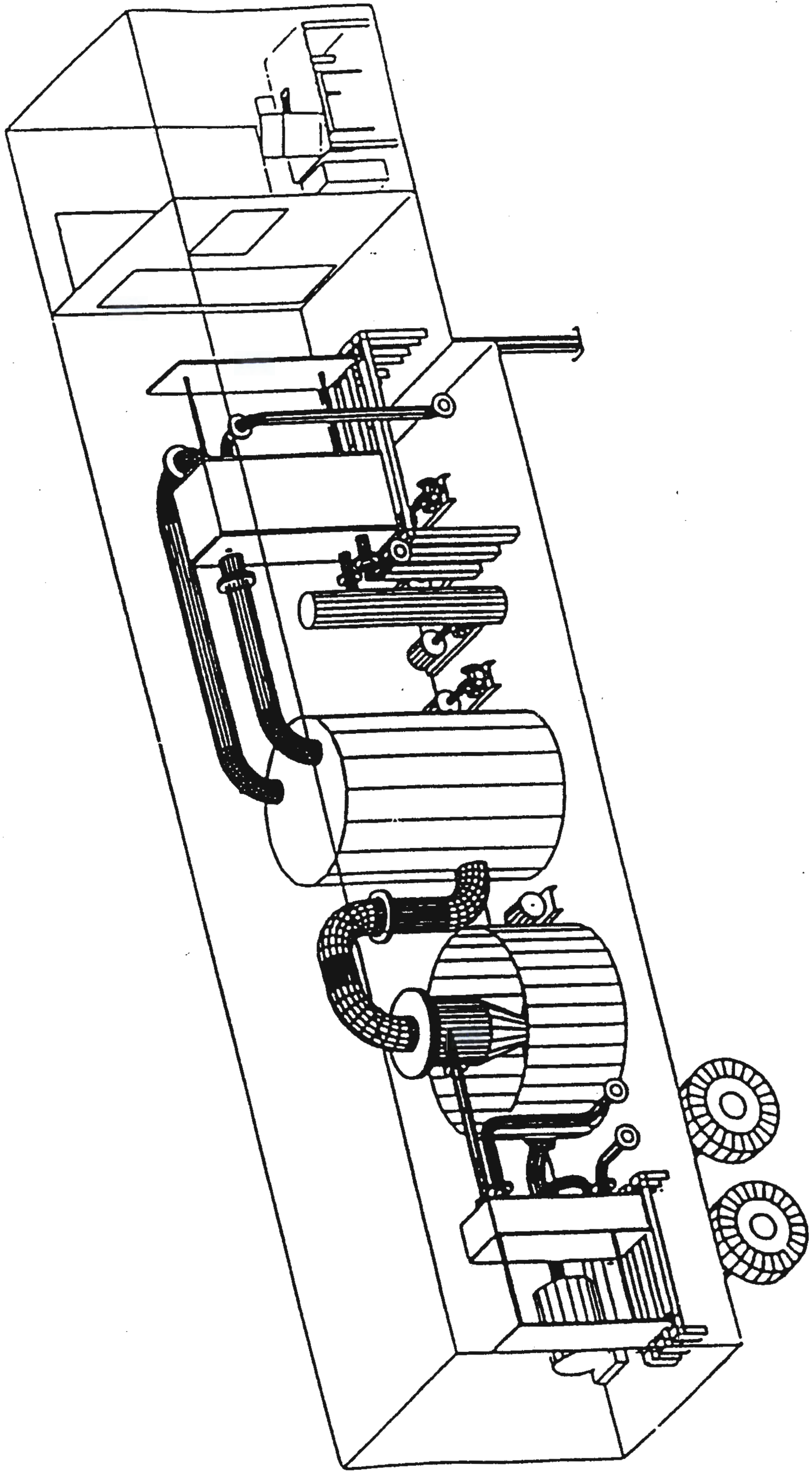
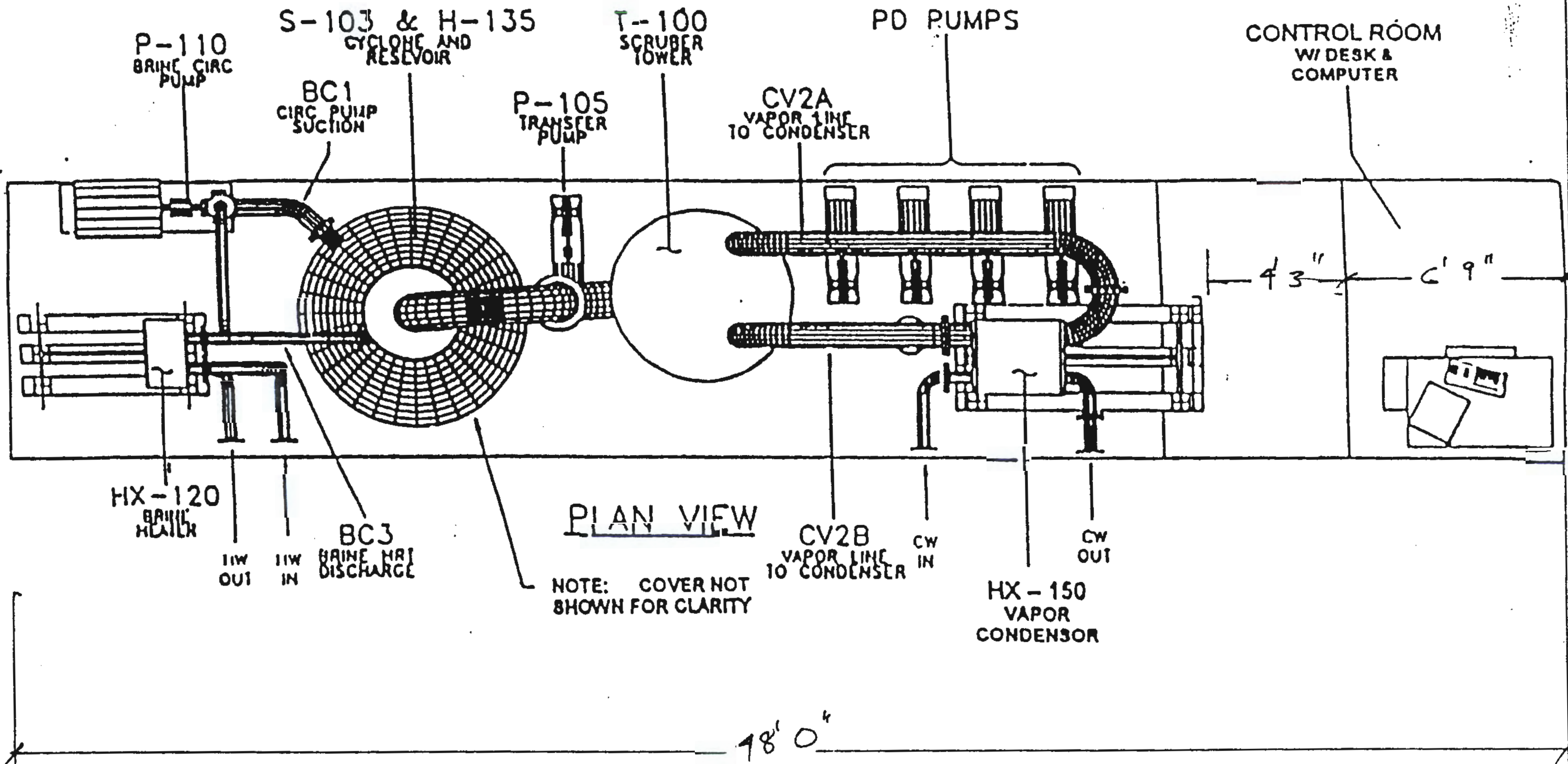


FIGURE 2
WMU ASSEMBLY

PROPOSAL TO
LOS ALAMOS NATIONAL LABORATORY

6503.71

BENCHMARK ENVIRONMENTAL CORPORATION



1" = 3-2'

PROPOSAL TO
LOS ALAMOS NATIONAL LABORATORY

FIGURE 3

WMU ASSEMBLY PLAN VIEW

RECEIVED

APR 14 1999

GROUND WATER BUREAU

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

WATER QUALITY & HYDROLOGY GROUP, ESH-18
FAX TRANSMITTAL SHEET

FAX #: (505) 665-9344 **VERIFICATION #: (505) 665-0453**

DATE: 4/14/99 LOG NO: WQ&H-FAX-99-

FROM: Bob Beers PHONE #: 505-667-7969

TO: Phyllis Bustamante FAX #: 827-2965 PHONE #: 827-0166

ORG: NMED/GWQB

TO: ______ FAX #: ______ PHONE #: ______

ORG: ______

TO: ______ FAX #: ______ PHONE #: ______

ORG: ______

MESSAGE: Phyllis —
Attached is the letter we committed to provide the NMED on the schedule for the mechanical evaporator. Please call me @ 667-7969 if you have any questions or concerns.
Bob

NUMBER OF PAGES TO FOLLOW: 3

Cy: WQ&H Fax File

RSB
TEAM LEADER OR GROUP LEADER

Los Alamos National Laboratory

Environment, Safety, and Health Division
P.O. Box 1663, Mail Stop K491
Los Alamos, New Mexico 87545
(505) 667-4218 / FAX: (505) 665-3811

Date: April 14, 1999
Refer to: ESH-DO:99-058

Ms. Phyllis Bustamante
Ground Water Quality Bureau
Pollution Prevention Section
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN APPLICATION FOR THE TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, DP-1132

Dear Ms. Bustamante:

Enclosed is a detailed project schedule for installation and start-up of the proposed mechanical evaporator for the Laboratory's Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. The estimated ready-to-run date for the mechanical evaporator is February 28, 2000. It should be noted that this project schedule includes a 20 percent contingency to account for the uncertainties associated with the required project activities. It is, however, the Laboratory's goal to complete the project by December 22, 1999, if no appreciable delays are encountered.

The Laboratory has tentatively identified Benchmark Environmental Corporation as the vendor for the mechanical evaporator. Benchmark has proposed a trailer-mounted system with a 15 gallon per minute (gpm) capacity. Input to the mechanical evaporator will be from the RLWTF's electrodialysis reversal (EDR) treatment unit that concentrates the reject stream from the reverse osmosis (RO) system. The condensate stream from the mechanical evaporator will be piped to the RLWTF's effluent tanks for eventual discharge to the NPDES Outfall at Mortandad Canyon or future reuse under the RLWTF's Zero Liquid Discharge Project. As currently proposed the bottoms waste stream from the mechanical evaporator will be shipped to an off-site contractor for solidification and disposal.

If you would like additional information concerning this response, please contact Bob Beers of the Laboratory's Water Quality and Hydrology Group at 667-7969.

Sincerely,

Dennis J. Erickson
Division Director
Environment, Safety, and Health Division

Sincerely,

Thomas E. Baca
Program Director
Environmental Management Program

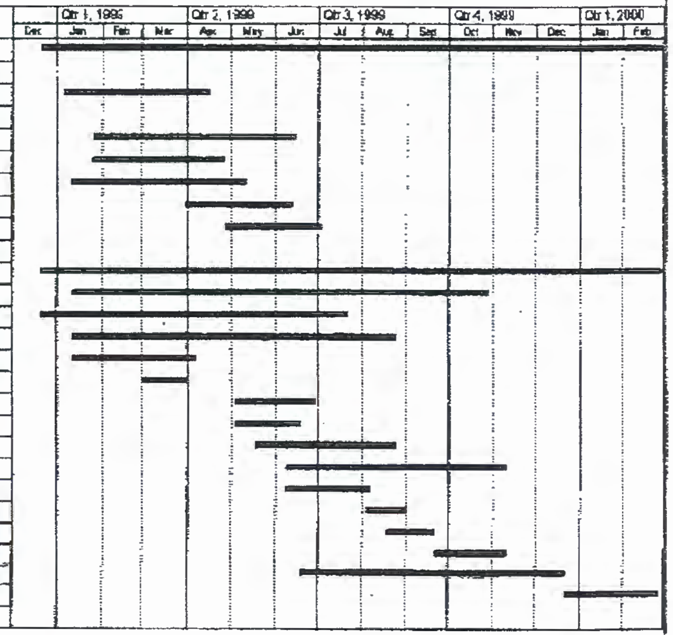
DJE:TEB:RB/mm

Enclosures: a/s

Cy: M. Leavitt, NMED GWQB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED SWQB, Santa Fe, New Mexico, w/enc.
B. Garcia, NMED HRMB, Santa Fe, New Mexico, w/enc.
B. Enz, RD Enz, Inc., Santa Fe, New Mexico, w/enc.
B. Stine, ALDNW, w/enc., MS F629
R. Michelotti, CST-7, w/enc., MS E525
T. Gunderson, DIR, w/enc., MS A100
R. Burick, DLD-OPS, MS A100, w/enc., MS A100
D. Gurule, DOE LAAO, w/enc., MS A316
J. Vozella, DOE LAAO, w/enc., MS A316
K. Hargis, EM/WM, w/enc., MS J591
S. Hanson, EM/RLW, w/enc., MS E518
D. Moss, EM/RLW, w/enc., MS E518
P. Worland, EM/RLW, w/enc., MS E518
T. Connors, EM/RLW, w/enc., MS E518
L. McAtee, ESH-DO, w/enc., MS K491
S. Rae, (ESH-18/WQ&H:99-0141) ESH-18, w/enc., MS K497
B. Beers, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
N. Williams, ESH-18, w/enc., MS K497
D. Woitte, LC/GL, w/enc., MS A187
B. Matthews, NMT-DO, w/enc., MS E500
S. Schriber, NMT-2, w/enc., MS K490
S. Yarbro, NMT-2, w/enc., MS E511
S. Gibbs, NW-MM, w/enc., MS A102
CIC-10, w/enc., MS A150
ESH-DO File, w/enc., MS K491
WQ&H File, w/enc., MS K497

INTERIM NITRATE COMPLIANCE PROJECT--EDR AND VOLUME REDUCTION EVAPORATOR--DETAILED PROJECT SCHEDULE

ID		Task Name	% Complete	Duration	Early Start	Early Finish
1		INTERIM NITRATE COMPLIANCE PROJECT	25%	287 days	Mon 12/21/98	Mon 2/28/00
2	✓	BEGIN PROJECT	100%	1 day	Mon 1/4/99	Mon 1/4/99
3		ZLD PRECONCEPTUAL DESIGN	48%	72 days	Tue 1/5/99	Fri 4/16/99
16		EDR PROJECT	28%	123 days	Mon 1/11/99	Tue 7/6/99
17		ES&H ACTIVITIES	23%	99 days	Tue 1/26/99	Mon 6/14/99
26		ENGINEERING ACTIVITIES (EDR)	45%	65 days	Mon 1/25/99	Mon 4/26/99
32		PROCUREMENT	50%	84 days	Mon 1/11/99	Mon 5/10/99
40		CONSTRUCTION	0%	53 days	Tue 3/30/99	Fri 6/11/99
62		EDR READINESS REVIEW	0%	48 days	Tue 4/27/99	Fri 7/2/99
71		READY TO RUN EDR	0%	1 day	Tue 7/6/99	Tue 7/6/99
72		VOLUME REDUCTION EVAPORATOR PROJECT	22%	287 days	Mon 12/21/98	Mon 2/28/00
73		ES&H ACTIVITES	35%	202 days	Tue 1/12/99	Thu 10/28/99
86		PROCUREMENT	88%	141 days	Mon 12/21/98	Tue 7/20/99
100		ENGINEERING ACTIVITIES	15%	157 days	Tue 1/12/99	Tue 8/24/99
101		PROCURE ENGINEERING SUPPORT	79%	58 days	Tue 1/12/99	Tue 4/6/99
107		AVAILABLE FACILITY REVIEW	21%	23 days	Mon 3/1/99	Wed 3/31/99
114		ENGINEER EVAPORATOR INSTALLATION	0%	40 days	Mon 5/3/99	Mon 6/28/99
124		ENGINEER I&C	0%	33 days	Mon 5/3/99	Thu 6/17/99
135		ENGINEER VR EVAP FACILITY REQUIREMENTS	0%	70 days	Mon 5/17/99	Tue 8/24/99
142		CONSTRUCT/INSTALL SYSTEM	0%	109 days	Tue 6/8/99	Wed 11/10/99
143		TASK/MOBILIZE JCNNM (VRE)	0%	43 days	Tue 6/8/99	Fri 8/6/99
155		FACILITY CONSTRUCTION	0%	20 days	Wed 8/4/99	Tue 8/31/99
161		SYSTEM INSTALLATION	0%	22 days	Wed 8/18/99	Mon 9/20/99
167		I&C INSTALLATION	0%	30 days	Tue 9/21/99	Wed 11/10/99
172		READINESS REVIEW	0%	127 days	Fri 6/18/99	Tue 12/21/99
182		20% PROJECT CONTINGENCY	0%	40 days	Wed 12/22/99	Fri 2/25/00
184		BEGIN EVAPORATOR OPERATIONS	0%	1 day	Mon 2/28/00	Mon 2/28/00



Project: RLW-EVAP Date: Mon 4/12/9

Task | Critical Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Critical Task | Rolled Up Milestone | Rolled Up Progress | Split | External Tasks | Project Summary

T CONNORS/EM-RLW

BASELINE SCHEDULE

: 01308

X-Sender: u114887@pobox1663.lanl.gov
X-Mailer: QUALCOMM Windows Eudora Pro Version 4.0.1
Date: Wed, 14 Apr 1999 14:14:03 -0600
To: phyllis <gwb_gw24@edser.nmenv.state.nm.us>
From: Bob Beers <bbeers@lanl.gov>
Subject: RLWTF Effluent Tank Discharge-4/13/99.
Cc: wdmoss@lanl.gov

Phyllis:

FYI, I received this e-mail from Dave Moss (RLWTF) today. Please let me know if you have any questions.

Bob

>X-Sender: wdm@wm0.lanl.gov
>X-Mailer: Windows Eudora Pro Version 3.0 (32)
>Date: Wed, 14 Apr 1999 14:03:30 -0600
>To: bbeers@lanl.gov
>From: Dave Moss <wdmoss@lanl.gov>
>Subject: 50 discharge.
>
>Bob, The effluent tank which we sampled with the state was discharged to
>Mortandad canyon on 04/13/99. The nitrates were measured as 8.2 mg/l with
>the Hach kit and the results from the analytical lab were 7.0 mg/l.
>

STATE OF NEW MEXICO DEPARTMENT OF HEALTH

SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196-4700

700 Camino de Salud, NE
[505] 841-2500

ORGANIC CHEMISTRY SECTION [505] 841-2570

RECEIVED
APR 23 1999
GROUND WATER BUREAU

ED FIELD OFFICE: ☑

NMED Ground Water Quality Bureau
Phyllis Bustamante
Ground Water Pollution Prevention Section
P.O. Box 26110
Santa Fe, NM 87502

SLD No.: OR- 9900605

REQUEST ID No.: 2280851

RECEIVED AT SLD: 4/14/99

SLD COPY USER 55410

SAMPLE COLLECTION: DATE: 4/13/99 TIME: 1330 BY: Bus

SAMPLING LOCATION: Effluent

SAMPLE MATRIX: water REPORTING UNITS: µg/L

Remarks: Sample was marked as preserved with hydrochloric acid.

EPA METHOD 8260 MASS SPECTROMETER VOLATILES BY PURGE AND TRAP

DATE EXTRACTED: N/A

DATE ANALYZED: 4/20/99 7 Days: Within EPA Analysis Time

SAMPLE VOL (ml): 5

ANALYSIS No.: OR- 9900605

SLD BATCH No.: 108

DILUTION FACTOR: 1.00

REQUEST ID No.: 2280851

SAMPLE PRESERVATION: Sample Temperature when received: 16 Degrees C.; pH = 1

CAS #	ANALYTE NAME	CONC. (ug/L)	QUAL.	SDL
71-43-2	Benzene		U	1.0
108-86-1	Bromobenzene		U	1.0
74-97-5	Bromochloromethane		U	1.0
75-27-4	Bromodichloromethane*		U	1.0
75-25-2	Bromoform*		U	1.0
74-83-9	Bromomethane		U	1.0
78-93-3	2-Butanone (MEK)	8.0	J	10.0
104-51-8	n-Butylbenzene		U	1.0
135-98-8	sec-Butylbenzene		U	1.0
98-06-6	tert-Butylbenzene		U	1.0
1634-04-4	tert-Butyl methyl ether (MTBE)		U	10.0
56-23-5	Carbon tetrachloride		U	1.0
108-90-7	Chlorobenzene (monochlorobenzene)		U	1.0
75-00-3	Chloroethane		U	1.0
67-66-3	Chloroform*		U	1.0
74-87-3	Chloromethane		U	1.0
95-49-8	2-Chlorotoluene		U	1.0
106-43-4	4-Chlorotoluene		U	1.0
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)		U	1.0
124-48-1	Dibromochloromethane*		U	1.0
106-93-4	1,2-Dibromoethane (Ethylene dibromide (EDB))		U	1.0
74-95-3	Dibromomethane		U	1.0
95-50-1	1,2-Dichlorobenzene (o-Dichlorobenzene)		U	1.0
541-73-1	1,3-Dichlorobenzene (m-Dichlorobenzene)		U	1.0
106-46-7	1,4-Dichlorobenzene (p-Dichlorobenzene)		U	1.0
75-71-8	Dichlorodifluoromethane		U	1.0
75-34-3	1,1-Dichloroethane		U	1.0
107-06-2	1,2-Dichloroethane		U	1.0
75-35-4	1,1-Dichloroethene		U	1.0
156-59-2	cis-1,2-Dichloroethene		U	1.0
156-60-5	trans-1,2-Dichloroethene		U	1.0
78-87-5	1,2-Dichloropropane		U	1.0
142-28-9	1,3-Dichloropropane		U	1.0
594-20-7	2,2-Dichloropropane		U	1.0

041311

563-58-6	1,1-Dichloropropene		U	1.0
1006-10-15	cis-1,3-Dichloropropene		U	1.0
1006-10-26	trans-1,3-Dichloropropene		U	1.0
100-41-4	Ethylbenzene		U	1.0
87-68-3	Hexachlorobutadiene		U	1.0
98-82-8	Isopropylbenzene		U	1.0
99-87-6	4-Isopropyltoluene		U	1.0
75-09-2	Methylene chloride (Dichloromethane)		U	2.0
91-20-3	Naphthalene		U	1.0
103-65-1	Propylbenzene		U	1.0
100-42-5	Styrene		U	1.0
630-20-6	1,1,1,2-Tetrachloroethane		U	1.0
79-34-5	1,1,2,2-Tetrachloroethane		U	1.0
127-18-4	Tetrachloroethene		U	1.0
109-99-9	Tetrahydrofuran (THF)	57.9		10.0
108-88-3	Toluene		U	1.0
87-61-6	1,2,3-Trichlorobenzene		U	1.0
120-82-1	1,2,4-Trichlorobenzene		U	1.0
71-55-6	1,1,1-Trichloroethane		U	1.0
79-00-5	1,1,2-Trichloroethane		U	1.0
79-01-6	Trichloroethene		U	1.0
75-69-4	Trichlorofluoromethane		U	1.0
96-18-4	1,2,3-Trichloropropane		U	1.0
95-63-6	1,2,4-Trimethylbenzene		U	1.0
108-67-8	1,3,5-Trimethylbenzene		U	1.0
75-01-4	Vinyl chloride		U	1.0
95-47-6	o-Xylene#		U	1.0
N/A	p- & m-Xylene#		U	1.0
N/A	#Total Xylenes#	0.0	U	1.0
N/A	*Total Trihalomethanes*	0.0	U	1.0

LABORATORY BATCH QUALITY CONTROL SUMMARY

	SURROGATE COMPOUNDS	CONCENTRATION	% RECOVERY
SURROGATE RECOVERIES:	Dibromofluoromethane	9.6	96%
	1,2-Dichloroethane-D4	10.1	101%
	Toluene -D8	10.0	100%
	4-Bromofluorobenzene	8.7	87%

LABORATORY FORTIFIED BLANK RECOVERIES

The % recoveries for compounds in the batch spike were from 80% to 120% with the exception of the compounds listed below:

COMPOUND	CONCENTRATION (µg/L)	% RECOVERY
Trichlorofluoromethane	14.4	144%
Acetone	4.6	46%
1,2,3-Trichlorobenzene	7.6	76%

LABORATORY BLANKS

No target compounds were detected above the sample detection limit in laboratory blank with the exception of the compound(s) listed below:

COMPOUND	CONCENTRATION (µg/L)
No Exceptions	

ANALYST: Michael Trujillo MET QC APPROVED BY: T.H.C. Timothy Chapman

DEFINITIONS

** Concentration Exceeds EPA's allowable Maximum Contamination Level

CAS# Chemical Abstract Services Number - Unique number to help identify analytes listed by different names

CONC. Concentration (ug/L) of analyte actually detected in the sample

QUAL Qualifier of analytical results as follows:

- B Analyte was detected in laboratory blank
- E Analyte was detected at a level above the concentration of the calibration curve.
- J Analyte was detected at a level below which an accurate quantitation can be given (~5 * SDL)
- U No analyte was detected above the Sample Detection Limit.

SDL Sample Detection Limit - The lowest concentration which can be differentiated from Zero with 99% confidence taking sample size (compositing) into account.

ug/L Concentration Units - micrograms per liter which is approximately equivalent to Parts Per Billion (ppb)

Request ID No. **ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM** SLD's Accession No.

2280851 | ere | **OR** | Scientific Laboratory Division, 700 Camino de Salud, NE (P.O. Box 4700), Albuquerque, NM 87106 (87196-4700), Phone: 505-841-2500/ -2570/ -2566 | **OR** | OR9900605

3 User Code: 5 5 4 1 1 0

Date & Time of Receipt at SLD: 99 APR 14 AM 8:45

4 Sample Priority: ___ *If 1 or 2 call SLD*

5 Submitter Code: 5 4 1 1 | WSS Code: ___ | User's Site ID: ___

6 *Sample Temp. Receipt @ SLD:* 16 °C

7 Facility or WSS Name: LANL-TA-56

Facility/WSS Location: *If No WSS Code Complete 8, 9 & 10*

8 County: Los Alamos

9 City: Los Alamos

10 State: *or CHANGE* NM *TO* ___

11 Sampling Location: Effluent

12 Sample Collection: On: 04 / 13 / 99 (Date: MM / DD / YY) By: Bustamante (Last Name)

At: 13 : 30 (Time: 24:00 Hour Clock) Phyllis (First Name)

13 Sample Info. Contact: Ph: [ ] - 827 - 0166

If not collector, per box 12, Please print name here: ______

14 *Reports are mailed to the address specified by the Submitter Code and WSS Code (when present). However, if one of the following applies, please check ☒ appropriate boxes below and complete address form.*

☐ New Address for: ☐ Submitter ☐ WSS / Client

☐ Send an additional Report to

Name: ______

Address: ______

City: ______ *State:* ______ *Zip:* ______

15 **Field Data:** *(When appropriate)*

Temperature: ____°C; pH: ____

Chlorinated ? ☐ YES or ☐ NO (Please Check Box)

Chlorine Residual: ____mG/L

Sulfate: ____ mG/L

SDWA Compositing:
- ☐ No Compositing Permitted
- ☐ Within This System Only
- ☐ Within All Systems

16 **Field Remarks:** *(Optional)*

17 **Sample Type:** *(Check ☒ only one)* ☐ Water ☐ Soil ☐ Vapor ☐ Plant ☐ Tissue ☐ Blood ☐ Other: ☐ Liquid: ☐ Solid: ______

18 **Preservation:** *(Check ☒ all that apply)* ☐ No Preservation ☒ Stored at 4°C ☒ Preserved with HCl to pH < 2 ☐ Other: ______

19 **Analyses Requested:** *Please Check ☒ the appropriate box(es) below to indicate your analytical request(s); and, please indicate the number of bottles & vials submitted:* Bottles ____ Vials ____.

Volatile Screens:
- ☐-(754) Aromatic & Halogenated Volatiles (EPA 8021)
- ☒-(765) Mass Spectrometer Volatiles (EPA 8260)
- ☐-(774) Volatile Organic Compounds [VOC's] (EPA 502.2)
- ☐-(766) SDWA Total Trihalomethanes (EPA 502.2)

Other Specific Compounds or Classes:
- ☐-(___) ______
- ☐-(___) ______

Remarks: ______

Semivolatile Screens:
- ☐-(789) Drinking Water Semivolatile Screens **(Indented list)**
  - ☐-(775) EDB, DBCP & TCP (EPA 504.1)
  - ☐-(758) Acid Herbicides (EPA 515.2)
  - ☐-(772) Carbamates (EPA 531.1)
  - ☐-(781) Glyphosate (EPA 547)
  - ☐-(782) Endothall (EPA 548.1)
  - ☐-(783) Diquat (EPA 549.1)
  - ☐-(788) SOC (EPA 525.2)
- ☐-(755) Base/Neutral Semivolatiles (No Acids) (EPA 8270)
- ☐-(756) Base/Neutral/Acids Semivolatiles (EPA 625/8270)
- ☐-(760) Organochlorine Pesticides / PCB's (EPA 608)
- ☐-(751) Hydrocarbon Fuel Screen (Modified EPA 8015)
- ☐-(768) Disinfection Byproducts Screen **(Indented list)**
  - ☐-(771) Haloacetic Acids (EPA 552.2)
  - ☐-(769) Haloacetonitriles / THM's (EPA 551.1)
  - ☐-(770) Chloral Hydrate (EPA 551.1)

01313

Organic Section Sample Collection Guidelines

(SLD-#) & Test Description	Approx. No. of Analytes Reported	Maximum Holding Time (days)	Sample Container	General Preservation Footnotes	Preservation Comments for Chlorinated Waters
VOLATILE ORGANIC COMPOUNDS:					
(754) Aromatic and Halogenated Volatiles	63	14	40 mL Glass Vial in duplicate	A, B, E	
(774) SDWA Volatile Organic Compounds, VOC-1's	63	14	40 mL Glass Vial in duplicate	A, B, E	Sample should be Unchlorinated
(766) SDWA Trihalomethanes	4	14	40 mL Glass Vial in duplicate	A, C, E	
(765) Volatile Organic Compounds, VOC's, by GC/MS	63	14	40 mL Glass Vial in duplicate	A, B, E	
SEMIVOLATILE ORGANIC COMPOUNDS:					
(758) Acid Herbicides	13	14	1 L Amber Glass	A, B, D	50 mG Sodium Sulfite per 1 L Bottle
(755) Base/Neutral Semivolatiles Organic Compounds by GC/MS	52	7	1 L Amber Glass in duplicate	A, B	
(756) Base/Neutral /Acid Semivolatile Organic Compounds by GC/MS	92	7	1 L Amber Glass in duplicate	A, B	
(772) Carbamate Pesticides	10	28	40 mL Glass Vial	A, C, D	3 mG Sodium Thiosulfate per 40 mL Vial
(783) Diquat	1	7	1 L Amber Plastic	A, C, D	100 mG/L Sodium Thiosulfate per 1 L Bottle
(775) EDB, DBCP & TCP	3	14	40 mL Glass Vial in duplicate	A, D	Sample should be Unchlorinated
(782) Endothall	1	7	40 mL Glass Vial in duplicate	A, D	4 mG Sodium Thiosulfate per 40 mL Vial
(781) Glyphosate	1	14	40 mL Amber Glass Vial	A, D	3 mG Sodium Thiosulfate per 40 mL Vial
(751) Hydrocarbon Fuel Screen (TPH and Hydrocarbon Range ID)	N/A	14	1 L Amber Glass in duplicate	A, B	
(760) Organochlorine Pesticides and PCB's	39	7	1 L Amber Glass in duplicate	A, B, D	100 mG/L Sodium Thiosulfate per 1 L Bottle
(788) Semivolatile Organic Compounds by GC/MS	72	14	1 L Amber Glass in duplicate	A, B, D	50 mG/L Sodium Sulfite per 1 L Bottle

Preservation Footnotes:

A = Cool samples to 4°C.
B = Reduce pH to 2 with Hydrochloric Acid, HCl.
C = As supplied by SLD, sample containers contain perservatives (check container label); Do **NOT** Rinse Container.
D = Chlorinated systems should request dechlorinating agents for SLD-#'s 775, 768, 772, 781, 782, 783 and 788. Add dechlorinating agent after filling bottle half full, then finish filling bottle. Do **NOT** add acid.
E = Fill bottle completely; i.e. No Air Bubble.

***** Please Use Chain-Of-Custody Form Only When Requirements Mandate *****

Single Sample **Chain-Of-Custody Form** *Single Sample*

We, the undersigned, certify that on 4/13/99 (Date) at 4:25 the sample identified on the container(s) and reverse of this request form by "*Request ID No.:* 2280851" was transferred with evidentiary seal(s):

(check applicable box) ☐ not present, ☒ present & intact, ☐ present & damaged.

Released by: Phyllis Burton (Signature) & Received by: Marchell Schuman (Signature)

Additional Transfer, If Applicable:

We, the undersigned, certify that on ____________ (Date) at ____________ (Time) the sample identified on the container(s) and reverse of this request form by "*Request ID No.:*________________" was transferred with evidentiary seal(s):

(check applicable box) ☐ not present, ☐ present & intact, ☐ present & damaged.

Released by: ______________________ (Signature) & Received by: ______________________ (Signature)

Donald

:01314

:01315

STATE OF NEW MEXICO

DEPARTMENT OF HEALTH

SCIENTIFIC LABORATORY DIVISION

P.O Box 4700
Albuquerque, NM 87196-4700
AIR & HEAVY METALS SECTION

700 Camino de Salud, NE
(505)-841-2500
(505)-841-2553

SAMPLE COLLECTION: DATE: 4/13/99 TIME: 0000

MATRIX: wpn BY: Bus

SAMPLING LOCATION:

SLD No.: HM-9900189

REQUEST ID No.: 2280852

RECEIVED AT SLD: 4/14/99

USER: 55410

SUBMITTER: 541

WSS #: 0

To: Submitter

ED Grd H20 Pollution Prev Sect
Ground Water Quality Bureau
P.O. Box 26110
Santa Fe, NM 87502

RECEIVED
APR 28 1999
GROUND WATER BUR

DISTRIBUTION TO:
Submitter
SLD Files

Practical Quantitation Limit (PQL) is defined as 10 times the Method Detection Limit (MDL)

ANALYTICAL RESULTS

Element	Result	Units	Analysis Date	Method	PQL	Dilution Factor	Sample Det. Limit.	Analyst	Data Qualifier
Aluminum	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Barium	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Beryllium	<0.05	mg/L	4/19/99	200.7	0.05	1	0.05	MLM	C H
Boron	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Cadmium	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Calcium	56.	mg/L	4/19/99	200.7	1	1	1	MLM	C H
Chromium	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Cobalt	<0.05	mg/L	4/19/99	200.7	0.05	1	0.05	MLM	C H
Copper	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Iron	0.2	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Magnesium	3.	mg/L	4/19/99	200.7	1	1	1	MLM	C H
Manganese	<0.05	mg/L	4/19/99	200.7	0.05	1	0.05	MLM	C H
Molybdenum	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Nickel	0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Silicon	18.	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Silver	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Strontium	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Tin	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	H
Vanadium	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H
Zinc	<0.1	mg/L	4/19/99	200.7	0.1	1	0.1	MLM	C H

STATE OF NEW MEXICO

DEPARTMENT OF HEALTH

SCIENTIFIC LABORATORY DIVISION

P.O Box 4700
Albuquerque, NM 87196-4700
AIR & HEAVY METALS SECTION

700 Camino de Salud, NE
(505)-841-2500
(505)-841-2553

SAMPLE COLLECTION:	DATE: 4/13/99	TIME: 0000		**SLD No.:**	**HM-9900189**
	MATRIX: wpn	BY: Bus		REQUEST ID No.:	2280852
SAMPLING LOCATION:				RECEIVED AT SLD:	4/14/99
				USER:	55410
				SUBMITTER:	541
				WSS #:	0

To: Submitter

ED Grd H20 Pollution Prev Sect
Ground Water Quality Bureau
P.O. Box 26110
Santa Fe, NM 87502

DISTRIBUTION TO:
Submitter
SLD Files

Laboratory Comments:

Seal broken at SLD on 4/14/99.
Chain of Custody Sample.
Facility Name: LANL TA-50

Reviewed by: Ron Amato
Supervisor, Air & Heavy Metals Section
Printed: 4/21/99

KP

Data Qualifier Codes and Definitions

A = Insufficient sample for analysis
B = Laboratory Reagent Blank (RB)
C = Spike recovery between 80-120%
D = Spike recovery <80% or >120%
E = Over Calibration Range
F = Matrix interference suspected
G = Inconsistent results; suggest re-sampling
H = Analyzed in duplicate
I = Analyzed in Triplicate
J = Estimated Quantity, only.
K = Holding time exceeded
L = Equals or exceeds USEPA MCL
M = Equals or exceeds USEPA Action Level
N = Insufficient sample to verify results
O = Internal Standards(ICP/MS) <60% or >125% when sample analyzed straight
R = The data are unusable
T = Total Metals
TR = Total Recoverable Metals
U = Not detected above the PQL or SDL.
UJ = Not detected. Estimated value, only.

:01318

STATE OF NEW MEXICO — DEPARTMENT OF HEALTH

RECEIVED MAY 06 1999

SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700, Albuquerque, NM 87196-4700

700 Camino de Salud, NE, [505] 841-2500

ORGANIC CHEMISTRY SECTION [505] 841-2570

GROUND WATER BUREAU

ED FIELD OFFICE: ☐

Attn: Phyllis Bustamante
ED Grd H20 Pollution Prev Sect
P.O. Box 26110
Santa Fe, NM 87502

SLD No.: OR- 9900606

REQUEST ID No.: 2280850

RECEIVED AT SLD: 4/14/99

☐SLD COPY USER: 55410

SAMPLE COLLECTION: DATE: 4/13/99 TIME: 1330 BY: Bus

SAMPLING LOCATION: Effluent

SAMPLE MATRIX: water REPORTING UNITS: ug/L

EPA METHOD 8270 SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

DATE EXTRACTED: 4/15/99 — 2 Days: Within EPA Holding Time

DATE ANALYZED: 4/21/99 — 8 Days: Within EPA Analysis Time

SAMPLE VOL (ml): 990

ANALYSIS No.: OR- 9900606

SLD BATCH No.: 105

DILUTION FACTOR: 1.01

REQUEST ID No.: 2280850

SAMPLE PRESERVATION: Sample Temperature when received: 5 Degrees C.; pH = 7

NOT COMPOSITED

EXTRACTION TECHNIQUE: Separatory Funnel PERCENT MOISTURE: N/A

GPC CLEANUP: Not Used

CAS #	ANALYTE NAME	CONC. (ug/L)	QUAL.	SDL
83-32-9	Acenaphthene		U	0.29
208-96-8	Acenaphthylene		U	0.29
15972-60-8	Alachlor		U	1.18
309-00-2	Aldrin		U	0.71
120-12-7	Anthracene		U	0.29
1912-24-9	Atrazine		U	0.33
319-86-8	delta-BHC		U	0.40
319-84-6	alpha-BHC		U	0.40
65-85-0	Benzoic acid		U	0.67
56-55-3	Benzo(a)anthracene		U	0.29
205-99-2	Benzo(b)fluoranthene		U	1.00
207-08-9	Benzo(k)fluoroanthene		U	0.75
191-24-2	Benzo(g,h,i)perylene		U	0.23
50-32-8	Benzo(a)pyrene		U	0.03
100-51-6	Benzyl alcohol		U	0.32
111-91-1	Bis(2-chloroethoxy)methane		U	0.30
111-44-4	Bis(2-chloroethyl)ether		U	0.40
108-60-1	Bis(2-chloroisopropyl)ether		U	2.53
117-81-7	Bis(2-ethylhexyl)phthalate	0.5	JB	0.80
101-55-3	4-Bromophenylphenyl ether		U	0.40
85-68-7	Butylbenzyl phthalate	0.1	JB	0.65
5103-71-9	cis-Chlordane		U	0.55
5103-74-2	trans-Chlordane		U	0.77
106-47-8	4-Chloroaniline		U	0.41
91-58-7	2-Chloronaphthalene		U	0.41
59-50-7	4-Chloro-3-methylphenol		U	0.24
95-57-8	2-Chlorophenol		U	0.32
7005-72-3	4-Chlorophenylphenyl ether		U	0.32

218-01-9	Chrysene		U	0.29
72-54-8	4,4'-DDD		U	0.36
72-55-9	4,4'-DDE		U	0.19
50-29-3	4,4'-DDT		U	0.72
53-70-3	Dibenz(a,h)anthracene		U	0.27
132-64-9	Dibenzofuran		U	0.25
84-74-2	Di-n-butyl phthalate	0.1	JB	0.40
95-50-1	1,2-Dichlorobenzene		U	0.29
541-73-1	1,3-Dichlorobenzene		U	0.29
106-46-7	1,4-Dichlorobenzene		U	0.21
91-94-1	3,3'-Dichlorobenzidine		U	0.29
120-83-2	2,4-Dichlorophenol		U	2.63
60-57-1	Dieldrin		U	0.40
84-66-2	Diethylphthalate	0.1	JB	0.33
105-67-9	2,4-Dimethylphenol		U	0.33
131-11-3	Dimethylphthalate		U	0.45
534-52-1	4,6-Dinitro-2-methylphenol		U	2.27
51-28-5	2,4-Dinitrophenol		U	1.09
121-14-2	2,4-Dinitrotoluene		U	0.47
606-20-2	2,6-Dinitrotoluene		U	0.17
117-84-0	Di-n-octyl phthalate		U	1.46
72-20-8	Endrin		U	0.64
7421-93-4	Endrin aldehyde		U	0.64
949-98-8	Endosulfan I		U	0.56
33213-65-9	Endosulfan II		U	0.56
1031-07-8	Endosulfan sulfate		U	0.36
206-44-0	Fluoranthene		U	0.33
86-73-7	Fluorene		U	0.48
76-44-8	Heptachlor		U	0.63
1024-57-3	Heptachlor epoxide		U	0.58
118-74-1	Hexachlorobenzene		U	0.49
87-68-3	Hexachlorobutadiene		U	0.24
77-47-4	Hexachlorocyclopentadiene		U	0.40
67-72-1	Hexachloroethane		U	0.21
193-39-5	Indeno(1,2,3-cd)pyrene		U	0.91
78-59-1	Isophorone		U	0.28
319-86-8	Lindane (γ-BHC)		U	0.82
118-74-1	Methoxychlor		U	0.78
91-57-6	2-Methylnaphthalene		U	0.21
95-48-7	2-Methylphenol		U	0.32
106-44-5	4-Methylphenol		U	0.42
91-20-3	Naphthalene		U	0.24
88-74-4	2-Nitroaniline		U	0.32
99-09-2	3-Nitroaniline		U	0.29
100-01-6	4-Nitroaniline		U	1.08
98-95-3	Nitrobenzene		U	0.58
88-75-5	2-Nitrophenol		U	0.33
100-02-7	4-Nitrophenol		U	3.62
86-30-6	N-nitrosodiphenylamine		U	0.47
62-75-9	N-nitrosodimethylamine		U	0.58
621-64-7	N-nitroso-di-n-propylamine		U	0.63
87-86-5	Pentachlorophenol		U	0.56
85-01-8	Phenanthrene		U	0.31
108-95-2	Phenol		U	0.33
129-00-0	Pyrene		U	0.40
122-34-9	Simazine		U	2.23
120-82-1	1,2,4-Trichlorobenzene		U	2.23
95-95-4	2,4,5-Trichlorophenol		U	1.41

01320

88-06-2	2,4,6-Trichloro, .enol		U	0.18
103-33-3	Azobenzene		U	0.18

COMPOUNDS DETECTED AND TENTATIVELY IDENTIFIED BY MASS SPECTROMETRY (TIC's)

CAS #	TENTATIVE ANALYTE NAME	EST CONC. (ug/L)	LIBRARY MS MATCH	RETENTION TIME (MIN)
78-40-0	Triethyl Ester Phosphoric Acid	3.7	872	14.83
54932-78-4	4-(2,2,3,3,-Tetramethylbutyl Phenol	9.6	944	28.28
58-0-2	Caffeine	9.7	761	33.74

* "Library MS Match" is a number showing the approximate percentage agreement with our 60,000 compound, NIST mass spectral library.
"Retention Time" is the time required for the specific compound to pass through the chromatographic column.

QUALITY CONTROL SUMMARY

SURROGATE QC	SURROGATE COMPOUNDS ADDED TO SAMPLE BEFORE EXTRACTION	Surrogate Recovered	% RECOVERY	QC Eval.
Surrogate com-	Nitrobenzene-d5 (Neutral Surrogate added at 50ug/L)	37.6	75%	Normal
pounds are added	2-Fluorobiphenyl (Neutral Surrogate added at 50ug/L)	40.0	80%	Normal
to samples to de-	Terphenyl-d14 (Neutral Surrogate added at 50ug/L)	48.0	96%	Normal
termine extraction	Phenol-d6 (Acid Surrogate added at 100 ug/L)	47.7	48%	Normal
efficiency and	2-Fluorophenol (Acid Surrogate added at 100 ug/L)	27.4	27%	Low
analytical QC	2,4,6-Tribromophenol (Acid Surrogate added at 100ug/L)	50.2	50%	Normal

LABORATORY FORTIFIED BLANK RECOVERIES
The % recoveries of target analytes in the batch spike(s) were within the expected range with the following exceptions:

COMPOUND	CONCENTRATION	% RECOVERY
No Exceptions		

LABORATORY BLANKS
No target analytes were detected above the sample detection limit in laboratory blank with the exception of the compound(s) listed below:

COMPOUND	CONCENTRATION (ug/L)
Bis(2-ethylhexyl)phthalate	0.2
Di-n-butyl phthalate	0.01
Diethylphthalate	0.01

LABORATORY REMARKS: This analysis includes the organochlorine pesticides specified in EPA-625 but not the PCB's.

ANALYST: **ARNOLD BENTZ** QC APPROVED BY: **Roberta Hine**

DEFINITIONS

** **Concentration Exceeds EPA's allowable Maximum Contamination Level**
CAS# Chemical Abstract Services Number - Unique number to help identify analytes listed by different names
CONC. Concentration (ug/L) of analyte actually detected in the sample
QUAL Qualifier of analytical results as follows:
- B Analyte was detected in laboratory blank
- J Analyte was detected at a level below which an accurate quanitation can be given (~5 * SDL)
- U No analyte was detected above the Sample Detection Limit.

MCL Maximum Contamination Level Allowed by EPA for regulated analytes
SDL Sample Detection Limit - The lowest concentration which can be differentiated from Zero with 99% confidence taking sample size (compositing) into account.
ug/L Concentration Units - micrograms per liter which is approximately equivalent to Parts Per Billion (ppb)

Request ID No.

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

2280850

Scientific Laboratory Division
700 Camino de Salud, NE (P.O. Box 4700)
Albuquerque, NM 87106 (87196-4700)
Phone: 505-841-2500/ -2570/ -2566

For S. OR9900606
OR-___-______

3 User Code: 5 5 4 1 0 | Date & Time of Receipt at SLD: 99 APR 14 AM 8:45 | 4 Sample Priority: |__| If 1 or 2 call SLD

5 Submitter Code: 5 4 1 | WSS Code: | User's Site ID: | 6 Sample Temp. Receipt @ SLD: 5 °C

7 Facility or WSS Name: LANL TA-50

Facility/WSS Location: *If No WSS Code Complete 8, 9 & 10* | 8 County: Los Alamos | 9 City: Los Alamos | 10 State: *or CHANGE* NM *TO* |__|

11 Sampling Location: Effluent

12 Sample Collection: On: 04 / 13 / 99 (Date: MM / DD / YY) By: Buisitamanitel (Last Name)
At: 13 : 30 (Time: 24:00 Hour Clock) Phygillis (First Name)

13 Sample Info. Contact: Ph: [____] - 827 - 0166 If not collector, per box 12, Please print name here: ______

14 *Reports are mailed to the address specified by the Submitter Code and WSS Code (when present). However, if one of the following applies, please check ☒ appropriate boxes below and complete address form.*

☐ New Address for: ☐ Submitter ☐ WSS / Client
☐ Send an additional Report to
Name: ______
Address: PO Box 26110
City: Santa Fe *State:* ______ *Zip:* 87502

15 **Field Data:** *(When appropriate)*
Temperature: ____°C; pH: ____
Chlorinated ? ☐ YES or ☐ NO (Please Check Box)
Chlorine Residual: ____mG/L
Sulfate: ____ mG/L

SDWA Compositing:
☐ No Compositing Permitted
☐ Within This System Only
☐ Within All Systems

16 **Field Remarks:** *(Optional)*

17 **Sample Type:** *(Check ☒ only one)* ☒ Water ☐ Vapor ☐ Tissue ☐ Other: ☐ Liquid: ☐ Soil ☐ Plant ☐ Blood ☐ Solid: ______

18 **Preservation:** *(Check ☒ all that apply)* ☒ No Preservation ☒ Stored at 4°C ☐ Preserved with HCl to pH < 2 ☐ Other: ______

19 **Analyses Requested:** *Please Check ☒ the appropriate box(es) below to indicate your analytical request(s); and, please indicate the number of bottles & vials submitted:* Bottles ____ Vials ____.

Volatile Screens:
☐-(754) Aromatic & Halogenated Volatiles (EPA 8021)
☐-(765) Mass Spectrometer Volatiles (EPA 8260)
☐-(774) Volatile Organic Compounds [VOC's] (EPA 502.2)
☐-(766) SDWA Total Trihalomethanes (EPA 502.2)

Other Specific Compounds or Classes:
☐-(___) ______
☐-(___) ______

Remarks: ______

Semivolatile Screens:
☐-(789) Drinking Water Semivolatile Screens (**Indented list**)
- ☐-(775) EDB, DBCP & TCP (EPA 504.1)
- ☐-(758) Acid Herbicides (EPA 515.2)
- ☐-(772) Carbamates (EPA 531.1)
- ☐-(781) Glyphosate (EPA 547)
- ☐-(782) Endothall (EPA 548.1)
- ☐-(783) Diquat (EPA 549.1)
- ☐-(788) SOC (EPA 525.2)

☐-(755) Base/Neutral Semivolatiles (No Acids) (EPA 8270)
☒-(756) Base/Neutral/Acids Semivolatiles (EPA 625/8270)
☐-(760) Organochlorine Pesticides / PCB's (EPA 608)
☐-(751) Hydrocarbon Fuel Screen (Modified EPA 8015)
☐-(768) Disinfection Byproducts Screen (**Indented list**)
- ☐-(771) Haloacetic Acids (EPA 552.2)
- ☐-(769) Haloacetonitriles / THM's (EPA 551.1)
- ☐-(770) Chloral Hydrate (EPA 551.1)
- ☐-(773) Total Organic Halides [TOX] (EPA 5320b)

01322

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: May 6, 1999
In Reply Refer To: ESH-18/WQ&H:99-0161
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Quality Bureau
Pollution Prevention Section
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

RECEIVED
MAY 10 1999
GROUND WATER BUR

SUBJECT: RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, JANUARY 1-MARCH 31, 1999

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from January 1 through March 31, 1999. In December 1998, the Laboratory proposed to submit quarterly reports to the N.M. Environment Department's Ground Water Quality Bureau on a voluntary basis. These quarterly reports include effluent and monitoring well analytical results as well as progress reports on the planned upgrades to the RLWTF.

Attachment 1.0 presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown in Attachment 1.0 for the monitoring period March 22, 1999, through April 18, 1999, were below N.M. Water Quality Control Commission (NM WQCC) Regulations, Section 3103 Ground Water Standards for nitrates (NO3-N), fluoride (F), and total dissolved solids (TDS).

In addition to the weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening from March 22, 1999, through April 22, 1999, showed the average nitrate (NO3-N) concentration in the effluent to be 7.3 mg/L for those samples collected upstream of the effluent holding tank and 5.1 mg/L for those samples collected at the effluent holding tank.

Attachment 2.0 presents the analytical results from the bimonthly sampling of Mortandad Canyon alluvial monitoring wells from October through April, 1999. The Laboratory's objective is to track any trends that might develop as a result of the improvements made in the RLWTF's effluent quality since March 21, 1999, when nitrate restrictions were initiated. The Laboratory will continue to monitor the alluvial wells in Mortandad Canyon on a bimonthly basis.

Table 2.0 Analytical Results from Sampling of Mortandad Canyon Alluvial Monitoring Wells (mg/L).

	Sample Date: October, 1998					Sample Date: December, 1998					Sample Date: February, 1999					Sample Date: April, 1999				
Location	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**
MCO-3	29.1	0.6	<0.2	507	1.1	36.4	0.7	<0.2	713	1.0	41.9	0.5	<0.2	595	0.9	8.2	0.4	<0.2	302	1
MCO-4B	16.1	0.4	<0.2	355	1.3	14.0	0.6	<0.2	343	1.4	37.8	0.4	<0.2	505	1.0	NS	NS	NS	NS	NS
MCO-6	13.7	0.4	<0.2	350	1.7	14.8	0.6	<0.2	374	1.7	17.0	0.4	<0.2	357	1.4					
MCO-6 duplicate	NA	NA	NA	NA	NA	15.0	0.6	<0.2	378	1.6	17.8	0.4	<0.2	362	1.4					
MCO-6B*																32.2	0.3	<0.2	494	1.2
MCO-7	16.0	0.4	<0.2	355	1.7	14.0	0.6	<0.2	368	1.8	13.8	0.3	<0.2	354	1.7	14.7	0.3	<0.2	351	1.7
MCO-7 duplicate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14.6	0.3	<0.2	355	1.7
NM WQCC 3103 Ground Water Standards	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*

Notes:
*Monitoring well MCO-6B, located in the immediate vicinity of MCO-6, was subsituted for MCO-6 during the April 1999 sampling round.
NA means that no duplicate sample was collected during this sampling event.
NS means that no sample was collected at this well due to insufficient water.
All units: mg/L

ghy11()

State of New Mexico
ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
P.O. Box 1663, MS/J-993
Los Alamos, New Mexico 87545

GARY JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

RECEIVED
MAY 13 1999
GROUND WATER BUR...

May 12, 1999

Jay Coghlan
Concerned Citizens for Nuclear Safety
107 Cienega St.
Santa Fe, NM 87501

Subject: **Status of Current and Planned Upgrades at the TA-50 Radioactive Liquid Waste Treatment Facility and the Ground Water Discharge Plan (DP-1132) Application**

Dear Mr. Coghlan:

We are responding to your March 29, 1999 request for information about status of current and planned upgrades at the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) and the associated Ground Water Discharge Plan (DP-1132) application. These responses are based upon our review of the Ground Water Discharge Plan, correspondence between NMED and the laboratory, and meetings with the laboratory and TA-50 personnel.

Your questions regarding TA-50 discharges during 1998 that exceeded New Mexico Water Quality Standards and DOE Derived Concentration Guidelines will require additional time. This also applies to your questions regarding TA-16. We will provide a response to those questions as soon as our data search and review is complete. If you have any questions regarding this response please contact Ralph Ford-Schmid or Bob Weeks at 827-1536.

Sincerely,

Tim Michael FOR SY

Steve Yanicak
NMED, DOE OB, LANL POC

cc with enclosures:

Greg Lewis, NMED, Director, WWMD
John Parker, NMED, Chief, DOE OB
Jim Davis, NMED, Chief, SWQB
James Bearzi, NMED, Chief, HRMB
Marcy Leavitt, NMED, Chief, GWQB
Joe Vozella, DOE/AIP/POC, MS A316
Steve Rae, LANL, ESH-18, MS K490
Steve Hanson, LANL, EM-RLW, MS E518

1. What is the current and planned status of retrofitting reverse osmosis equipment.
   - Is RO equipment now in the facility's "production" line?
   - If not, is there a time guaranteed by LANL? Please specify how RO equipment will improve the facility's performance.

Response:
The reverse osmosis (RO) is intended to remove water soluble (dissolved) constituents. The RO equipment has been installed, tested and went "hot" on April 7, 1999. The RO system will not be used "full time" until a pathway for the RO reject water is in place. Currently the RO reject stream is temporarily stored in Clarifier No. 1 (25,000 gallons) or WM-90 (100,000 gallons) at TA-50. Testing of the RO system has nearly exhausted this storage capacity for the RO reject water and will limit the use of the RO system until the Electrodialysis Reversal (EDR) and the Mechanical Evaporator are installed.

As part of their Ground Water Discharge Plan Application, LANL has submitted a project schedule (enclosed) for installation and start up of the proposed mechanical evaporator. The estimated ready-to-run date for the mechanical evaporator is February 28, 2000. It is, however, the Laboratory's goal to complete the project by December 22, 1999, if no appreciable delays are encountered.

Ultimately the RO reject stream will be fed into the EDR unit. The EDR will be used to concentrate the RO reject water prior to the Mechanical Evaporator. The EDR product water is routed back to the TA-50 headworks or back to the clarifier for reprocessing. The EDR concentrate is then routed to the mechanical evaporator. The distillate from the mechanical evaporator is sent to the effluent tanks for testing and discharged through NPDES outfall 051 or future re-use under the RLWTF's Zero Liquid Discharge Project. The evaporator bottoms, or solids, will be shipped to an off-site contractor for solidification and disposal or they will be solidified at TA-50 and disposed of at TA-54. See enclosed flow diagram (Figure 2.0).

2. What is the current and planned status of retrofitting ultrafiltration equipment.
   - When will ultrafiltration equipment be in the "production" line, at a time guaranteed by LANL?
   - To what extent will nitrate/nitrite, tritium and other water soluble constituents (please describe other constituents, as appropriate) be eliminated or greatly reduced?
   - Please specify how ultrafiltration equipment will improve the facility's performance.

Response:
The Tubular Ultrafiltration (TUF) equipment has been installed, tested and went "hot" on April 7, 1999. The TUF will continue to be used full-time and will remain the RWLTF's primary treatment unit until the RO can be used "full time". The TUF is not expected to be effective at reducing water soluble (dissolved) constituents, but it is very effective at removing particulate material. Until the RO system is in operation "full time" dissolved constituents will be present to some degree in the effluent.

The laboratory is currently using upstream controls (e.g., waste minimization, product substitution, and containerization) to reduce sources of nitrogenous wastes into the RLWTF. For example, the TA-55 Room 60 Process acid stream, which contains highly concentrated nitrogenous wastes, will be temporarily stored until the Nitric Acid Recovery System (NARS) is operational in June, 1999. These controls have resulted in significant reductions of nitrate/nitrite in the waste stream coming into the RWLTF and subsequently discharged in the effluent.

The laboratory plans to divert all tritiated water to TA-53 for treatment sometime in the near future (approximately 6 mos). The laboratory plans to install a solar evaporator to treat all tritiated waste (reactor and accelerator produced). The solar evaporator will replace the evaporation ponds at TA-53.

3. What is the general status of the RLWTF's Groundwater Discharge Plan?
   - Will measures to remediate existing contamination be incorporated into the Groundwater Discharge Plan?

Response:
The Ground Water Quality Bureau is reviewing LANL's responses to their requests for additional information to determine if the application is complete. The Environment Department Secretary will decide if a public hearing will be held to discuss DP-1132.

DP-1132 requires that if after two years of monitoring a series of wells in Mortandad Canyon, the groundwater quality does not meet WQCC standards, LANL will be required to submit a Groundwater Corrective Action Plan for NMED approval.

4. How does LANL guarantee that zero accelerator-produced tritium never enters the facility?

Response:
The Chemical Science and Technology Division, CST-13, has implemented a Waste Acceptance Criteria for the RLWTF that prohibits any waste generator from disposing of accelerator-produced tritium at the RLWTF. A Waste Profile Form (WPF) must be completed by each generator of waste prior to the acceptance of that waste stream at the RLWTF. The Radioactive and Industrial Wastewater Science group of CST-13 must approve the WPF before transfer to the Radioactive Liquid Waste Collection System. When the characteristics of a waste stream change, the waste generator must notify CST-13 and submit a new WPF for approval. In addition, the RLWTF Waste Acceptance Criteria places an upper-limit on the concentration of reactor-produced tritium allowed for treatment. The concentration of reactor-produced tritium allowed is 20,000 pCi/L.

5. Articles in the media indicated that LANL was considering instituting zero discharges for the RLWTF through the creation of a closed loop system.
   - What is the status of this concept?

Response:
The incentives for eliminating outfall 051, the regulatory and technical issues involved, and recommended steps to accomplish this goal are presented in a report published by LANL in 1998. The report, LA-13452-MS, 1998, is enclosed as an attachment to these responses. Many of the recommended steps have been completed or initiated. The biological process for nitrate removal, outlined in the report, has been replaced with the EDR and Mechanical Evaporator system. The installation of the EDR and the Mechanical Evaporator, to treat the RO reject water, is expected to result in a high quality RLWTF effluent capable of being recycled back to waste generators for re-use or use as cooling water supply.

Attachments

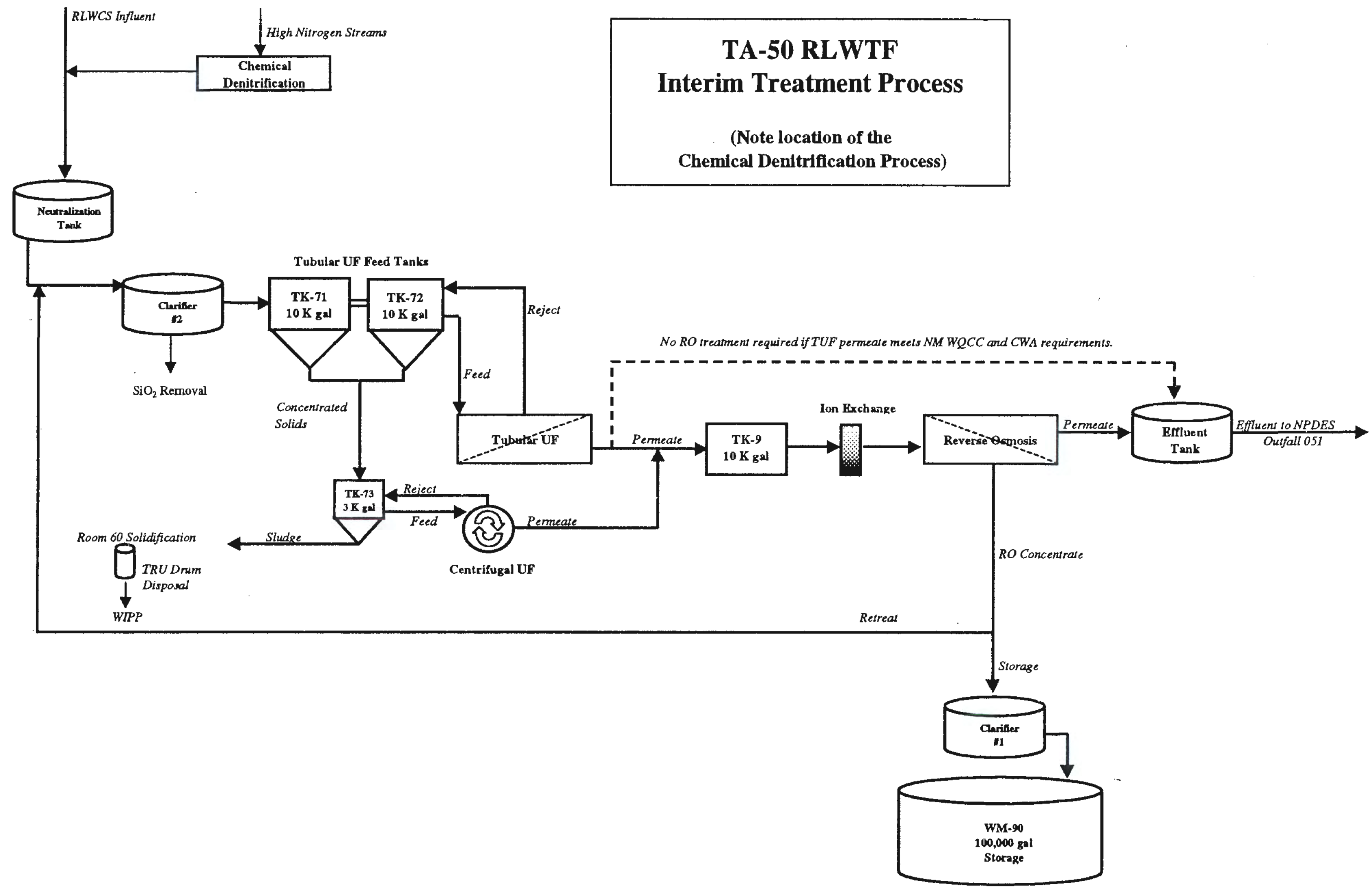
1) TA-50 RLWTF Interim Treatment Process
2) TA-50 RLWTF Final Treatment Process
3) Detailed Project Schedule
4) Radiation Liquid Waste Collection System
5) Sources of Liquid Waste to TA-50
6) LA-13452-MS Elimination of Liquid Discharge to the Environment for the TA-50 Radioactive Treatment Facility

ATTACHMENT 2.0

Figure 1.0. Schematic of Interim Treatment Process

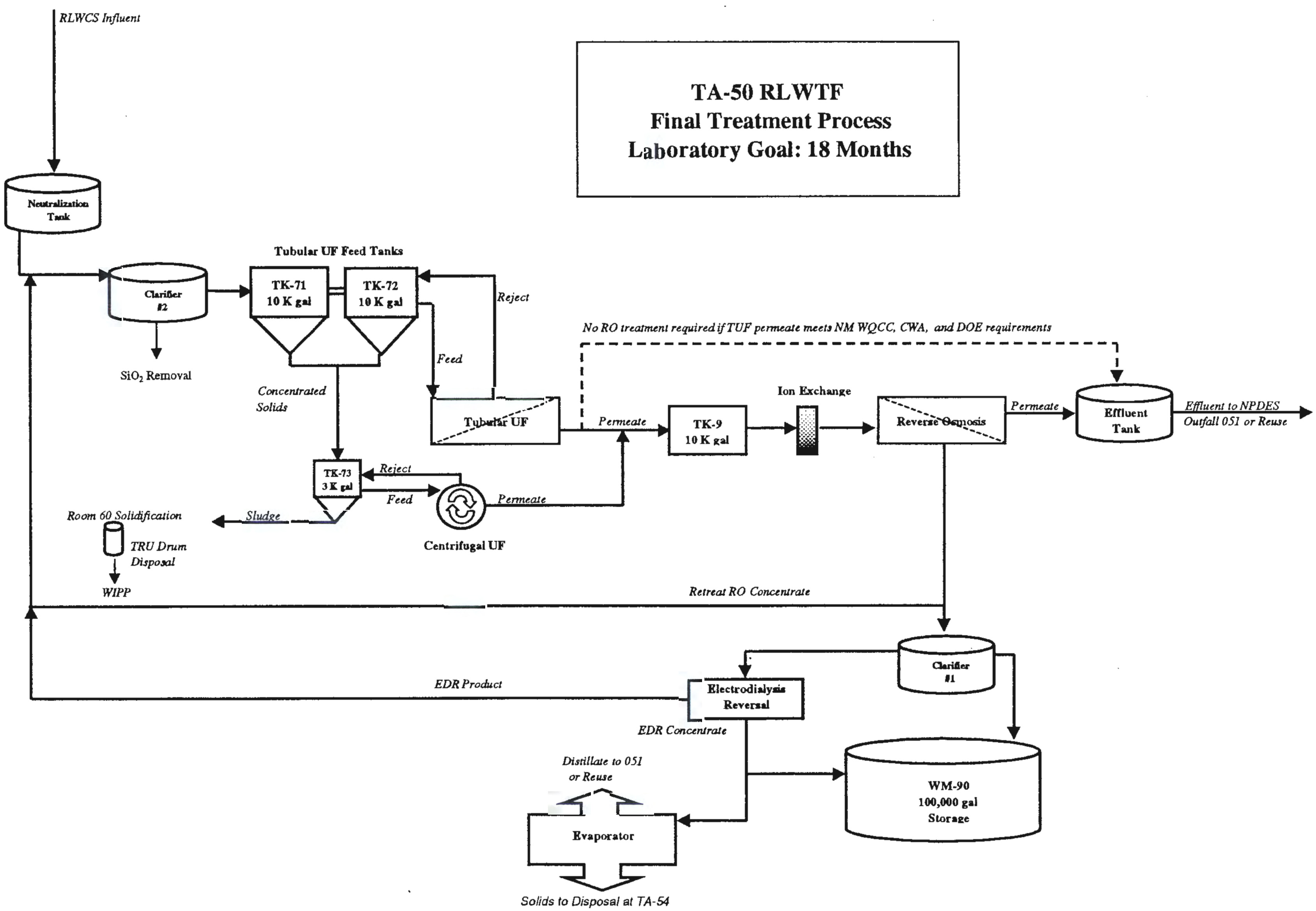
Figure 2.0. Schematic of Final Treatment Process

Figure 1.0



RLWCS Influent
High Nitrogen Streams
Chemical Denitrification
TA-50 RLWTF
Interim Treatment Process
(Note location of the
Chemical Denitrification Process)
Neutralization Tank
Clarifier #2
SiO2 Removal
Tubular UF Feed Tanks
TK-71 10 K gal
TK-72 10 K gal
Reject
Feed
Concentrated Solids
No RO treatment required if TUF permeate meets NM WQCC and CWA requirements.
Tubular UF
Permeate
TK-9 10 K gal
Ion Exchange
Reverse Osmosis
Permeate
Effluent Tank
Effluent to NPDES Outfall 051
TK-73 3 K gal
Reject
Feed
Permeate
Centrifugal UF
Room 60 Solidification
Sludge
TRU Drum Disposal
WIPP
RO Concentrate
Retreat
Storage
Clarifier #1
WM-90
100,000 gal
Storage

Figure 2.0



RLWCS Influent
TA-50 RLWTF
Final Treatment Process
Laboratory Goal: 18 Months
Neutralization Tank
Tubular UF Feed Tanks
Clarifier #2
TK-71 10 K gal
TK-72 10 K gal
Reject
No RO treatment required if TUF permeate meets NM WQCC, CWA, and DOE requirements
Feed
SiO2 Removal
Concentrated Solids
Ion Exchange
Tubular UF
Permeate
TK-9 10 K gal
Reverse Osmosis
Permeate
Effluent Tank
Effluent to NPDES Outfall 051 or Reuse
TK-73 3 K gal
Reject
Feed
Permeate
Room 60 Solidification
Sludge
TRU Drum Disposal
Centrifugal UF
WIPP
Retreat RO Concentrate
Clarifier #1
EDR Product
Electrodialysis Reversal
EDR Concentrate
Distillate to 051 or Reuse
WM-90 100,000 gal Storage
Evaporator
Solids to Disposal at TA-54

ATTACHMENT 4.0

Attachment 1, Estimated Quality of the Reverse Osmosis Concentrate Stream

Attachment 2, Estimated Quality of the Reverse Osmosis Permeate Stream

(Revised March 1999)

Submitted to NMED GWQB on November 20, 1998 (ESH-DO:98-349)

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

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

Notes:
*Temperature = 80°F

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

ATTACHMENT 2
(Revised March 1999)

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

3/8/99

CONSTITUENTS	UNITS	RO PERMEATE 70% RECOVERY	RO PERMEATE 80% RECOVERY	RO PERMEATE 90% RECOVERY	NM WQCC 3103. GROUND WATER STANDARDS
ALUMINUM	mg/liter	0.0077	0.0067	0.0060	5
ARSENIC	mg/liter	0.0001	0.0001	0.0001	0.1
BARIUM	mg/liter	0	0	0	1
BORON	mg/liter	0.090	0.079	0.070	0.75
CADMIUM	mg/liter	0.00003	0.00002	0.00002	0.01
CHLORIDE	mg/liter	10.6	13.9	26.1	250
CHROMIUM	mg/liter	0.0003	0.0003	0.0003	0.05
COPPER	mg/liter	0.0059	0.25	0.23	1
CYANIDE	mg/liter	0.0018	0.0016	0.0014	0.2
FLUORIDE	mg/liter	0	0	0	1.6
IRON	mg/liter	0.0054	0.0047	0.0042	1
LEAD	mg/liter	0.0003	0.0002	0.0002	0.05
MERCURY	mg/liter	5.15E-06	4.50E-06	4.00E-06	0.002
NITRATE-N	mg/liter	2.24	2.89	5.53	10
pH*	units	5.7	5.8	6.1	6 to 9
SELENIUM	mg/liter	0.00004	0.00004	0.00003	0.05
SULFATE	mg/liter	0.4	0.6	1.1	600
TDS	mg/liter	42	54	102	1000
URANIUM	mg/liter	0.00001	0.00001	0.00001	5
ZINC	mg/liter	0.0052	0.0046	0.0041	10

Notes:
Temperature = 80°F.
* pH adjustment will occur in the effluent tank prior to discharge.

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

:01339

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

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 21, 1999

Kathy Sanchez, President
Pi'ee Quiyo Inc.
Rt. 5 Box 442-B
San Ildefonso Pueblo
Española, New Mexico 87532

RE: Public Hearing, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Ms. Sanchez:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) has received comments and requests for a public hearing for the approval of the groundwater discharge plan for the Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132, located in Los Alamos, New Mexico in Section 22, T19N, R6E, Los Alamos County.

On May 4, 1999, the Cabinet Secretary of NMED determined there is significant public interest in the approval of DP- 1132, and a public hearing will be held pursuant to the New Mexico Water Quality Control Commission (WQCC) Regulation 3108.E. The GWQB technical review of the discharge plan is currently ongoing. Once the discharge plan has been deemed technically complete, a public hearing will be scheduled. Interested participants will be notified of the hearing by mail and a notice will be published in local newspapers at least 30 days in advance of the hearing with the date and location of the hearing. For your information, a copy of the flow diagram describing the discharge plan process and a copy of WQCC Regulation 3110 which details the public hearing participation process have been enclosed.

Thank you for your cooperation. If you have any questions, please contact Phyllis Bustamante at

827-0166 or Phyllis_Bustamante@nmenv.state.nm.us, or Dale Doremus at 827-2945 or Dale_Doremus@nmenv.state.nm.us.

Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

ML:PAB/pab

enc: Discharge Plan Processing Flow Chart
WQCC Regulation 3110

xc: Benito Garcia, District Manager, NMED District II
David Gurule, Area Manager, Department of Energy, Los Alamos Area Office, 528 35th Street, Los Alamos, New Mexico 87544

3110. PUBLIC HEARING PARTICIPATION

A. The secretary may appoint an impartial hearing officer to preside over the hearing. The hearing officer may be a department employee other than an employee of the bureau evaluating the application. [2-18-77, 12-1-95; 20 NMAC 6.2.3108.C, 11-15-96]

B. The hearing shall be at a place in the area affected by the facility for which the discharge plan proposal, modification or renewal is sought. [11-15-96]

C. Any person who wishes to present technical evidence at the hearing shall, no later than ten (10) days prior to the hearing, File with the department, and if filed by a person who is not the applicant, serve on the applicant, a statement of intent to present evidence. A person who does not file a statement of intent to present evidence may present a general non-technical statement in support of or in opposition to the discharge plan proposal, modification or renewal. The statement of intent to present technical evidence shall include:

1. the name of the person filing the statement;

2. indication of whether the person filing the statement supports or opposes the discharge plan proposal, modification or renewal;

3. the name of each witness;

4. an estimate of the length of the direct testimony of each witness;

5. a list of exhibits, if any, to be offered into evidence at the hearing; and

6. a summary or outline of the anticipated direct testimony of each witness.

[11-15-96]

D. At the hearing, the New Mexico Rules of Civil Procedure, SCRA 1986, 1-001 to 1-102 and the New Mexico Rules of Evidence, SCRA 1986, 11-101 to 11-1102 shall not apply. At the discretion of the hearing officer, the rules may be used as guidance. Any reference to the Rules of Civil Procedure and the Rules of Evidence shall not be construed to extend or otherwise modify the authority and jurisdiction of the department under the Act. [11-15-96]

E. The hearing officer shall conduct a fair and impartial proceeding, assure that the facts are fully elicited, and avoid delay. The hearing officer shall have authority to take all measures necessary for the maintenance of order and for the efficient, fair and impartial adjudication of issues arising in the proceedings. [11-15-96]

F. At the hearing, all persons shall be given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing. [2-18-77; 20 NMAC 6.2.3108.C, 11-15-96]

G. Unless otherwise allowed by the hearing officer, testimony shall be presented in the following order:

1. testimony by and examination of the applicant or permittee proving the facts relied upon to justify the proposed discharge plan, renewal or modification and meeting the requirements of the regulations;

2. testimony by and examination of technical witnesses supporting or opposing approval, approval subject to conditions, or disapproval of the proposed discharge plan, renewal or modification, in any reasonable order;

3. testimony by the general public; and

4. rebuttal testimony, if appropriate.

[11-15-96]

H. The secretary may provide translation service at a public hearing conducted in a locale where the Department can reasonably expect to receive testimony from non-English speaking people. [12-1-95; 20 NMAC 6.2.3108.C, 11-15-96]

I. If determined useful by the hearing officer, within thirty (30) days after conclusion of the hearing, or within such time as may be fixed by the hearing officer, the hearing officer may allow proposed findings of fact and conclusions of law and closing argument. All such submissions, if allowed, shall be in writing, shall be served upon the applicant or permittee, the department and all persons who request copies in advance in writing, and shall contain adequate references to the record and authorities relied on. No new evidence shall be presented unless specifically allowed by the hearing officer. [11-15-96]

J. The department shall make an audio recording of the hearing. If the applicant or permittee, or a participant requests a written transcript or certified copy of the audio recording, the requestor shall pay the cost of the transcription or audio copying. [11-15-96]

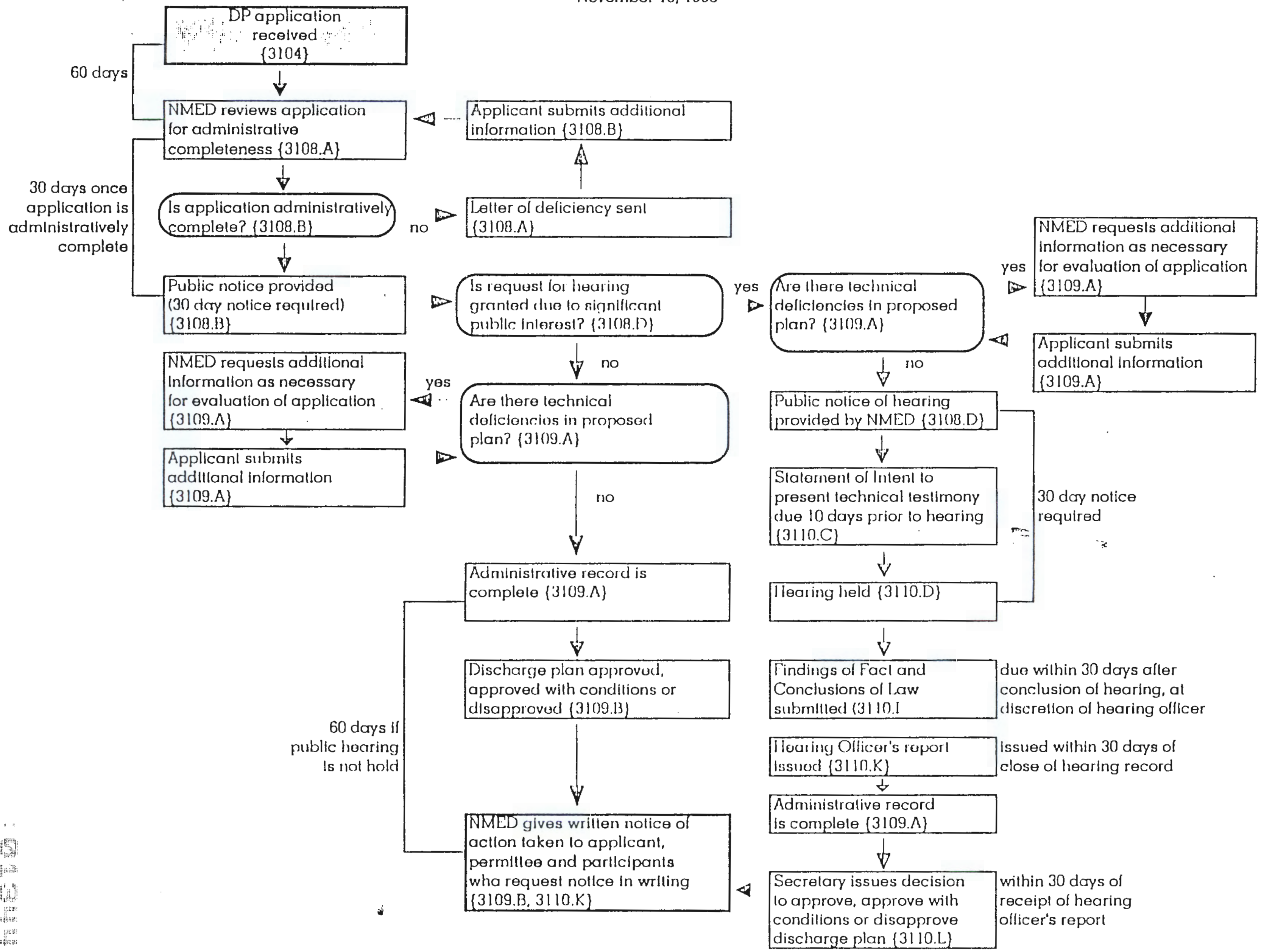
K. The hearing officer shall issue a report within thirty (30) days after the close of the hearing record. The report may include findings of fact, conclusions regarding all material issues of law or discretion, as well as reasons therefore. The report shall be served on the applicant or permittee, the department, and all persons who request copies in advance in writing. The report will be available for public inspection at the department's office in Santa Fe and at the field office closest to the point of the proposed discharge. [11-15-96]

L. The secretary shall issue a decision in the matter no later than thirty (30) days of receipt of the hearing report. The decision shall be served and made available for inspection pursuant to Subsection K above. [11-15-96]

M. Any person who testifies at the hearing or submits a written statement for the record will be considered a participant for purposes of Subsection 3113 and NMSA 1978, §74-6-5.N. [11-15-96]

DISCHARGE PLAN REVIEW PROCESS

November 15, 1996



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State of New Mexico
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Fax (505) 827-2965

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

Z 434 830 647

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Sent to	Mr. David Gurule, Area Manager
Street & Number	Dept. of Energy, Los Alamos Area
	528 35th Street
Post Office, State, & ZIP Code	Los Alamos, NM 87544
	$
Postage	
Certified Fee	

CERTIFIED LETTER - RETURN

June 30, 1999

David Gurule, Area Manager
Department of Energy, Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544

RE: Public Hearing, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132

Dear Mr. Gurule:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) has received comments and requests for a public hearing for the approval of the groundwater discharge plan for the Los Alamos National Laboratory (LANL), Radioactive Liquid Waste Treatment Facility (RLWTF), DP-1132, located in Los Alamos, New Mexico in Section 22, T19N, R6E, Los Alamos County.

On May 4, 1999, the Cabinet Secretary of NMED determined there is significant public interest in the approval of DP-1132, and a public hearing will be held pursuant to the New Mexico Water Quality Control Commission (WQCC) Regulation 3108.E. The GWQB technical review of the discharge plan is currently ongoing. Once the discharge plan has been deemed technically complete, a public hearing will be scheduled. Interested participants will be notified of the hearing by mail and a notice will be published in local newspapers at least 30 days in advance of the hearing with the date and location of the hearing. For your information, a copy of the flow diagram describing the discharge plan process and a copy of WQCC Regulation 3110 which details the public hearing participation process have been enclosed.

Thank you for your cooperation. If you have any questions, please contact Phyllis Bustamante at 827-0166 or Phyllis_Bustamante@nmenv.state.nm.us, or Dale Doremus at 827-2945 or Dale_Doremus@nmenv.state.nm.us.

Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

ML:PAB/pab

enc: Discharge Plan Processing Flow Chart
WQCC Regulation 3110

xc: Benito Garcia, District Manager, NMED District II
John Kieling, HRMB
Barbara Hoditschek, SWQB
Ralph Ford-Schmid, DOE Oversight Bureau
Steve Rae, LANL, Mail Stop K497, Los Alamos, New Mexico 87545

State of New Mexico
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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

CERTIFIED LETTER - RETURN RECEIPT REQUIRED

June 30, 1999

David Gurule, Area Manager
Department of Energy, Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544

RE: Public Hearing, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132

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Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 21, 1999

Susan Diane
P.O. Box 9855
Santa Fe, New Mexico 87504

RE: Public Hearing, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Ms. Diane:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) has received comments and requests for a public hearing for the approval of the groundwater discharge plan for the Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132, located in Los Alamos, New Mexico in Section 22, T19N, R6E, Los Alamos County.

On May 4, 1999, the Cabinet Secretary of NMED determined there is significant public interest in the approval of DP- 1132, and a public hearing will be held pursuant to the New Mexico Water Quality Control Commission (WQCC) Regulation 3108.E. The GWQB technical review of the discharge plan is currently ongoing. Once the discharge plan has been deemed technically complete, a public hearing will be scheduled. Interested participants will be notified of the hearing by mail and a notice will be published in local newspapers at least 30 days in advance of the hearing with the date and location of the hearing. For your information, a copy of the flow diagram describing the discharge plan process and a copy of WQCC Regulation 3110 which details the public hearing participation process have been enclosed.

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Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

ML:PAB/pab

enc: Discharge Plan Processing Flow Chart
WQCC Regulation 3110

xc: Benito Garcia, District Manager, NMED District II
David Gurule, Area Manager, Department of Energy, Los Alamos Area Office, 528 35th Street, Los Alamos, New Mexico 87544

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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 21, 1999

Douglas Meiklejohn, Executive Director
New Mexico Environmental Law Center
1405 Luisa Street, Suite 5
Santa Fe, New Mexico 87505

RE: Public Hearing, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Mr. Meiklejohn:

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Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

ML:PAB/pab

enc: Discharge Plan Processing Flow Chart
WQCC Regulation 3110

xc: Benito Garcia, District Manager, NMED District II
David Gurule, Area Manager, Department of Energy, Los Alamos Area Office, 528 35th Street, Los Alamos, New Mexico 87544

State of New Mexico
ENVIRONMENT DEPARTMENT
Ground Water Quality Bureau
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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 21, 1999

Kathy Sanchez, President
Pi'ee Quiyo Inc.
Rt. 5 Box 442-B
San Ildefonso Pueblo
Española, New Mexico 87532

RE: Public Hearing, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Ms. Sanchez:

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Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

ML:PAB/pab

enc: Discharge Plan Processing Flow Chart
WQCC Regulation 3110

xc: Benito Garcia, District Manager, NMED District II
David Gurule, Area Manager, Department of Energy, Los Alamos Area Office, 528 35th Street, Los Alamos, New Mexico 87544

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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 21, 1999

Joey Natseway
Tewa Women United
Rte 5 Box 298
Santa Fe, New Mexico 87501

RE: Public Hearing, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Ms. Natseway:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) has received comments and requests for a public hearing for the approval of the groundwater discharge plan for the Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132, located in Los Alamos, New Mexico in Section 22, T19N, R6E, Los Alamos County.

On May 4, 1999, the Cabinet Secretary of NMED determined there is significant public interest in the approval of DP- 1132, and a public hearing will be held pursuant to the New Mexico Water Quality Control Commission (WQCC) Regulation 3108.E. The GWQB technical review of the discharge plan is currently ongoing. Once the discharge plan has been deemed technically complete, a public hearing will be scheduled. Interested participants will be notified of the hearing by mail and a notice will be published in local newspapers at least 30 days in advance of the hearing with the date and location of the hearing. For your information, a copy of the flow diagram describing the discharge plan process and a copy of WQCC Regulation 3110 which details the public hearing participation process have been enclosed.

Thank you for your cooperation. If you have any questions, please contact Phyllis Bustamante at

827-0166 or Phyllis_Bustamante@nmenv.state.nm.us, or Dale Doremus at 827-2945 or Dale_Doremus@nmenv.state.nm.us.

Sincerely,

Marcy Leavitt, Chief
Ground Water Quality Bureau

ML:PAB/pab

enc: Discharge Plan Processing Flow Chart
WQCC Regulation 3110

xc: Benito Garcia, District Manager, NMED District II
David Gurule, Area Manager, Department of Energy, Los Alamos Area Office, 528 35th Street, Los Alamos, New Mexico 87544

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: July 23, 1999
In Reply Refer To: ESH-18/WQ&H:99-0274
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, APRIL 1-JUNE 30, 1999

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from April 1 through June 30, 1999. In December 1998, the Laboratory proposed to submit quarterly reports to the N.M. Environment Department's Ground Water Quality Bureau on a voluntary basis. These quarterly reports include effluent and monitoring well analytical results as well as progress reports on the planned upgrades to the RLWTF.

Attachment 1.0 presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results for the monitoring period March 15, 1999, through June 27, 1999, were below N.M. Water Quality Control Commission (NM WQCC) Regulations, Section 3103 Ground Water Standards for nitrates (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of a nitrate (NO3-N) exceedance during the week of March 15-21, 1999. Please note that analysis was not completed on six fluoride and nine TDS samples during this quarter. These samples were disposed of before analysis could be completed. Actions have been taken with the analytical laboratory to prevent this problem from reoccurring.

In addition to the weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the second quarter of 1999 (April, May, and June) showed the average nitrate (NO3-N) concentration to be 4.6 mg/L.

Attachment 2.0 presents the analytical results from second quarter ground water sampling at the Laboratory's Mortandad Canyon alluvial monitoring wells. The Laboratory's objective is to closely track any trends that might develop as a result of the improvements made in the RLWTF's effluent quality since March 21, 1999, when nitrate restrictions were initiated. The Laboratory will continue to monitor the alluvial wells in Mortandad Canyon on a routine basis.

During the second quarter of 1999, the RLWTF continued to treat radioactive liquid waste with the Phase I treatment upgrades (tubular ultrafilter and reverse osmosis). The RO treatment unit continues to be used only when the permeate stream from the tubular ultrafilter fails to meet NM WQCC ground water standards or NPDES Permit requirements.

On April 14, 1999, the Laboratory submitted to you a detailed project schedule and an estimated completion date for installation and start-up of the proposed mechanical evaporator for the RLWTF (ESH-DO:99-058). The Laboratory is still on schedule to meet the ready-to-run completion date of February 28, 2000.

In November 1998, the Laboratory reported to you that the Nitric Acid Recovery System (NARS) at TA-55 was scheduled to be completed in June 1999 (ESH-DO:98-349, November 20, 1999). Due to budgetary constraints, completion of the NARS Project at TA-55 has been delayed. The Laboratory's current goal is to complete the NARS Project by December, 1999.

If you would like additional information, please contact me at 667-7969.

Sincerely,

Bob Beers

Bob Beers
Water Quality and Hydrology Group

RB/em

Attachments: a/s

Cy: M. Leavitt, NMED GWQB, Santa Fe, New Mexico, w/att.
J. Davis, NMED SWQB, Santa Fe, New Mexico, w/att.
B. Garcia, NMED HRMB, Santa Fe, New Mexico, w/att.
S. Yanicak, NMED DOE/OB, w/att., MS J993
B. Stine, ALDNW, w/att., MS F629
J. Vozella, DOE LAAO, w/att., MS A316
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T. Gunderson, DLDOPS, w/att., MS A100
D. Erickson, ESH-DO, w/att., MS K491
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T. Connors, FWO-FWM, w/att., MS E518
D. Moss, FWO-RLW, w/att., MS E518
P. Worland, FWO-RLW, w/att., MS E518

Cy: (continued)

D. Woitte, LC/GL, w/att., MS A187
S. Schreiber, NMT-2, w/att., MS H845
S. Yarbro, NMT-2, w/att., MS E511
S. Gibbs, NW-MM, w/att., MS A102
WQ&H File, w/enc., w/att., MS K497
CIC-10, w/enc., w/att., MS A150

Table 1.0. RLWTF Weekly Effluent Monitoring Analytical Results, March 15-June 27, 1999.

Monitoring Period	**Weekly Effluent Monitoring Analytical Results**		
	NO3-N (mg/L)	**F (mg/L)**	**TDS (mg/L)**
3/15/99-3/21/99	13	1.09	728
3/22/99-3/28/99	6.72	0.69	476
3/29/99-4/4/99	6.97	0.93	452
4/5/99-4/11/99	7.81	0.88	304
4/12/99-4/18/99	1.91	0.24	162
4/19/99-4/25/99	3.03	0.7	NA
4/26/99-5/2/99	1.02	0.41	236
5/3/99-5/9/99	1.71	0.43	NA
5/10/99-5/16/99	6.17	0.58	NA
5/17/99-5/23/99	3.95	NA	NA
5/24/99-5/30/99	5.27	NA	NA
5/31/99-6/6/99	5.31	NA	NA
6/7/99-6/13/99	2.4	NA	NA
6/14/99-6/20/99	0.46	NA	NA
6/21/99-6/27/99	1.8	NA	NA
Quarterly Average (mg/L)	**4.50**	**0.66**	**393**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

Notes:
NA means that no sample results are available for this monitoring period.

Table 2.0 Analytical Results from Sampling of Mortandad Canyon Alluvial Monitoring Wells (mg/L), April-June, 1999.

	Sample Date: April 13, 1999					Sample Date: May 14, 1999					Sample Date: June 24, 1999					
Location	NO3-N	TKN	NH3	TDS	F	NO3-N	TKN	NH3	TDS	F	NO3-N	NO2-N	TKN	NH3	TDS	F
MCO-3	**8.2**	**0.4**	**<0.2**	**302**	**1.0**	**5.0**	**0.3**	**<0.2**	**285**	**0.9**	**2.1**	**<0.1**	**0.5**	**<0.2**	**259**	**1.0**
MCO-4B	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	**28.5**	**0.4**	**0.3**	**<0.2**	**494**	**1.0**
MCO-4B duplicate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**30.5**	**0.5**	**0.3**	**<0.2**	**487**	**1.0**
MCO-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**30.8**	**0.5**	**0.6**	**<0.2**	**509**	**1.2**
MCO-6B*	**32.2**	**0.3**	**<0.2**	**494**	**1.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MCO-7	**14.7**	**0.3**	**<0.2**	**351**	**1.7**	NA	NA	NA	NA	NA	**24.2**	**0.3**	**0.4**	**<0.2**	**399**	**1.4**
MCO-7 duplicate	**14.6**	**0.3**	**<0.2**	**355**	**1.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NM WQCC 3103 Ground Water Standards	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*	*10*				*1000*	*1.6*

Notes:
*Monitoring well MCO-6B, located in the immediate vicinity of MCO-6, was subsituted for MCO-6 during the April 1999 sampling round.
NA means that no sample was collected during this sampling event.
NS means that no sample was collected at this well due to insufficient water.
All units: mg/L

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: July 23, 1999
In Reply Refer To: ESH-18/WQ&H:99-0274
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

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If you would like additional information, please contact me at 667-7969.

Sincerely,

Bob Beers

Bob Beers
Water Quality and Hydrology Group

RB/em

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MCO-7 duplicate	14.6	0.3	<0.2	355	1.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NM WQCC 3103 Ground Water Standards	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*	*10*				*1000*	*1.6*

Notes:
*Monitoring well MCO-6B, located in the immediate vicinity of MCO-6, was subsituted for MCO-6 during the April 1999 sampling round.
NA means that no sample was collected during this sampling event.
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All units: mg/L

NEW MEXICO
ENVIRONMENTAL LAW CENTER

August 6, 1999

Marcy Leavitt, Chief
Ground Water Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, N.M. 87502

Re: New Mexico Environment Department discharge plan 1132

Dear Ms. Leavitt:

Thank you for sending me the materials concerning discharge plan 1132.

The New Mexico Environmental Law Center's request for a public hearing on the discharge plan was made on behalf of the San Ildefonso Pueblo, but the Law Center is no longer representing the Pueblo. I therefore would appreciate it if you would remove the Law Center from the Environment Department's mailing list for the discharge plan, and direct all future mailings to the Pueblo directly. Please send all materials to:

The Honorable Terry Aguilar
Governor
San Ildefonso Pueblo
Route 5, Box 315A
Santa Fe, N.M. 87501.

Please do not hesitate to contact me if you have any questions concerning this matter.

Thank you for your cooperation.

Yours truly,

Douglas Meiklejohn
Executive Director

pc: Peter Chestnut
Attorney at Law

1405 Luisa St., Suite 5 Santa Fe, N.M. 87505
(505) 989-9022 FAX (505) 989-3769

Proceso Modificado

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: October 4, 1999
In Reply Refer To: ESH-18/WQ&H:99-0394
Mail Stop: K497
Telephone: (505) 667-7969

RECEIVED
OCT 06 1999
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN, DP-1132

Dear Ms. Bustamante:

Pursuant to New Mexico Water Quality Control Commission Regulation 3107.C., Los Alamos National Laboratory (Laboratory) would like to notify your agency of a process modification at the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). As you are aware, in March 1999 the RLWTF began operating a tubular ultrafiltration (TUF) unit as part of the Phase I facility upgrades. In September 1999, the RLWTF's operators determined that a critical seal in the TUF unit was leaking. The leak was resulting in a by-pass or short-circuit between the permeate and concentrate (reject) streams. The TUF was taken out of service and primary treatment operations at the RLWTF were replaced with the facility's clarifiers.

A subsequent investigation by the RLWTF determined that it is necessary to replace all 300 of the TUF unit's stainless steel filter tubes with CPVC tubes. Tube replacement will begin during the first week of October, 1999 and is scheduled for completion in early November 1999.

Until the TUF unit can be repaired and returned to service, primary treatment is being conducted by the clarifiers and the anthracite/sand filters. As you are aware, the RLWTF has extensive experience with these treatment units, their use dating back to 1963. Secondary treatment by the reverse osmosis (RO) treatment unit is being conducted only as necessary to meet NPDES and NMWQCC effluent limits. Concentrates (rejects) from the RO unit continue to be stored on-site awaiting volume reduction by the electrodialysis reversal (EDR) treatment unit and final treatment by the interim evaporator.

The EDR unit has been installed, is currently being tested with potable water, and is scheduled for start-up in October 1999. The interim evaporator is on-site and is scheduled to be placed into service in February, 2000.

Please contact me at 667-7969 if you have any questions or concerns regarding this notification.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/rm

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas
E. Spencer, USEPA, Region 6, Dallas, Texas
J. Davis, NMED/SWQB, Santa Fe, New Mexico
J. Bearzi, NMED/HRMB, Santa Fe, New Mexico
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:01374

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: October 29, 1999
In Reply Refer To: ESH-18/WQ&H:99-0425
Mail Stop: K497
Telephone: (505) 667-7969

RECEIVED
OCT 29 1999
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, JULY-SEPTEMBER, 1999

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from July 1 through September 30, 1999. In December 1998, the Laboratory proposed to submit quarterly reports to the New Mexico Environment Department's Ground Water Quality Bureau (NMED GWQB) on a voluntary basis. These quarterly reports include effluent and monitoring well analytical results as well as a progress report on the planned upgrades to the RLWTF.

Attachment 1.0 presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the third quarter of 1999 were below New Mexico Water Quality Control Commission (NM WQCC) Ground Water Standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of two fluoride exceedances during the weeks of August 16-22 and August 23-29, 1999. During this two-week period the RLWTF began using the clarifiers for pre-treatment. As you are aware, the lime used during the clariflocculation treatment process contains fluoride. The RLWTF reformulated the treatment chemicals used during clariflocculation (reducing the lime dose, increasing the iron dose) in order to minimize the amount of lime added. Fluoride concentrations after reformulation (8/30/99-9/26/99) returned to below the NM WQCC Ground Water Standard of 1.6 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the third quarter of 1999 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 9.4 mg/L, 0.9 mg/L, and 5.04 mg/L.

Attachment 2.0 presents the analytical results from second and third quarter ground water sampling at the Laboratory's Mortandad Canyon alluvial monitoring wells. The Laboratory's objective is to closely track any trends that might develop as a result of the improvements made in the RLWTF's effluent quality since March 21, 1999, when nitrate restrictions were initiated. The Laboratory will continue to monitor the alluvial wells in Mortandad Canyon on a routine basis.

In an October 4, 1999, letter (ESH-18/WQ&H:99-0394), the Laboratory notified the NMED GWQB that a critical seal had failed in the tubular ultrafilter (TUF) treatment unit. In addition, the letter informed the NMED GWQB that until the TUF unit can be repaired and returned to service, primary treatment would be performed by the RLWTF's clarifiers and anthracite/sand filters. Repair work on the TUF unit is scheduled for completion in mid-November 1999, with the TUF and RO returning to service by mid-December 1999. The RLWTF will continue to use the clarifiers for pretreatment after the TUF and RO units return to service.

The Laboratory is continuing to make progress towards completion of two significant upgrades to the RLWTF: the electrodialysis reversal (EDR) treatment unit, and the interim volume reducing evaporator. The EDR has been operated using non-radioactive tap water and is currently undergoing a readiness assessment. Start-up is now scheduled for mid-December 1999. The interim evaporator is on-site and preparations are underway for its installation. The evaporator project is still on schedule to meet the projected ready-to-run completion date of February 28, 2000.

As you are aware, until the interim evaporator becomes operational the RLWTF must store all of the reject (concentrate) wastewater from the RO treatment unit. During late-October 1999, the RLWTF will be siting approximately 40,000 gallons of temporary storage capacity at TA-50 for storing RO reject/EDR concentrate wastewaters. All RO reject wastewater in temporary storage will be treated by the EDR and interim evaporator prior to discharge at NPDES Outfall 051 once those treatment units become operational.

Please contact me at 667-7969 if you would like additional information.

Sincerely,

Bob Beers

Bob Beers
Water Quality and Hydrology Group

BB/rm

Enclosures: a/s

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S. Yarbro, NMT-2, MS E511
T. Stanford, FWO/DO, MS K492
S. Hanson, FWO-RLW, MS E518
D. Moss, FWO-RLW, MS E518
R. Alexander, FWO-WFM, MS E518
P. Worland, FWO-RLW, MS E518
D. Erickson, ESH-DO, MS K491
S. Rae, ESH-18, MS K497
M. Saladen, ESH-18,MS K497
D. Woitte, LC/GL, MS A187
P. Wardwell, LC/GL, MS A187
WQ&H File, MS K497
CIC-10, MS A150

Table 1.0. RLWTF Weekly Effluent Monitoring Analytical Results, July-September, 1999.

Monitoring Period	RLWTF Weekly Effluent Monitoring Analytical Results		
	NO3-N (mg/L)	F (mg/L)	TDS (mg/L)
6/28-7/4	5.82	1.32	1000
7/5-7/11	2.84	0.74	398
7/12-7/18	2.34	0.80	286
7/19-7/25	1.08	0.28	134
7/26-8/1	0.69	0.39	104
8/2-8/8	0.82	0.29	156
8/9-8/15	1.32	0.26	108
8/16-8/22	8.43	3.49	792
8/23-8/29	8.42	4.51	782
8/30-9/5	4.08	1.39	710
9/6-9/12	3.48	0.73	510
9/13-9/19	2.59	0.73	564
9/20-9/26	3.95	0.68	636
Quarterly Average (mg/L)	**3.53**	**1.20**	**475**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

Table 2.0 Analytical Results from Sampling of Mortandad Canyon Alluvial Monitoring Wells (mg/L), April-August, 1999.

Sampling Location	**Sample Date: April 13, 1999**					**Sample Date: June 24, 1999**					**Sample Date: August 19, 1999**				
	NO3-N	**TKN**	**NH3**	**TDS**	**F**	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**
MCO-3	8.2	0.4	<0.2	302	1.0	2.1	0.5	<0.2	259	1.0	2.2	0.3	<0.2	310	0.8
MCO-4B	NS	NS	NS	NS	NS	28.5	0.3	<0.2	494	1.0	16.9	0.3	<0.2	392	1.0
MCO-4B duplicate	NS	NS	NS	NS	NS	30.5	0.3	<0.2	487	1.0	16.9	0.2	<0.2	392	1.0
MCO-6	NA	NA	NA	NA	NA	30.8	0.6	<0.2	509	1.2	26.8	0.4	<0.2	492	1.1
MCO-6B*	32.2	0.3	<0.2	494	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MCO-7	14.7	0.3	<0.2	351	1.7	24.2	0.4	<0.2	399	1.4	29.4	0.5	<0.2	468	1.3
MCO-7 duplicate	14.6	0.3	<0.2	355	1.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*

Notes:

*Monitoring well MCO-6B, located in the immediate vicinity of MCO-6, was subsituted for MCO-6 during the April 1999 sampling round.

NA means that no sample was collected during this sampling event.

NS means that no sample was collected at this well due to insufficient water.

All units: mg/L

: 01380

Phyllis

State of New Mexico
ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
P.O. Box 1663, MS/J-993
Los Alamos, New Mexico 87545

GARY JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

RECEIVED
DEC 23 1999
GROUND WATER BUREAU

December 22, 1999

Steve Rae
Water Quality and Hydrology Group Leader
ESH-18/WQ&H
MS: K497
Los Alamos, NM 87545

Re: **Radioactive Effluent Quality at NPDES Outfall 051, TA-50, Building 1, October, 1999; (ESH-18/WQ&H:99-0467)**

Dear Mr. Rae:

On December 15, 1999, the New Mexico Environment Department, Department of Energy Oversight Bureau received the letter, dated December 9, 1999, referenced above. The letter reported the TA-50 radioactive effluent quality data as monthly average concentrations of nine radioisotopes and compared them with the corresponding DOE Derived Concentration Guideline (DCG) value.

We are pleased to see that the recent modifications to the TA-50 treatment system has enabled the facility to reduce the average concentration of the isotopes discharged to levels below their individual DCGs. However, we question the statement "There were no exceedances of DCGs during the monitoring period". It is our understanding that DOE Order 5400.5 requires that to meet the DCG for discharges containing multiple radionuclides, the sum of their respective fractional DCG values must equal less than one.

While monthly average concentrations of individual isotopes were indeed less than their individual DCGs, the sum of their fractional DCG values was 2.16 (see Table 1). The majority of this was due to the fractional DCG values for Pu-238 (0.70), Pu-239 (0.77), and Am-241 (0.57) which total 2.04.

Please let me know if you agree or disagree with our interpretation of DOE Order 5400.5 as it applies to waste streams containing multiple radionuclides and the appropriate DCG. Contact me at 667-0448 or Ralph Ford-Schmid at 827-1536 if you have any questions on this issue. We will look forward to your response.

Sincerely,

Stephen Yanicak

Steve Yanicak,
Point of Contact/LANL,
NMED, DOE OB

SY:rfs

cc: w/enclosures
John Parker, Chief, NMED, DOE OB
Jim Davis, Chief, NMED, SWQB
Marcy Leavitt, Chief, NMED, GWQB
Carl Sykes, DOE/AIP/POC, MS: A316

:01381

Table 1 (Modified from ESH-18/WQ&H:99-0467, December 9, 1999)

Species	DCG as (Ci/L)	Effluent as (Ci/L)	Fractional DCG Value
Sr-89	20.0 E-9	10.0 E-12	5.0 E-4
Sr-90	1.0 E-9	19.0 E-12	1.9 E-2
Tritium	2.0 E-6	7.4 E-9	3.7 E-3
U-234	500.0 E-12	25.0 E-12	5.0 E-2
U-235	5.0 E-9	0.1 E-12	2.0 E-5
Cs-137	3.0 E-9	150.0 E-12	5.0 E-2
Pu-238	40.0 E-12	28.0 E-12	7.0 E-1
Pu-239	30.0 E-12	23.0 E-12	7.7 E-1
Am-241	30.0 E-12	17.0 E-12	5.7 E-1
		Sum of Fractional DCGs for Pu-238, Pu-239 & Am-241	2.04
		Sum of Fractional DCGs for all Isotopes	2.16

ATTACHMENT 10.0

Revised Table 3.0. Proposed Monitoring Plan for the RLWTF Ground Water Discharge Plan

Revision No. 2. March 1999

Table 3.0. Proposed Monitoring Plan for the RLWTF Ground Water Discharge Plan Application [Revision 2. March 1999].

LOCATION	PARAMETER	NOTES	FREQUENCY
Discharge Point	Volume, in gallons	8	Per batch
RLWTF Effluent Tank	NO3-N, F, TDS	7, 8	1/week
Raw Feed Sample Tap (influent)	Organics	6, 9	1/week
RLWTF Effluent Tank	Health, Secondary, Irrigation Stds	3, 4, 5, 7, 8	1/month
NPDES Sampling Tap	Radiochemistry	2, 8	1/month
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Total Nitrogen, F, TDS, Water Level	1, 8	Quarterly
TW-8	Total Nitrogen, F, TDS	1, 8	Quarterly
MCO-6	Health, Secondary, Irrigation Stds	3, 4, 5, 8	Quarterly
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Radiochemistry	2, 9	Annual
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Health, Secondary, Irrigation Stds	3, 4, 5, 9	Annual
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Organics	6, 9	1 per 3 Years
TW-8	Radiochemistry	2, 9	Annual
TW-8	Health, Secondary, Irrigation Stds	3, 4, 5, 9	Annual
TW-8	Organics	6, 9	1 per 3 Years
GS-1 Gaging Station	Surface Flows	9	Continuous

Notes:

1. Total Nitrogen: TKN, Ammonia, NO3-N.
2. Radiochemistry (3103 A): Combined Ra-226 & Ra-228.
3. Health Standards (3103 A.): Ag, As, Ba, Cd, CN, Cr, F, Hg, NO3, Pb, Se, U.
4. Secondary Standards (3103 B.): Cl, Cu, Fe, Mn, SO4, Zn, TDS, and pH.
5. Irrigation Standards (3103 C.): Al, B, Co, Mo, Ni.
6. Volatile and Semivolatile Compounds, EPA SW 846 and Methods 8240 and 8270.
7. Flow proportioned composite sample from each treatment batch.
8. Data reported to NMED quarterly.
9. Data reported to NMED annually.
10. This Monitoring Plan includes only those wells available for sampling in March 1999. Future wells will be added to the Monitoring Plan as requested by the NMED GWQB.

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: January 25, 2000
In Reply Refer To: ESH-18/WQ&H:00-0020
Mail Stop: K497
Telephone: (505) 665-1859

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, FOURTH QUARTER, 1999

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from October 1 through December 31, 1999. In December 1998, the Laboratory proposed to submit quarterly reports to the New Mexico Environment Department's Ground Water Quality Bureau (NMED/GWQB) on a voluntary basis. These quarterly reports include effluent and monitoring well analytical results as well as a progress report on the planned upgrades to the RLWTF.

Attachment 1.0, Table 1.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the fourth quarter of 1999 were below New Mexico Water Quality Control Commission (NM WQCC) Ground Water Standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of two TDS exceedances during the weeks of October 18-24, and October 25-31, 1999. For the remainder of the quarter, TDS concentrations remained well below the NM WQCC Regulation 3103 Ground Water standard of 1000 mg/L. After the reverse osmosis (RO) treatment unit was returned to service on December10, 1999, TDS concentrations in the RLWTF's effluent dropped significantly to 4 mg/L and 12 mg/L for the last two weeks of the quarter. The average TDS concentration for the fourth quarter was 582 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the fourth quarter of 1999 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 9.7 mg/L, 0.6 mg/L, and 4.7 mg/L.

Attachment 2.0, Table 2.0, presents the analytical results from two rounds (October 26 and December 7, 1999) of ground water sampling at the Laboratory's Mortandad Canyon alluvial monitoring wells. The Laboratory's objective is to closely track any trends that might develop as a result of the improvements made in the RLWTF's effluent quality since March 21, 1999, when nitrate restrictions were initiated. The Laboratory will continue to monitor the alluvial wells in Mortandad Canyon on a routine basis.

In the last quarterly report (ESH-18/WQ&H:99-0425) submitted to your agency on October 29, 1999, the Laboratory reported that the tubular ultrafilter (TUF) needed retrofitting with new filter tubes and would be out of service until mid-November 1999. In the interim, the RLWTF's clarifiers would perform primary treatment. On November 18, 1999, work on the TUF treatment unit was completed and it was returned to service. In addition, new membranes were installed in the reverse osmosis (RO) treatment unit in late-November 1999 and that unit was returned to service on December 10, 1999. The RLWTF is continuing to use the clarifiers for pretreatment for silica and suspended solids removal.

Installation of the interim mechanical evaporator is 90% complete and the project is on schedule to meet the projected ready-to-run completion date of February 28, 2000. The RLWTF has scheduled a management self-assessment followed by independent contractor verification for the end of January, 2000.

On December 14, 1999, the RLWTF's two effluent holding tanks (EHTs) were taken out of service for refurbishing. In the interim, effluent will be stored in two 20,000 gallon portable steel storage tanks, with secondary containment, located inside TA-50 Building 34B. In addition, two 20,000 gallon portable steel storage tanks with secondary containment were installed outside of TA-50 Building 34B for the temporary storage of evaporator distillate. Following further analysis, the stored distillate will be discharge through NPDES Outfall 051 or retreated depending upon its quality.

For your information, since the RO treatment unit returned to service on December 10, 1999, the RLWTF's effluent has consistently met the U.S. Department of Energy's Derived Concentration Guide (DCG) for gross alpha particle activity of 30 pCi/L. Attachment 3.0, Figure 1.0, presents a chart showing the gross alpha activity of the RLWTF's effluent for the month of December 1999.

Please contact me at 667-7969 if you would like additional information regarding this report.

Sincerely,

Bob Beers

Bob Beers
Water Quality and Hydrology Group

SR:BB/rm

Enclosures: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas
E. Spencer, USEPA, Region 6, Dallas, Texas
J. Davis, NMED SWQB, Santa Fe, New Mexico
B. Hoditschek, NMED SWQB, Santa Fe, New Mexico
J. Bearzi, NMED HRMB, Santa Fe, New Mexico
J. Vozella, DOE LAAO, MS A316
M. Johansen, DOE LAAO, MS A316
J. Parker, NMED DOE/OB, Santa Fe, New Mexico
R. Ford-Schmid, NMED DOE/OB, Santa Fe, New Mexico
T. Gunderson, DLDOPS, MS A100
S. Gibbs, NW-MM, MS A102
B. Stine, ALDNW, MS F629
S. Yarbro, NMT-2, MS E511
T. Stanford, FWO-DO, MS K492
S. Hanson, FWO-DO, MS K492
D. Moss, FWO-RLW, MS E518
R. Alexander, FWO-WFM, MS E518
P. Worland, FWO-RLW, MS E518
D. Erickson, ESH-DO, MS K491
S. Rae, ESH-18, MS K497
M. Saladen, ESH-18, MS K497
D. Woitte, LC/GL, MS A187
WQ&H File, w/enc., MS K497
CIC-10, w/enc., MS A150

Table 1.0. RLWTF Weekly Effluent Monitoring Analytical Results, October - December, 1999.

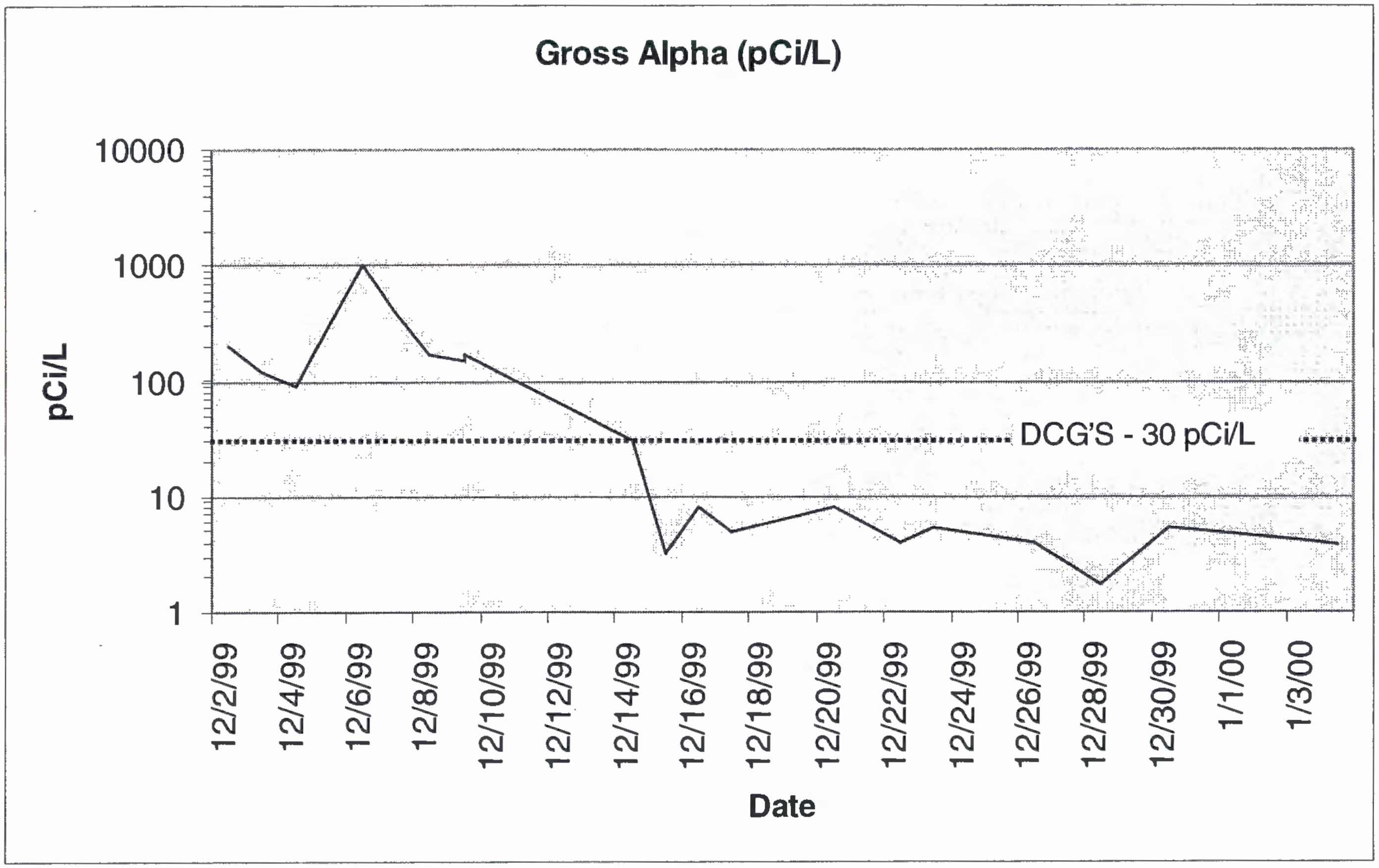
Monitoring Period	RLWTF Weekly Effluent Monitoring Analytical Results		
	NO3-N (mg/L)	F (mg/L)	TDS (mg/L)
10/3/99	5.23	0.65	698
10/10/99	1.11	0.58	636
10/17/99	2.99	0.81	804
10/24/99	5.52	1.01	1002
10/31/99	3.21	0.76	1044
11/7/99	4.81	0.64	866
11/14/99	NS	NS	NS
11/21/99	8.85	0.63	858
11/28/99	8.23	0.5	390
12/5/99	6.79	0.16	212
12/12/99	2.03	0.58	460
12/19/99	0.13	<0.01	4
12/26/99	0.09	<0.01	12
4th Quarter 1999 Averages (mg/L)	**4.08**	**0.63**	**582**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

Table 2.0 Analytical Results from Sampling of Mortandad Canyon Alluvial Monitoring Wells (mg/L), October - December, 1999.

Sampling Location	**Sample Date: October 26, 1999**					**Sample Date: December 7, 1999**				
	NO3-N	**TKN**	**NH3**	**TDS**	**F**	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**
MCO-3	4.1	0.3	<0.2	505	0.6	6.1	0.2	<0.2	425	0.6
MCO-4B	6.8	0.2	<0.2	293	1.2	NS	NS	NS	NS	NS
MCO-6	14.2	<0.2	<0.2	367	1.2	9.5	0.4	<0.2	306	1.3
MCO-7	24.5	<0.2	<0.2	437	1.3	19.0	0.3	<0.2	380	1.4
MCO-7 duplicate	24.5	<0.2	<0.2	433	1.3	NA	NA	NA	NA	NA
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*

Notes:
NA means that no sample was collected during this sampling event.
NS means that no sample was collected at this well due to insufficient water.
All units: mg/L

Figure 1.0. RLWTF Effluent Gross Alpha Results, December 1999.



Notes:
1. On December 10, 1999, the RO treatment unit was returned to service.
2. DCG means Derived Concentration Guides established by the U. S. Department of Energy (DOE).

:01392

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: February 18, 2000
In Reply Refer To: ESH-18/WQ&H:00-0049
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Barbara Hoditschek
Surface Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: MONTHLY STATUS REPORT, RLWTF AT TA-50

Dear Ms. Hoditschek:

At a December 2, 1999, meeting with Los Alamos National Laboratory (Laboratory), NMED Surface Water Quality Bureau (SWQB), and EPA Region 6, the Laboratory volunteered to provide the SWQB with a monthly report on the status of treatment operations and upgrades at Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. As you are aware, the Laboratory currently submits a quarterly status report on RLWTF operations to the NMED Ground Water Quality Bureau (GWQB). In an effort to avoid redundant reporting, the Laboratory proposes to copy the SWQB on all GWQB quarterly reports, and provide your agency with monthly reports during the remaining eight (8) months. On January 25, 2000, you were sent a copy of the Laboratory's fourth quarter 1999 report for the RLWTF (ESH-18/WQ&H:00-0020). This report is addresses operations at the RLWTF for January 2000.

Operational Changes
At the December 2, 1999, meeting referenced above, the Laboratory made a commitment to your agency to reduce the rate which effluent is discharged into Mortandad Canyon at NPDES Outfall 051. Since December 3, 1999, the RLWTF has been discharging from the effluent holding tanks using only one (1) pump. As a result, the rate of discharge has been reduced from approximately 725 gallons per minute (two pumps) to approximately 475 gallons per minute (one pump). Accordingly, the time required to complete a discharge event has increased from approximately 29 minutes (two pumps) to approximately 47 minutes (one pump).

On November 18, 1999, work on the TUF treatment unit was completed and it was returned to service. In addition, new membranes were installed in the reverse osmosis (RO) treatment unit in late-November 1999 and that unit was returned to service on December 10, 1999. The RLWTF is continuing to use the clarifiers for pretreatment for silica and suspended solids removal. Since the RO treatment unit returned to service on December 10, 1999, the RLWTF's effluent has consistently met the U.S. Department of Energy's Derived Concentration Guide (DCG) for gross alpha particle activity of 30 pCi/L. During January 2000, the sum of the fractions for radionuclides in the RLWTF's effluent has been less than the DCG value of 1.

Facility Upgrades

In January 2000, the Electrodialysis Reversal (EDR) treatment unit completed its start-up phase and was placed into permanent service. The EDR houses a series of charge-sensitive membranes sandwiched between plates that produce an electric field. The electric field drives ions through the membranes. As a result, the EDR is capable of achieving a 5-6 fold concentration of the RO reject stream. The feed water to the EDR will be the reject stream from the RO treatment unit. The product (permeate) water from the EDR will be transferred to storage for analysis and subsequent discharge if of acceptable quality. The reject stream from the EDR will be transferred to storage for eventual treatment by the interim mechanical evaporator.

On January 31, 2000, the interim mechanical evaporator at the RLWTF was placed into service. The evaporator is treating reject (concentrate) water from the RLWTF's EDR treatment unit. The distillate from the evaporator is being stored in the two new 20,000-gallon temporary storage tanks recently installed. The distillate will be stored pending further analysis to determine if it meets the requirements for discharge or if it requires retreatment.

With the completion of the interim mechanical evaporator, the RLWTF has finished the second phase of a two-phased project to upgrade the facility's treatment units. Phase I, installation of the Tubular Ultrafiltration and Reverse Osmosis treatment units, was completed in December 1999. The Phase I upgrades were critical steps towards compliance with U.S. Department of Energy DCG limits. The Phase II upgrades, installation of the interim mechanical evaporator, is a critical step towards compliance with New Mexico Water Quality Control Commission Regulation 3103 ground water standards and the Laboratory's future goal of zero liquid discharge.

Please contact me at 667-7969 if you would like additional information regarding this report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/rm

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas
E. Spencer, USEPA, Region 6, Dallas, Texas
P. Bustamante, NMED/GWQB, Santa Fe, New Mexico
J. Parker, NMED DOE/OB, Santa Fe, New Mexico
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J. Vozella, DOE LAAO, MS A316
M. Johansen, DOE LAAO, MS A316
T. Gunderson, DLDOPS, MS A100
T. Stanford, FWO-DO, MS K492

Cy (continued):
B. Ramsey, FWO-DO, MS K492
D. Mclain, FWO-RLW, MS J595
S. Hanson, FWO-DO, MS J595
D. Moss, FWO-RLW, MS E518
R. Alexander, FWO-WFM, E518
P. Worland, FWO-RLW, MS E518
D. Erickson, ESH-DO, MS K491
S. Rae, ESH-18, MS K497
M. Saladen, ESH-18, MS K497
D. Woitte, LC/GL, MS A187
WQ&H File, MS K497
CIC-10, MS A150

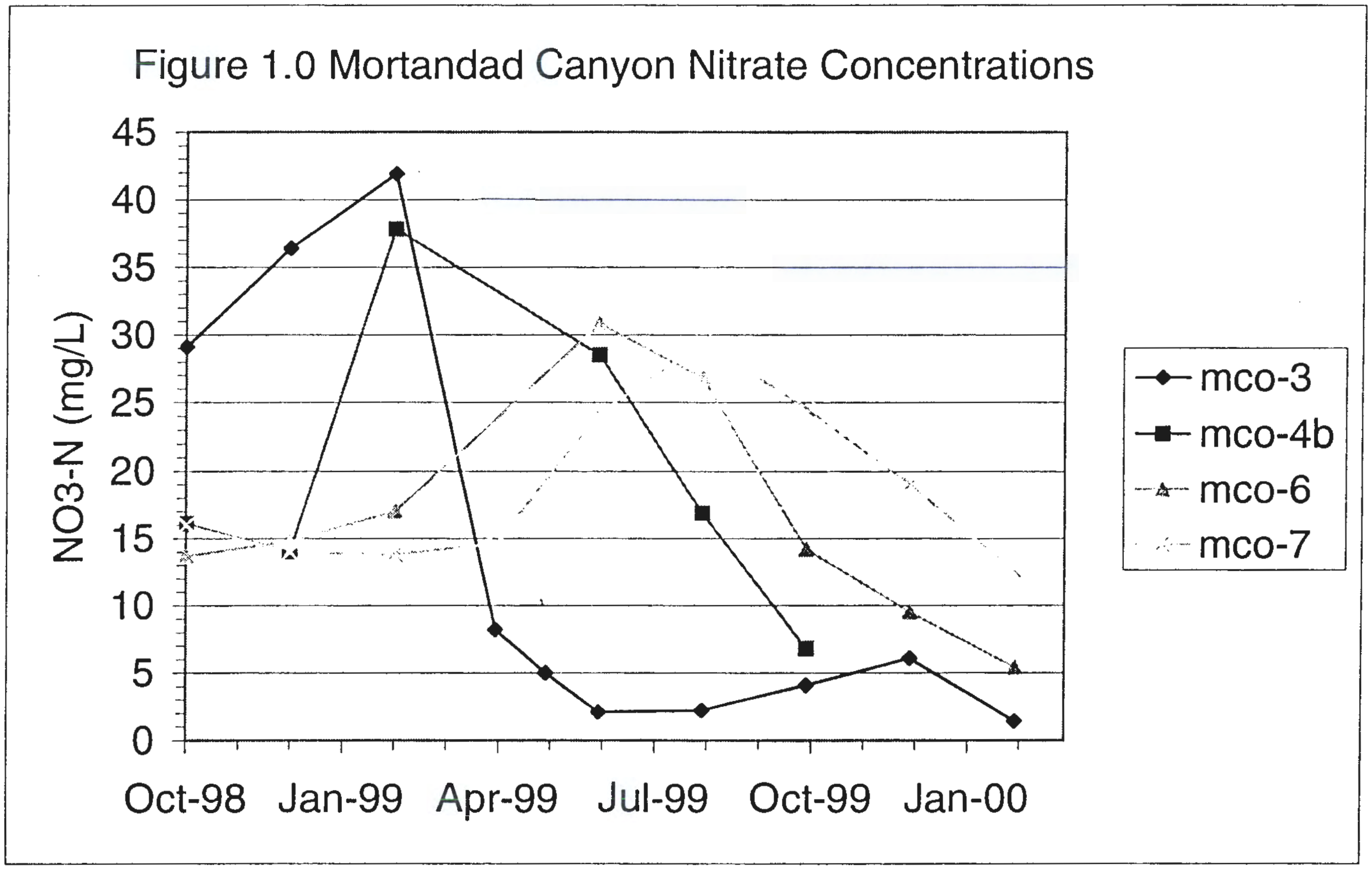
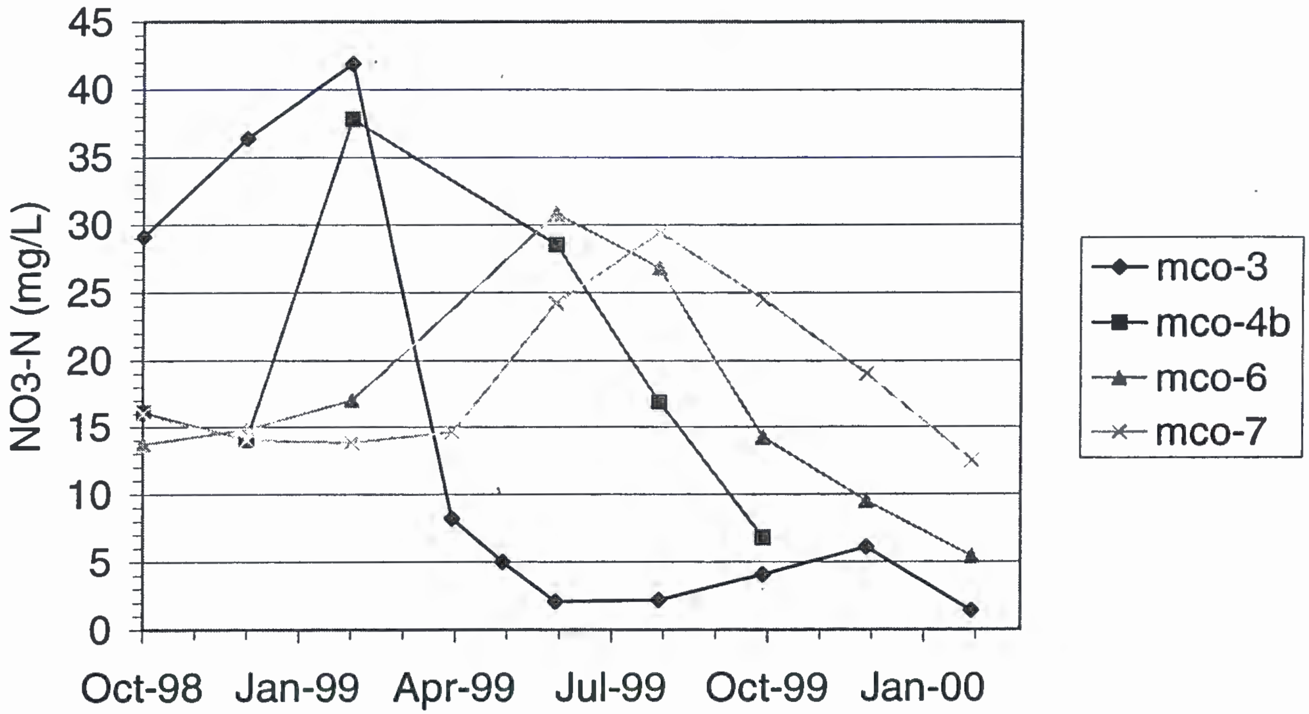


Figure 1.0 Mortandad Canyon Nitrate Concentrations
45
40
35
30
25
20
15
10
5
0
NO3-N (mg/L)
Oct-98
Jan-99
Apr-99
Jul-99
Oct-99
Jan-00
mco-3
mco-4b
mco-6
mco-7

Figure 1.0 Mortandad Canyon Nitrate Concentrations



Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: March 20, 2000
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Telephone: (505) 667-7969

Ms. Barbara Hoditschek
Surface Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: MONTHLY STATUS REPORT FOR FEBRUARY 2000, RLWTF AT TA-50

Dear Ms. Hoditschek:

This report addresses operations at Los Alamos National Laboratory's Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for February 2000.

Operational Changes
The only significant operational change during February 2000 was a 27 percent increase in influent flows to the RLWTF. A small portion of this increase is attributable to discharges from the boiler and cooling tower associated with the interim mechanical evaporator. The remaining increase has been attributed by the RLWTF to an increase in research activity at the Laboratory.

During February 2000, the RLWTF operated overtime (typically 7am-8pm) in order to treat the daily influent entering the facility and to reduce the volume of Electrodialysis Reversal (EDR) treatment unit reject (concentrate) water which was stockpiled prior to the start-up of the interim mechanical evaporator. The RLWTF continues to operate on a batch treat/batch discharge regime.

Since the Reverse Osmosis (RO) treatment unit returned to service on December 10, 1999, the RLWTF's effluent has consistently met the U.S. Department of Energy's Derived Concentration Guide (DCG) for gross alpha particle activity of 30 pCi/L. During February 2000, the sum of the fractions for radionuclides in the RLWTF's effluent was less than the DCG value of 1. Worth noting, in February 2000 the RLWTF discharged a batch of effluent from the RO treatment unit with a gross alpha particle activity of 0 piC/L (+/- 2 piC/L).

Facility Upgrades
On January 31, 2000, the interim mechanical evaporator was placed into service at the RLWTF to treat the EDR reject (concentrate) water (Note: the EDR treats the RO reject water resulting in a volume reduction of 6:1). The interim evaporator treats the EDR reject water by reducing the

volume 4:1 (e.g., 80,000 gallons of EDR concentrate is reduced 20,000 gallons of evaporator bottoms). The distillate from the evaporator is being stored in the two 20,000 gallon temporary storage tanks recently installed at the RLWTF. During February 2000, one distillate tank was discharged through NPDES Outfall 051 meeting all NPDES, NMED Ground Water Discharge Plan, and Department of Energy DCG limits.

Please contact me at 667-7969 if you would like additional information regarding this report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Enclosures: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas
E. Spencer, USEPA, Region 6, Dallas, Texas
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T. Gunderson, DLDOPS, MS A100
T. Stanford, FWO-DO, MS K492
S. Hanson, FWO-DO, MS J595
D. Mclain, FWO-RLW, MS J595
D. Moss, FWO-RLW, MS E518
P. Worland, FWO-RLW, MS E518
R. Alexander, FWO-WFM, MS E518
D. Erickson, ESH-DO, MS K491
S. Rae, ESH-18, MS K497
M. Saladen, ESH-18, MS K497
D. Woitte, LC/GL, MS A187
WQ&H File, w/enc., MS K497
CIC-10, w/enc., MS A150

ATTACHMENT 7.0

Effluent Canyon Surface Water Monitoring

-Summary Table of Results

-Assaigai Analytical Laboratories, Inc. Report

Effluent Canyon[2]

Surface Water Monitoring

Sample Type: Water, Filtered

Units: mg/L

Sample ID No.	Sample Date	Al	Ag	As	B	Ba	Cd	Cr	Co	Cu	Fe	Hg	Mn	Mo	Ni	Pb	Se	Zn
EFF.022599	2/25/99	<0.5	<0.02	<0.06	<0.1	0.02	<0.008	<0.04	<0.01	<0.04	0.3	<0.0002	0.056	<0.5	<0.04	<0.06	<0.05	<0.1
EFFA.022599	2/25/99	<0.5	<0.02	<0.06	<0.1	0.02	<0.008	<0.04	<0.01	<0.04	0.3	<0.0002	0.055	<0.5	<0.04	<0.06	>0.05	<0.1

Sample ID No.	Sample Date	pH[1]	TDS	Cl	F	NO3-N	PO4-P	SO4	Alkalinity
EFF.022599	2/25/99	7.9	238	7.1	0.7	<0.1	0.9	4.4	116
EFFA.022599	2/25/99	7.9	235	7.0	0.7	<0.1	1.0	4.5	114

Notes:

[1] pH is expressed in standard units.

[2] Sampling location is approximately 100 yards above TA-50 outfall in Effluent Canyon.

ASSAIGAI ANALYTICAL LABORATORIES, INC.

7300 Jefferson, NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

3332 Wedgewood, E-5 • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820

127 Eastgate Drive, 212-C • Los Alamos, New Mexico 87544 • (505) 662-2558

LOS ALAMOS NATIONAL LABS
attn: **BOB BEERS**
PO BOX 1663-MSK497
LOS ALAMOS, NM, 87545

* explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **LOS ALAMOS NATIONAL LABS**
Project: **9902242** **DP-1132 APP. 7C18WE3A00000000**

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Client Sample ID **EFF.022599** Sample Matrix **H20** Sample Collected **02/25/99 10:15:00**

Fraction	QC Group	CAS #		Result	Units	Dilution Factor	Detection Limit	*	Sequence	Run Date
			Test: EPA 245.1 CVAA							
9902242-01A	M99295	7439-97-6	Mercury	ND	mg / L	1	0.0002		MT.1999.525-4	03/10/99
			Test: EPA200 series AA-FL							
9902242-01A	M99305	7439-98-7	Molybdenum	ND	mg / L	1	0.5		MW.1999.272-12	03/09/99
			Test: EPA200.7 ICP							
9902242-01A	M99275	7429-90-5	Aluminum	ND	mg / L	1	0.5		MW.1999.255-21	03/03/99
	M99275	7440-38-2	Arsenic	ND	mg / L	1	0.06		MW.1999.255-21	
	M99275	7440-39-3	Barium	0.02	mg / L	1	0.01		MW.1999.255-21	
	M99275	7440-42-8	Boron	ND	mg / L	1	0.1		MW.1999.260-42	03/05/99
	M99275	7440-43-9	Cadmium	ND	mg / L	1	0.008		MW.1999.255-21	03/03/99
	M99275	7440-47-3	Chromium	ND	mg / L	1	0.04		MW.1999.255-21	
	M99275	7440-48-4	Cobalt	ND	mg / L	1	0.01		MW.1999.255-21	
	M99275	7440-50-8	Copper	ND	mg / L	1	0.04		MW.1999.255-21	
	M99275	7439-89-6	Iron	0.3	mg / L	1	0.2		MW.1999.255-21	
	M99275	7439-92-1	Lead	ND	mg / L	1	0.06		MW.1999.260-42	03/05/99
	M99275	7439-96-5	Manganese	0.056	mg / L	1	0.01		MW.1999.255-21	03/03/99
	M99275	7440-02-0	Nickel	ND	mg / L	1	0.04		MW.1999.255-21	
	M99275	7782-49-2	Selenium	ND	mg / L	1	0.05		MW.1999.255-21	
	M99275	7440-22-4	Silver	ND	mg / L	1	0.02		MW.1999.255-21	
	M99275	7440-66-6	Zinc	ND	mg / L	1	0.1		MW.1999.255-21	
			Test: EPA 150.1							
9902242-01B	WPH9921		pH	7.9	units	1	0.1	H	MT.1999.458-1	02/27/99

Certificate of Analysis

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242 DP-1132 APP. 7C18WE3A00000000**

Fraction	QC Group	CAS #		Result	Units	Dilution Factor	Detection Limit	*	Sequence	Run Date
			Test: EPA 160.1							
9902242-01B	TD994		Total Dissolved Solids	238	mg / L	1	10		MT.1999.479-2	03/02/99
			Test: EPA 300.0							
9902242-01B	W9939		Chloride	7.1	mg / L	1	0.5		MW.1999.236-4	02/27/99
	W9939		Fluoride	0.7	mg / L	1	0.5		MW.1999.236-4	
	W9939		Nitrate, as N	ND	mg / L	1	0.1	H	MW.1999.236-4	
	W9939		Nitrite, as N	ND	mg / L	1	0.1	H	MW.1999.236-4	
	W9939		Orthophosphate, as P	0.9	mg / L	1	0.4	H	MW.1999.236-4	
	W9939		Sulfate	4.4	mg / L	1	0.5		MW.1999.236-4	
			Test: EPA 310.1							
9902242-01B	ALK998		Alkalinity, Bicarbonate	116	mg / L	1	2		MT.1999.468-21	03/01/99

Client Sample ID ***EFFA.022599*** Sample Matrix ***H20*** Sample Collected ***02/25/99 10:30:00***

Fraction	QC Group	CAS #		Result	Units	Dilution Factor	Detection Limit	*	Sequence	Run Date
			Test: EPA 245.1 CVAA							
9902242-02A	M99295	7439-97-6	Mercury	ND	mg / L	1	0.0002		MT.1999.525-5	03/10/99
			Test: EPA200 series AA-FL							
9902242-02A	M99305	7439-98-7	Molybdenum	ND	mg / L	1	0.5		MW.1999.272-13	03/09/99
			Test: EPA200.7 ICP							
9902242-02A	M99275	7429-90-5	Aluminum	ND	mg / L	1	0.5		MW.1999.255-24	03/03/99
	M99275	7440-38-2	Arsenic	ND	mg / L	1	0.06		MW.1999.255-24	
	M99275	7440-39-3	Barium	0.02	mg / L	1	0.01		MW.1999.255-24	
	M99275	7440-42-8	Boron	ND	mg / L	1	0.1		MW.1999.260-45	03/05/99
	M99275	7440-43-9	Cadmium	ND	mg / L	1	0.008		MW.1999.255-24	03/03/99
	M99275	7440-47-3	Chromium	ND	mg / L	1	0.04		MW.1999.255-24	
	M99275	7440-48-4	Cobalt	ND	mg / L	1	0.01		MW.1999.255-24	
	M99275	7440-50-8	Copper	ND	mg / L	1	0.04		MW.1999.255-24	
	M99275	7439-89-6	Iron	0.3	mg / L	1	0.2		MW.1999.255-24	
	M99275	7439-92-1	Lead	ND	mg / L	1	0.06		MW.1999.260-45	03/05/99
	M99275	7439-96-5	Manganese	0.055	mg / L	1	0.01		MW.1999.255-24	03/03/99
	M99275	7440-02-0	Nickel	ND	mg / L	1	0.04		MW.1999.255-24	
	M99275	7782-49-2	Selenium	ND	mg / L	1	0.05		MW.1999.255-24	
	M99275	7440-22-4	Silver	ND	mg / L	1	0.02		MW.1999.255-24	
	M99275	7440-66-6	Zinc	ND	mg / L	1	0.1		MW.1999.255-24	
			Test: EPA 150.1							
9902242-02B	WPH9921		pH	7.9	units	1	0.1	H	MT.1999.458-2	02/27/99
			Test: EPA 160.1							
9902242-02B	TD994		Total Dissolved Solids	235	mg / L	1	10		MT.1999.479-3	03/02/99
			Test: EPA 300.0							
9902242-02B	W9939		Chloride	7.0	mg / L	1	0.5		MW.1999.236-5	02/27/99
	W9939		Fluoride	0.7	mg / L	1	0.5		MW.1999.236-5	

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242 DP-1132 APP. 7C18WE3A00000000**

9902242-02B	W9939		Nitrate, as N	ND	mg / L	1	0.1	H	MW.1999.236-5	02/27/99
	W9939		Nitrite, as N	ND	mg / L	1	0.1	H	MW.1999.236-5	
	W9939		Orthophosphate, as P	1.0	mg / L	1	0.4	H	MW.1999.236-5	
	W9939		Sulfate	4.5	mg / L	1	0.5		MW.1999.236-5	
			Test: EPA 310.1							
9902242-02B	ALK998		Alkalinity, Bicarbonate	114	mg / L	1	2		MT.1999.468-22	03/01/99

**** Sample specific analytical Detection Limit is determined by multiplying the sample Dilution Factor by the listed method Detection Limit. ****

**** Results relate only to the items tested. ****

Assaigai Analytical Laboratories, Inc.

Quality Control Summary

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242** **DP-1132 APP. 7C18WE3A00000000**

* explanation of codes	
D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

QC Type **LCS: Lab Control Spike** QC Matrix **DW**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA200 series AA-FL					
M99305	M99305-002	Molybdenum	115	(%) Recov		MW.1999.272-10	03/09/99
		Test: EPA200.7 ICP					
M99275	M99275-002	Aluminum	100	(%) Recov		MW.1999.255-18	03/03/99
	M99275-002	Arsenic	99	(%) Recov		MW.1999.255-18	
	M99275-002	Barium	98	(%) Recov		MW.1999.255-18	
	M99275-002	Boron	108	(%) Recov		MW.1999.260-40	03/05/99
	M99275-002	Cadmium	104	(%) Recov		MW.1999.255-18	03/03/99
	M99275-002	Chromium	100	(%) Recov		MW.1999.255-18	
	M99275-002	Cobalt	98	(%) Recov		MW.1999.255-18	
	M99275-002	Copper	99	(%) Recov		MW.1999.255-18	
	M99275-002	Iron	104	(%) Recov		MW.1999.255-18	
	M99275-002	Lead	101	(%) Recov		MW.1999.260-40	03/05/99
	M99275-002	Manganese	101	(%) Recov		MW.1999.255-18	03/03/99
	M99275-002	Nickel	98	(%) Recov		MW.1999.255-18	
	M99275-002	Selenium	100	(%) Recov		MW.1999.255-18	
	M99275-002	Silver	101	(%) Recov		MW.1999.255-18	
	M99275-002	Zinc	100	(%) Recov		MW.1999.255-18	

QC Type **LCSD: Lab Control Spike Duplicate Accuracy** QC Matrix **DW**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA200 series AA-FL					
M99305	M99305-003	Molybdenum	106	(%) Recov		MW.1999.272-11	03/09/99
		Test: EPA200.7 ICP					
M99275	M99275-003	Aluminum	111	(%) Recov		MW.1999.255-19	03/03/99
	M99275-003	Arsenic	110	(%) Recov		MW.1999.255-19	
	M99275-003	Barium	107	(%) Recov		MW.1999.255-19	
	M99275-003	Boron	105	(%) Recov		MW.1999.260-41	03/05/99
	M99275-003	Cadmium	114	(%) Recov		MW.1999.255-19	03/03/99
	M99275-003	Chromium	110	(%) Recov		MW.1999.255-19	
	M99275-003	Cobalt	108	(%) Recov		MW.1999.255-19	
	M99275-003	Copper	109	(%) Recov		MW.1999.255-19	
	M99275-003	Iron	113	(%) Recov		MW.1999.255-19	
	M99275-003	Lead	98	(%) Recov		MW.1999.260-41	03/05/99
	M99275-003	Manganese	111	(%) Recov		MW.1999.255-19	03/03/99
	M99275-003	Nickel	108	(%) Recov		MW.1999.255-19	
	M99275-003	Selenium	110	(%) Recov		MW.1999.255-19	
	M99275-003	Silver	113	(%) Recov		MW.1999.255-19	
	M99275-003	Zinc	110	(%) Recov		MW.1999.255-19	

Assaigai Analytical Laboratories, Inc.

Quality Control Summary

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242 DP-1132 APP. 7C18WE3A00000000**

* explanation of codes	
D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

QC Type **LCSD: Lab Control Spike Duplicate Precision** QC Matrix **DW**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA200 series AA-FL					
M99305	M99305-003	Molybdenum	8	(%) RPD		MW.1999.272-11	03/09/99
		Test: EPA200.7 ICP					
M99275	M99275-003	Aluminum	10	(%) RPD		MW.1999.255-19	03/03/99
	M99275-003	Arsenic	11	(%) RPD		MW.1999.255-19	
	M99275-003	Barium	9	(%) RPD		MW.1999.255-19	
	M99275-003	Boron	3	(%) RPD		MW.1999.260-41	03/05/99
	M99275-003	Cadmium	10	(%) RPD		MW.1999.255-19	03/03/99
	M99275-003	Chromium	9	(%) RPD		MW.1999.255-19	
	M99275-003	Cobalt	9	(%) RPD		MW.1999.255-19	
	M99275-003	Copper	10	(%) RPD		MW.1999.255-19	
	M99275-003	Iron	8	(%) RPD		MW.1999.255-19	
	M99275-003	Lead	2	(%) RPD		MW.1999.260-41	03/05/99
	M99275-003	Manganese	9	(%) RPD		MW.1999.255-19	03/03/99
	M99275-003	Nickel	10	(%) RPD		MW.1999.255-19	
	M99275-003	Selenium	10	(%) RPD		MW.1999.255-19	
	M99275-003	Silver	11	(%) RPD		MW.1999.255-19	
	M99275-003	Zinc	9	(%) RPD		MW.1999.255-19	

QC Type **MB: Method Blank** QC Matrix **DW**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA200 series AA-FL					
M99305	M99305-001	Molybdenum	ND	mg / L		MW.1999.272-8	03/09/99
		Test: EPA200.7 ICP					
M99275	M99275-001	Aluminum	ND	mg / L		MW.1999.255-17	03/03/99
	M99275-001	Arsenic	ND	mg / L		MW.1999.255-17	
	M99275-001	Barium	ND	mg / L		MW.1999.255-17	
	M99275-001	Boron	ND	mg / L		MW.1999.260-39	03/05/99
	M99275-001	Cadmium	ND	mg / L		MW.1999.255-17	03/03/99
	M99275-001	Chromium	ND	mg / L		MW.1999.255-17	
	M99275-001	Cobalt	ND	mg / L		MW.1999.255-17	
	M99275-001	Copper	ND	mg / L		MW.1999.255-17	
	M99275-001	Iron	ND	mg / L		MW.1999.255-17	
	M99275-001	Lead	ND	mg / L		MW.1999.260-39	03/05/99
	M99275-001	Manganese	ND	mg / L		MW.1999.255-17	03/03/99
	M99275-001	Nickel	ND	mg / L		MW.1999.255-17	
	M99275-001	Selenium	ND	mg / L		MW.1999.255-17	
	M99275-001	Silver	ND	mg / L		MW.1999.255-17	
	M99275-001	Zinc	ND	mg / L		MW.1999.255-17	

Assaigai Analytical Laboratories, Inc.

Quality Control Summary

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242 DP-1132 APP. 7C18WE3A00000000**

* explanation of codes	
D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

QC Type **MS: Matrix Spike** QC Matrix **DW**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA200 series AA-FL					
M99305	M99305-006	Molybdenum	115	(%) Recov		MW.1999.272-14	03/09/99
		Test: EPA200.7 ICP					
M99275	M99275-006	Aluminum	92	(%) Recov		MW.1999.255-22	03/03/99
	M99275-006	Arsenic	88	(%) Recov		MW.1999.255-22	
	M99275-006	Barium	88	(%) Recov		MW.1999.255-22	
	M99275-006	Boron	98	(%) Recov		MW.1999.260-43	03/05/99
	M99275-006	Cadmium	94	(%) Recov		MW.1999.255-22	03/03/99
	M99275-006	Chromium	90	(%) Recov		MW.1999.255-22	
	M99275-006	Cobalt	90	(%) Recov		MW.1999.255-22	
	M99275-006	Copper	91	(%) Recov		MW.1999.255-22	
	M99275-006	Iron	93	(%) Recov		MW.1999.255-22	
	M99275-006	Lead	88	(%) Recov		MW.1999.260-43	03/05/99
	M99275-006	Manganese	91	(%) Recov		MW.1999.255-22	03/03/99
	M99275-006	Nickel	89	(%) Recov		MW.1999.255-22	
	M99275-006	Selenium	93	(%) Recov		MW.1999.255-22	
	M99275-006	Silver	92	(%) Recov		MW.1999.255-22	
	M99275-006	Zinc	91	(%) Recov		MW.1999.255-22	

QC Type **MSD: Matrix Spike Duplicate Accuracy** QC Matrix **DW**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA200 series AA-FL					
M99305	M99305-007	Molybdenum	100	(%) Recov		MW.1999.272-15	03/09/99
		Test: EPA200.7 ICP					
M99275	M99275-007	Aluminum	98	(%) Recov		MW.1999.255-23	03/03/99
	M99275-007	Arsenic	94	(%) Recov		MW.1999.255-23	
	M99275-007	Barium	94	(%) Recov		MW.1999.255-23	
	M99275-007	Boron	102	(%) Recov		MW.1999.260-44	03/05/99
	M99275-007	Cadmium	101	(%) Recov		MW.1999.255-23	03/03/99
	M99275-007	Chromium	94	(%) Recov		MW.1999.255-23	
	M99275-007	Cobalt	95	(%) Recov		MW.1999.255-23	
	M99275-007	Copper	97	(%) Recov		MW.1999.255-23	
	M99275-007	Iron	100	(%) Recov		MW.1999.255-23	
	M99275-007	Lead	91	(%) Recov		MW.1999.260-44	03/05/99
	M99275-007	Manganese	98	(%) Recov		MW.1999.255-23	03/03/99
	M99275-007	Nickel	95	(%) Recov		MW.1999.255-23	
	M99275-007	Selenium	98	(%) Recov		MW.1999.255-23	
	M99275-007	Silver	98	(%) Recov		MW.1999.255-23	
	M99275-007	Zinc	97	(%) Recov		MW.1999.255-23	

Assaigai Analytical Laboratories, Inc.

Quality Control Summary

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242** **DP-1132 APP. 7C18WE3A00000000**

* explanation of codes	
D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

QC Type: **MSD: Matrix Spike Duplicate Precision** QC Matrix: **DW**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA200 series AA-FL					
M99305	M99305-007	Molybdenum	13	(%) RPD		MW.1999.272-15	03/09/99
		Test: EPA200.7 ICP					
M99275	M99275-007	Aluminum	6	(%) RPD		MW.1999.255-23	03/03/99
	M99275-007	Arsenic	7	(%) RPD		MW.1999.255-23	
	M99275-007	Barium	7	(%) RPD		MW.1999.255-23	
	M99275-007	Boron	4	(%) RPD		MW.1999.260-44	03/05/99
	M99275-007	Cadmium	8	(%) RPD		MW.1999.255-23	03/03/99
	M99275-007	Chromium	5	(%) RPD		MW.1999.255-23	
	M99275-007	Cobalt	6	(%) RPD		MW.1999.255-23	
	M99275-007	Copper	6	(%) RPD		MW.1999.255-23	
	M99275-007	Iron	6	(%) RPD		MW.1999.255-23	
	M99275-007	Lead	3	(%) RPD		MW.1999.260-44	03/05/99
	M99275-007	Manganese	7	(%) RPD		MW.1999.255-23	03/03/99
	M99275-007	Nickel	6	(%) RPD		MW.1999.255-23	
	M99275-007	Selenium	6	(%) RPD		MW.1999.255-23	
	M99275-007	Silver	6	(%) RPD		MW.1999.255-23	
	M99275-007	Zinc	7	(%) RPD		MW.1999.255-23	

Quality Control Summary

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242 DP-1132 APP. 7C18WE3A00000000**

* explanation of codes	
D	*Not applicable due to sample dilution*
L	*Not applicable due to MDL proximity*

QC Type **LCS: Lab Control Spike** QC Matrix **WATER**

QC Group	Run ID	Test / Analyte	Result	Units	*	Sequence	Run Date
		Test: EPA 160.1					
TD994	TD994(2)	Total Dissolved Solids	99	% Recovery		MT.1999.472-2	02/26/99
		Test: EPA 245.1 CVAA					
M99295	M99295(1)	Mercury	100	% Recovery		MT.1999.525-1	03/10/99
		Test: EPA 300.0					
W9939	W9939-002	Chloride	104	% Recovery		MW.1999.231-43	02/26/99
	W9939-002	Fluoride	104	% Recovery		MW.1999.231-43	
	W9939-002	Nitrate, as N	104	% Recovery		MW.1999.231-43	
	W9939-002	Nitrite, as N	106	% Recovery		MW.1999.231-43	
	W9939-002	Orthophosphate, as P	107	% Recovery		MW.1999.231-43	
	W9939-002	Sulfate	101	% Recovery		MW.1999.231-43	

QC Type **LCSD: Lab Control Spike Duplicate Accuracy** QC Matrix **WATER**

QC Group	Run ID	Test / Analyte	Result	Units	*	Sequence	Run Date
		Test: EPA 160.1					
TD994	TD994(3)	Total Dissolved Solids	99	% Recovery		MT.1999.472-3	02/26/99
		Test: EPA 245.1 CVAA					
M99295	M99295(2)	Mercury	102	% Recovery		MT.1999.525-2	03/10/99
		Test: EPA 300.0					
W9939	W9939-003	Chloride	103	% Recovery		MW.1999.231-44	02/26/99
	W9939-003	Fluoride	102	% Recovery		MW.1999.231-44	
	W9939-003	Nitrate, as N	102	% Recovery		MW.1999.231-44	
	W9939-003	Nitrite, as N	102	% Recovery		MW.1999.231-44	
	W9939-003	Orthophosphate, as P	104	% Recovery		MW.1999.231-44	
	W9939-003	Sulfate	102	% Recovery		MW.1999.231-44	

QC Type **LCSD: Lab Control Spike Duplicate Precision** QC Matrix **WATER**

QC Group	Run ID	Test / Analyte	Result	Units	*	Sequence	Run Date
		Test: EPA 160.1					
TD994	TD994(3)	Total Dissolved Solids	< 1	PFA		MT.1999.472-3	02/26/99
		Test: EPA 245.1 CVAA					
M99295	M99295(2)	Mercury	2	RPD		MT.1999.525-2	03/10/99

Assaigai Analytical Laboratories, Inc.

Quality Control Summary

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242 DP-1132 APP. 7C18WE3A00000000**

* explanation of codes	
D	*Not applicable due to sample dilution*
L	*Not applicable due to MDL proximity*

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA 300.0					
W9939	W9939-003	Chloride	1	RPD		MW.1999.231-44	02/26/99
	W9939-003	Fluoride	1	RPD		MW.1999.231-44	
	W9939-003	Nitrate, as N	1	RPD		MW.1999.231-44	
	W9939-003	Nitrite, as N	3	RPD		MW.1999.231-44	
	W9939-003	Orthophosphate, as P	3	RPD		MW.1999.231-44	
	W9939-003	Sulfate	< 1	RPD		MW.1999.231-44	

QC Type **MB: Method Blank** QC Matrix **WATER**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA 160.1					
TD994	TD994(1)	Total Dissolved Solids	ND	mg / L		MT.1999.472-1	02/26/99
		Test: EPA 245.1 CVAA					
M99295	M99295(3)	Mercury	ND	mg / L		MT.1999.525-3	03/10/99
		Test: EPA 300.0					
W9939	W9939-001	Chloride	ND	mg / L		MW.1999.231-42	02/26/99
	W9939-001	Fluoride	ND	mg / L		MW.1999.231-42	
	W9939-001	Nitrate, as N	ND	mg / L		MW.1999.231-42	
	W9939-001	Nitrite, as N	ND	mg / L		MW.1999.231-42	
	W9939-001	Orthophosphate, as P	ND	mg / L		MW.1999.231-42	
	W9939-001	Sulfate	ND	mg / L		MW.1999.231-42	

QC Type **MD: Matrix Duplicate** QC Matrix **WATER**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA 150.1					
WPH9921	WPH9921(3)	pH	0.02	DIFF		MT.1999.458-3	02/27/99
		Test: EPA 160.1					
TD994	TD994(9)	Total Dissolved Solids	1	PFA		MT.1999.472-9	02/26/99

QC Type **MS: Matrix Spike** QC Matrix **WATER**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA 245.1 CVAA					
M99295	M99295(7)	Mercury	180	% Recovery		MT.1999.525-7	03/10/99
		Test: EPA 300.0					
W9939	W9939-005	Chloride	104	% Recovery		MW.1999.231-46	02/26/99
	W9939-005	Fluoride	103	% Recovery		MW.1999.231-46	

Quality Control Summary

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9902242 DP-1132 APP. 7C18WE3A00000000**

* explanation of codes	
D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

QC Group	Run ID		Result	Units	*	Sequence	Run Date
W9939	W9939-005	Nitrate, as N	103	% Recovery		MW.1999.231-46	02/26/99
	W9939-005	Nitrite, as N	106	% Recovery		MW.1999.231-46	
	W9939-005	Orthophosphate, as P	107	% Recovery		MW.1999.231-46	
	W9939-005	Sulfate	101	% Recovery		MW.1999.231-46	

QC Type **MSD: Matrix Spike Duplicate Accuracy** QC Matrix **WATER**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA 245.1 CVAA					
M99295	M99295(6)	Mercury	176	% Recovery		MT.1999.525-6	03/10/99
		Test: EPA 300.0					
W9939	W9939-006	Chloride	104	% Recovery		MW.1999.231-47	02/26/99
	W9939-006	Fluoride	102	% Recovery		MW.1999.231-47	
	W9939-006	Nitrate, as N	103	% Recovery		MW.1999.231-47	
	W9939-006	Nitrite, as N	107	% Recovery		MW.1999.231-47	
	W9939-006	Orthophosphate, as P	106	% Recovery		MW.1999.231-47	
	W9939-006	Sulfate	101	% Recovery		MW.1999.231-47	

QC Type **MSD: Matrix Spike Duplicate Precision** QC Matrix **WATER**

QC Group	Run ID		Result	Units	*	Sequence	Run Date
		Test: EPA 245.1 CVAA					
M99295	M99295(6)	Mercury	2	RPD		MT.1999.525-6	03/10/99
		Test: EPA 300.0					
W9939	W9939-006	Chloride	< 1	RPD		MW.1999.231-47	02/26/99
	W9939-006	Fluoride	< 1	RPD		MW.1999.231-47	
	W9939-006	Nitrate, as N	< 1	RPD		MW.1999.231-47	
	W9939-006	Nitrite, as N	< 1	RPD		MW.1999.231-47	
	W9939-006	Orthophosphate, as P	< 1	RPD		MW.1999.231-47	
	W9939-006	Sulfate	< 1	RPD		MW.1999.231-47	

ATTACHMENT 8.0

Geologic Log and Well Construction Information

Mortandad Canyon Monitoring Wells

MCO-8.2, MCO-13, and MCO-7A

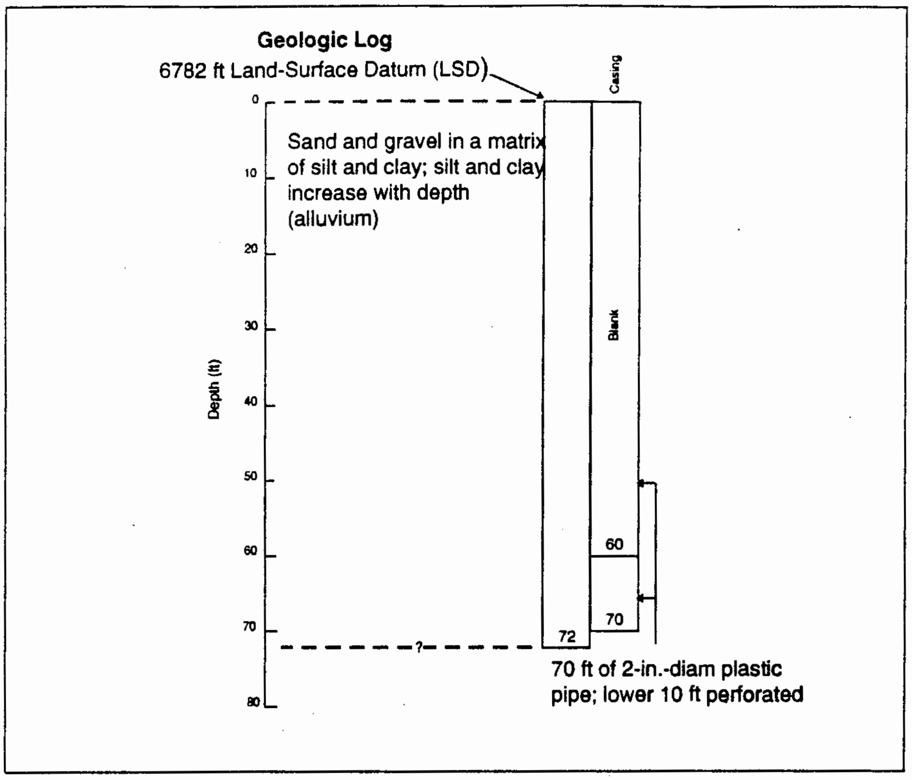

Fig. VI-O. Mortandad Canyon observation well MCO-8.2, completed November 1961, water level 59.2 ft (Purtymun 1964).

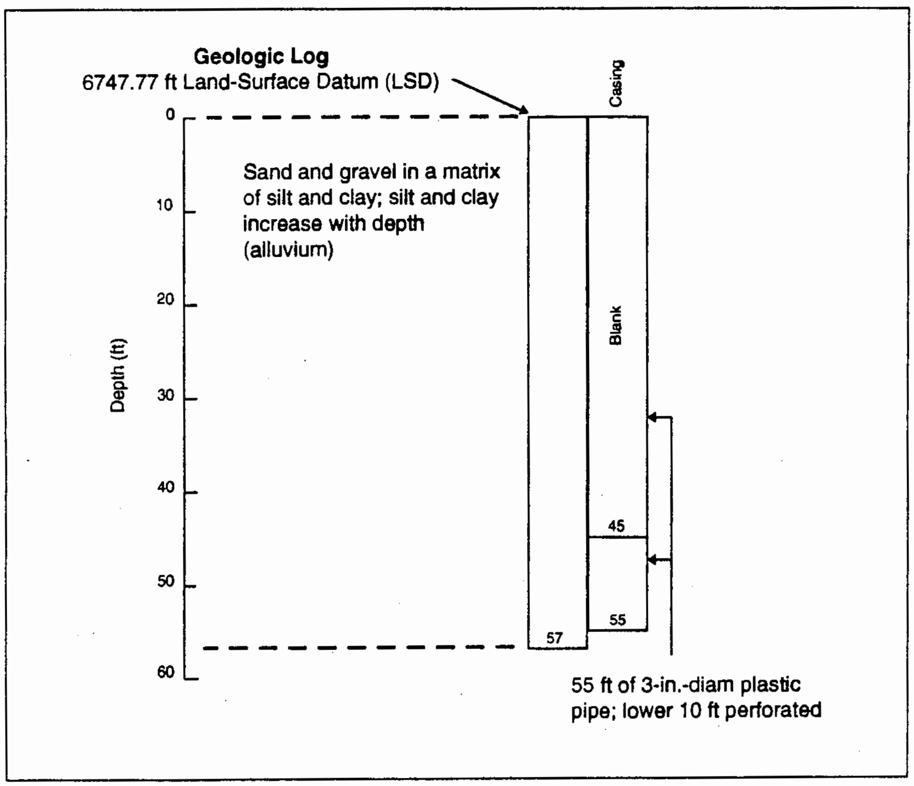

Fig. VI-P. Mortandad Canyon observation well MCO-9, completed November 1961, dry (Purtymun 1964).

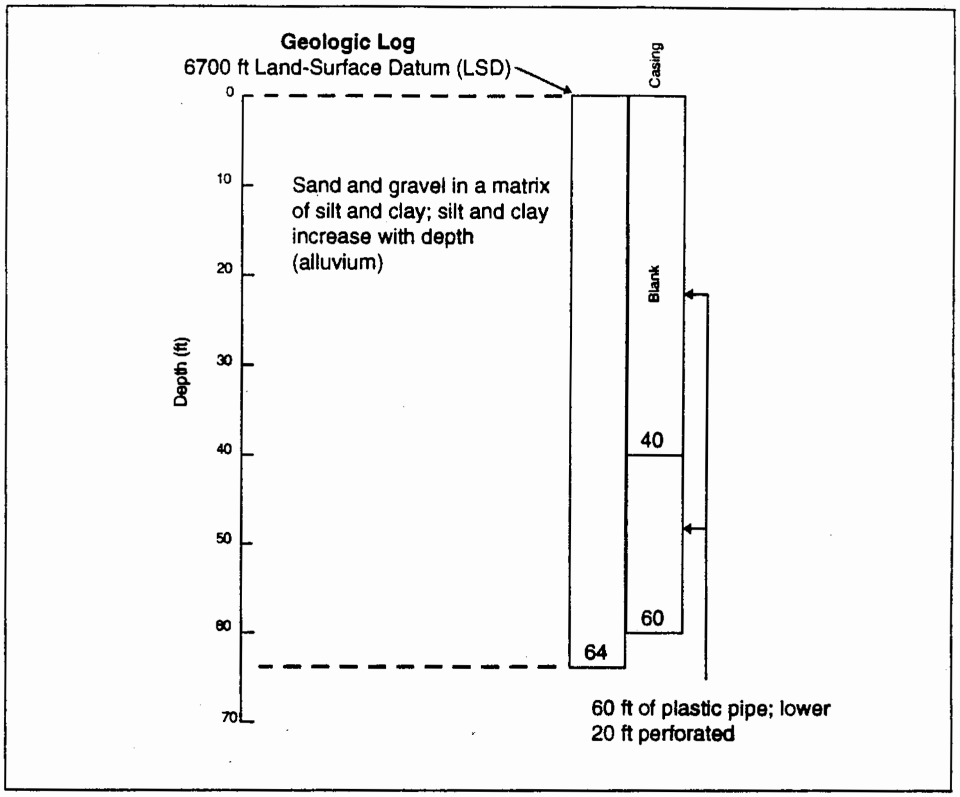

Fig. VI-T. Mortandad Canyon observation well, MCO-12, completed November 1961, dry; June 1971, well was dry, casing was pulled, well was abandoned, plugged, and relocated to the north about 12 ft (Purtymun 1964).

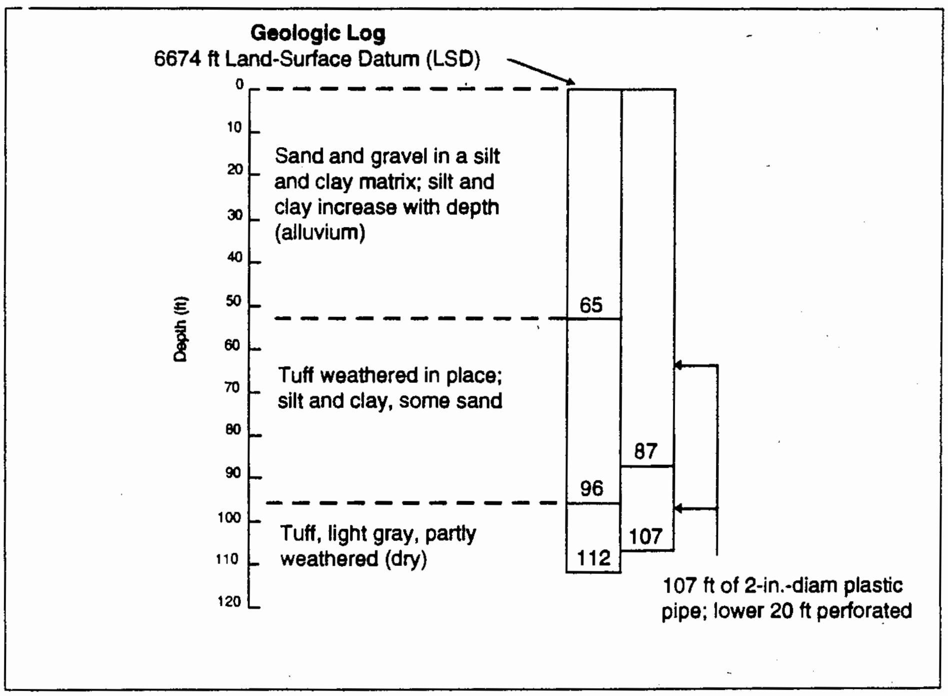

Fig. VI-U. Mortandad Canyon observation well MCO-13, completed July 1970, dry (Purtymun 1970).

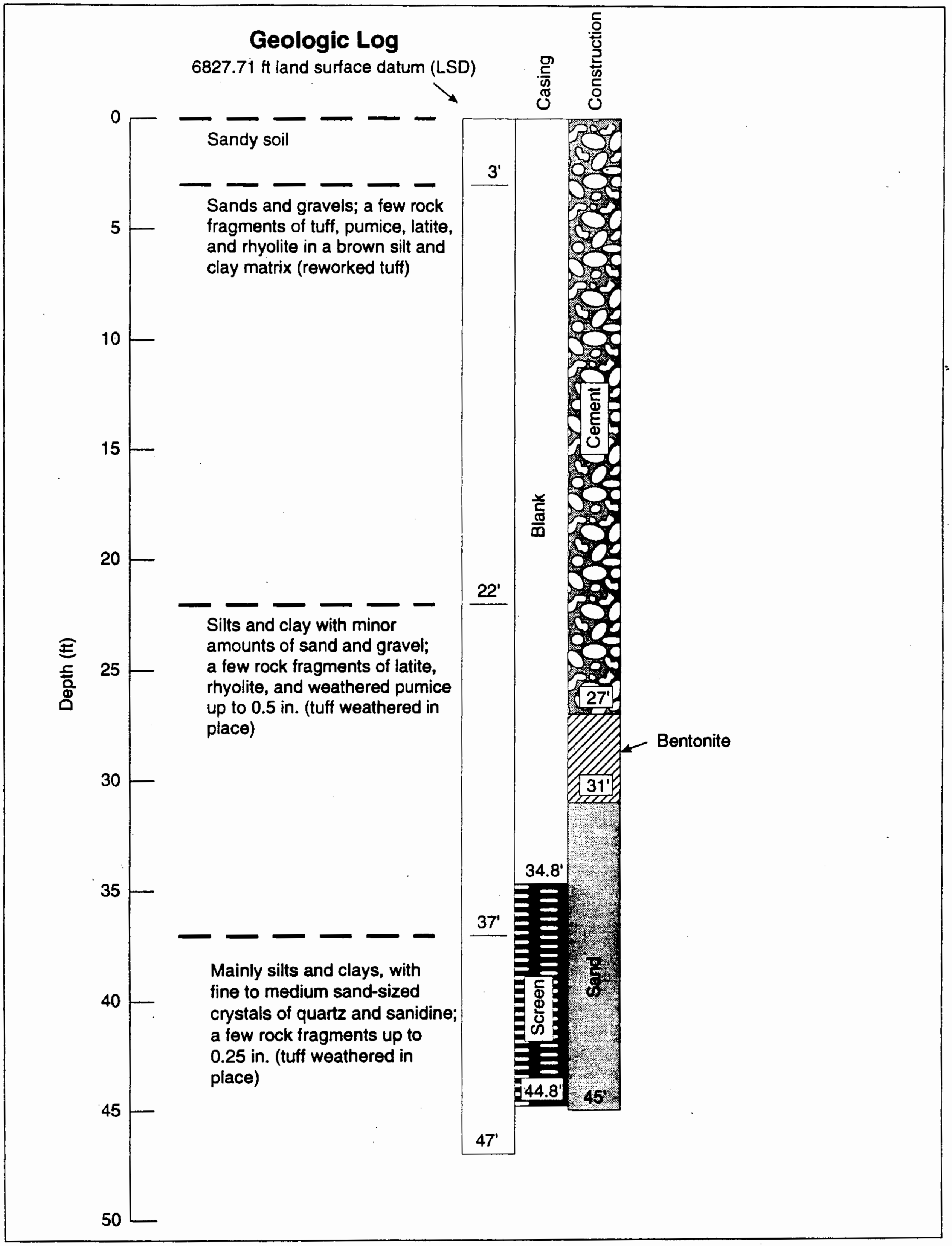

Fig. VIII-O. Mortandad Canyon observation well MCO-7A, completed November 1989, water level 35.2 ft (Purtymun and Stoker 1990).

TABLE VI-A. Hydrologic Data for Observation Wells in Mortandad Canyon

Observation Wells	Date Completed	Depth Drilled (ft)	Depth Completed (ft)	Depth 1991	Water Levels At Completion (ft)	Water Levels At Present Date	Water Levels (ft)	Elevation Land-Surface Datum (LSD) (ft)	Top of Casing (Measuring Point) to Land Surface Datum	Remarks
MCO-1	11/60	8	8	—	2.8	—	—	7153	—	Unable to locate in 1991
MCO-2	11/60	10	9	7.5	0.3	4/91	5.06	7133	2.00	
MCO-3	3/67	18	12	10.1	4.4	4/91	3.36	7052.72	1.54	Originally drilled 11/60; redrilled and cased 3/67
MCO-4	10/63	24	19	16.3	3.3	4/91	7.19	6900.36	1.02	
MCO-4.9	7/73	42	30	23.4	—	4/91	22.10	6879.31	1.25	
MCO-5	10/60	47	46	44.9	24.6	2/91	20.75	6875.80	1.95	
MCO-6	10/60	82	71	—	38.1	—	—	6849	—	Plugged and abandoned (relocated)
MCO-6	3/74	47	47	41.5	28.9	2/91	33.75	6848.96	2.34	
MCO-6.5A	11/61	47	45	33.3	41.0	2/91	Dry	6840	2.15	
MCO-6.5B	11/61	42	42	36.0	36.3	2/91	Dry	6839	0.70	
MCO-7	10/60	77	69	54.7	39.7	2/91	37.47	6827.40	1.24	
MCO-7.5A	11/61	63	60	—	41.2	—	—	6809	—	Well damaged (relocated)
MCO-7.5B	4/74	62	60	56.0	42.1	2/91	43.71	6808.80	1.28	
MCO-8	10/60	92	84	22.7	61.6		—	6796.70	0.25	Obstruction in well
MCO-8A	11/61	52	50	48.5	Dry	2/91	Dry	6800	0.61	
MCO-8.2	11/61	72	70	60.3	59.2	2/91	Dry	6782	2.00	
MCO-9	11/60	57	55	54.6	Dry	2/91	Dry	6747.77	1.44	
MCO-9.5	11/61	57	46	40.3	Dry	2/91	Dry	6740	2.00	
MCO-11	11/61	23	20	—	Dry	—	—	6720	—	Unable to locate in 1991
MCO-12	11/61	64	60	—	Dry	—	—	6700	—	Casing pulled; hole plugged (relocated)
MCO-12	6/71	112	108	96.2	Dry	2/91	Dry	6702	0.62	
MCO-13	7/70	112	107	106.2	Dry	2/91	Dry	6674	0.67	
TSCO-1	11/61	37	35	23.1	Dry	2/91	8.93	6857	0.97	

Sources: Baltz et al. 1963; Purtymun 1964, 1971, and 1974.

ATTACHMENT 9.0

TABLE 1. Mortandad Canyon Test Well (TW)-8 Chemical Quality of Ground Water for 1998

TABLE 2. Mortandad Canyon Monitoring Alluvial Ground Water Quality for 1998 and 1999 MCO-3, MCO-4B, MCO-6, and MCO-7

TABLE 1

Mortandad Canyon Test Well (TW) - 8
Chemical Quality of Ground Water for 1998

3/8/99

SAMPLE DATE	SUITE	ANALYTE	RESULT	UNCERTAINTY	UNITS
9/2/98	Gen_Inorg	Cl	3.50	0.50	mg/L
9/2/98	Gen_Inorg	Cl	3.60	0.50	mg/L
9/2/98	Gen_Inorg	CN	< 0.01	0.01	mg/L
9/2/98	Gen_Inorg	CN	< 0.01	0.01	mg/L
9/2/98	Gen_Inorg	F	0.15	0.02	mg/L
9/2/98	Gen_Inorg	F	0.15	0.02	mg/L
9/2/98	Gen_Inorg	NO3-N	0.26	0.03	mg/L
9/2/98	Gen_Inorg	NO3-N	0.28	0.03	mg/L
9/2/98	Gen_Inorg	pH	7.45	0.10	pH
9/2/98	Gen_Inorg	pH	7.53	0.10	pH
9/2/98	Gen_Inorg	TDS	144	14	mg/L
9/2/98	Gen_Inorg	TDS	140	14	mg/L
9/2/98	Metals	Ag	< 10	0	ug/l
9/2/98	Metals	Ag	< 10	0	ug/l
9/2/98	Metals	Al	< 50	50	ug/l
9/2/98	Metals	Al	< 50	50	ug/l
9/2/98	Metals	As	< 2	2	ug/L
9/2/98	Metals	As	< 2	2	ug/L
9/2/98	Metals	B	25	20	ug/l
9/2/98	Metals	B	33	20	ug/l
9/2/98	Metals	Ba	8	1	ug/l
9/2/98	Metals	Ba	8	2	ug/l
9/2/98	Metals	Be	< 3	2	ug/l
9/2/98	Metals	Be	< 3	2	ug/l
9/2/98	Metals	Cd	< 7	7	ug/l
9/2/98	Metals	Cd	< 7	7	ug/l
9/2/98	Metals	Co	< 8	8	ug/l
9/2/98	Metals	Co	< 8	8	ug/l
9/2/98	Metals	Cr	< 7	7	ug/l
9/2/98	Metals	Cr	< 7	7	ug/l
9/2/98	Metals	Cu	< 10	10	ug/l
9/2/98	Metals	Cu	< 10	10	ug/l
9/2/98	Metals	Fe	117	20	ug/l
9/2/98	Metals	Fe	135	20	ug/l
9/2/98	Metals	Hg	< 0.2	0.03	ug/L
9/2/98	Metals	Hg	< 0.2	0.03	ug/L
9/2/98	Metals	Mn	5	2	ug/l
9/2/98	Metals	Mn	4	3	ug/l
9/2/98	Metals	Mo	< 30	30	ug/l
9/2/98	Metals	Mo	< 30	30	ug/l
9/2/98	Metals	Ni	< 20	20	ug/l
9/2/98	Metals	Ni	< 20	20	ug/l
9/2/98	Metals	Pb	5	3	ug/L
9/2/98	Metals	Pb	5	3	ug/L
9/2/98	Metals	Se	< 2	2	ug/L
9/2/98	Metals	Se	< 2	2	ug/L
9/2/98	Metals	Zn	665	67	ug/l
9/2/98	Metals	Zn	709	71	ug/l

Chemical Quality of Ground Water for 1998

SAMPLE DATE	SUITE	ANALYTE	RESULT	UNCERTAINTY	UNITS
36040	Organics	Acenaphthene	< 10		ug/L
36040	Organics	Acenaphthene	< 10		ug/L
36040	Organics	Acenaphthylene	< 10		ug/L
36040	Organics	Acenaphthylene	< 10		ug/L
36040	Organics	Aniline	< 10		ug/L
36040	Organics	Aniline	< 10		ug/L
36040	Organics	Anthracene	< 10		ug/L
36040	Organics	Anthracene	< 10		ug/L
36040	organics	Aroclor 1016	< 2.5		ug/L
36040	organics	Aroclor 1016	< 2.5		ug/L
36040	organics	Aroclor 1221	< 2.5		ug/L
36040	organics	Aroclor 1221	< 2.5		ug/L
36040	organics	Aroclor 1232	< 2.5		ug/L
36040	organics	Aroclor 1232	< 2.5		ug/L
36040	organics	Aroclor 1242	< 2.5		ug/L
36040	organics	Aroclor 1242	< 2.5		ug/L
36040	organics	Aroclor 1248	< 2.5		ug/L
36040	organics	Aroclor 1248	< 2.5		ug/L
36040	organics	Aroclor 1254	< 2.5		ug/L
36040	organics	Aroclor 1254	< 2.5		ug/L
36040	organics	Aroclor 1260	< 2.5		ug/L
36040	organics	Aroclor 1260	< 2.5		ug/L
36040	organics	Aroclor 1262	< 2.5		ug/L
36040	organics	Aroclor 1262	< 2.5		ug/L
36040	Organics	Azobenzene	< 10		ug/L
36040	Organics	Azobenzene	< 10		ug/L
36040	Organics	Benzidine [m-]	< 50		ug/L
36040	Organics	Benzidine [m-]	< 50		ug/L
36040	Organics	Benzo[a]anthracene	< 10		ug/L
36040	Organics	Benzo[a]anthracene	< 10		ug/L
36040	Organics	Benzo[a]pyrene	< 10		ug/L
36040	Organics	Benzo[a]pyrene	< 10		ug/L
36040	Organics	Benzo[b]fluoranthene	< 10		ug/L
36040	Organics	Benzo[b]fluoranthene	< 10		ug/L
36040	Organics	Benzo[g,h,i]perylene	< 10		ug/L
36040	Organics	Benzo[g,h,i]perylene	< 10		ug/L
36040	Organics	Benzo[k]fluoranthene	< 10		ug/L
36040	Organics	Benzo[k]fluoranthene	< 10		ug/L
36040	Organics	Benzoic acid	< 50		ug/L
36040	Organics	Benzoic acid	< 50		ug/L
36040	Organics	Benzyl alcohol	< 10		ug/L
36040	Organics	Benzyl alcohol	< 10		ug/L
36040	Organics	Bis(2-chloroethoxy)methane	< 10		ug/L
36040	Organics	Bis(2-chloroethoxy)methane	< 10		ug/L
36040	Organics	Bis(2-chloroethyl)ether	< 10		ug/L
36040	Organics	Bis(2-chloroethyl)ether	< 10		ug/L
36040	Organics	Bis(2-chloroisopropyl)ether	< 10		ug/L
36040	Organics	Bis(2-chloroisopropyl)ether	< 10		ug/L
36040	Organics	Bis(2-ethylhexyl)phthalate	< 10		ug/L
36040	Organics	Bis(2-ethylhexyl)phthalate	< 10		ug/L

Chemical Quality of Ground Water for 1998

SAMPLE DATE	SUITE	ANALYTE	RESULT	UNCERTAINTY	UNITS
36040	Organics	Bromophenylphenyl ether [4-]	< 10		ug/L
36040	Organics	Bromophenylphenyl ether [4-]	< 10		ug/L
36040	Organics	Butyl benzyl phthalate	< 10		ug/L
36040	Organics	Butyl benzyl phthalate	< 10		ug/L
36040	Organics	Chloro-3-methylphenol [4-]	< 10		ug/L
36040	Organics	Chloro-3-methylphenol [4-]	< 10		ug/L
36040	Organics	Chloroaniline [4-]	< 10		ug/L
36040	Organics	Chloroaniline [4-]	< 10		ug/L
36040	Organics	Chloronaphthalene [2-]	< 10		ug/L
36040	Organics	Chloronaphthalene [2-]	< 10		ug/L
36040	Organics	Chlorophenol [o-]	< 10		ug/L
36040	Organics	Chlorophenol [o-]	< 10		ug/L
36040	Organics	Chlorophenylphenyl ether [4-]	< 10		ug/L
36040	Organics	Chlorophenylphenyl ether [4-]	< 10		ug/L
36040	Organics	Chrysene	< 10		ug/L
36040	Organics	Chrysene	< 10		ug/L
36040	Organics	Di-n-butyl phthalate	< 10		ug/L
36040	Organics	Di-n-butyl phthalate	< 10		ug/L
36040	Organics	Di-n-octyl phthalate	< 10		ug/L
36040	Organics	Di-n-octyl phthalate	< 10		ug/L
36040	Organics	Dibenzo[a,h]anthracene	< 10		ug/L
36040	Organics	Dibenzo[a,h]anthracene	< 10		ug/L
36040	Organics	Dibenzofuran	< 10		ug/L
36040	Organics	Dibenzofuran	< 10		ug/L
36040	Organics	Dichlorobenzene (1,2) [o-]	< 10		ug/L
36040	Organics	Dichlorobenzene (1,2) [o-]	< 10		ug/L
36040	Organics	Dichlorobenzene (1,3) [m-]	< 10		ug/L
36040	Organics	Dichlorobenzene (1,3) [m-]	< 10		ug/L
36040	Organics	Dichlorobenzene (1,4) [p-]	< 10		ug/L
36040	Organics	Dichlorobenzene (1,4) [p-]	< 10		ug/L
36040	Organics	Dichlorobenzidine [3,3'-]	< 20		ug/L
36040	Organics	Dichlorobenzidine [3,3'-]	< 20		ug/L
36040	Organics	Dichlorophenol [2,4-]	< 10		ug/L
36040	Organics	Dichlorophenol [2,4-]	< 10		ug/L
36040	Organics	Diethyl phthalate	< 10		ug/L
36040	Organics	Diethyl phthalate	< 10		ug/L
36040	Organics	Dimethyl phthalate	< 10		ug/L
36040	Organics	Dimethyl phthalate	< 10		ug/L
36040	Organics	Dimethylphenol [2,4-]	< 10		ug/L
36040	Organics	Dimethylphenol [2,4-]	< 10		ug/L
36040	Organics	Dinitrophenol [2,4-]	< 50		ug/L
36040	Organics	Dinitrophenol [2,4-]	< 50		ug/L
36040	Organics	Dinitrotoluene [2,4-]	< 10		ug/L
36040	Organics	Dinitrotoluene [2,4-]	< 10		ug/L
36040	Organics	Dinitrotoluene [2,6-]	< 10		ug/L
36040	Organics	Dinitrotoluene [2,6-]	< 10		ug/L
36040	Organics	Fluoranthene	< 10		ug/L
36040	Organics	Fluoranthene	< 10		ug/L
36040	Organics	Fluorene	< 10		ug/L
36040	Organics	Fluorene	< 10		ug/L

Chemical Quality of Ground Water for 1998

SAMPLE DATE	SUITE	ANALYTE	RESULT	UNCERTAINTY	UNITS
36040	Organics	Hexachlorobenzene	< 10		ug/L
36040	Organics	Hexachlorobenzene	< 10		ug/L
36040	Organics	Hexachlorobutadiene	< 50		ug/L
36040	Organics	Hexachlorobutadiene	< 50		ug/L
36040	Organics	Hexachlorocyclopentadiene	< 10		ug/L
36040	Organics	Hexachlorocyclopentadiene	< 10		ug/L
36040	Organics	Hexachloroethane	< 10		ug/L
36040	Organics	Hexachloroethane	< 10		ug/L
36040	Organics	Indeno[1,2,3-cd]pyrene	< 10		ug/L
36040	Organics	Indeno[1,2,3-cd]pyrene	< 10		ug/L
36040	Organics	Isophorone	< 10		ug/L
36040	Organics	Isophorone	< 10		ug/L
36040	Organics	Methyl-4,6-dinitrophenol [2-]	< 50		ug/L
36040	Organics	Methyl-4,6-dinitrophenol [2-]	< 50		ug/L
36040	Organics	Methylnaphthalene [2-]	< 10		ug/L
36040	Organics	Methylnaphthalene [2-]	< 10		ug/L
36040	Organics	Methylphenol [2-]	< 10		ug/L
36040	Organics	Methylphenol [2-]	< 10		ug/L
36040	Organics	Methylphenol [4-]	< 10		ug/L
36040	Organics	Methylphenol [4-]	< 10		ug/L
36040	Organics	Naphthalene	< 10		ug/L
36040	Organics	Naphthalene	< 10		ug/L
36040	Organics	Nitroaniline [2-]	< 20		ug/L
36040	Organics	Nitroaniline [2-]	< 20		ug/L
36040	Organics	Nitroaniline [3-]	< 20		ug/L
36040	Organics	Nitroaniline [3-]	< 20		ug/L
36040	Organics	Nitroaniline [4-]	< 20		ug/L
36040	Organics	Nitroaniline [4-]	< 20		ug/L
36040	Organics	Nitrobenzene	< 10		ug/L
36040	Organics	Nitrobenzene	< 10		ug/L
36040	Organics	Nitrophenol [2-]	< 10		ug/L
36040	Organics	Nitrophenol [2-]	< 10		ug/L
36040	Organics	Nitrophenol [4-]	< 50		ug/L
36040	Organics	Nitrophenol [4-]	< 50		ug/L
36040	Organics	Nitrosodi-n-propylamine [N-]	< 10		ug/L
36040	Organics	Nitrosodi-n-propylamine [N-]	< 10		ug/L
36040	Organics	Nitrosodimethylamine [N-]	< 10		ug/L
36040	Organics	Nitrosodimethylamine [N-]	< 10		ug/L
36040	Organics	Nitrosodiphenylamine [N-]	< 10		ug/L
36040	Organics	Nitrosodiphenylamine [N-]	< 10		ug/L
36040	Organics	Pentachlorophenol	< 50		ug/L
36040	Organics	Pentachlorophenol	< 50		ug/L
36040	Organics	Phenanthrene	< 10		ug/L
36040	Organics	Phenanthrene	< 10		ug/L
36040	Organics	Phenol	< 10		ug/L
36040	Organics	Phenol	< 10		ug/L
36040	Organics	Picoline [2-]	< 10		ug/L
36040	Organics	Picoline [2-]	< 10		ug/L
36040	Organics	Pyrene	< 10		ug/L
36040	Organics	Pyrene	< 10		ug/L

TABLE 1

Mortandad Canyon Test Well (TW) - 8
Chemical Quality of Ground Water for 1998

3/8/99

SAMPLE DATE	SUITE	ANALYTE	RESULT	UNCERTAINTY	UNITS
36040	Organics	Pyridine	< 10		ug/L
36040	Organics	Pyridine	< 10		ug/L
36040	Organics	Trichlorobenzene [1,2,4-]	< 10		ug/L
36040	Organics	Trichlorobenzene [1,2,4-]	< 10		ug/L
36040	Organics	Trichlorophenol [2,4,5-]	< 10		ug/L
36040	Organics	Trichlorophenol [2,4,5-]	< 10		ug/L
36040	Organics	Trichlorophenol [2,4,6-]	< 10		ug/L
36040	Organics	Trichlorophenol [2,4,6-]	< 10		ug/L
9/2/98	Rad	U	0.53	0.06	ug/L
9/2/98	Rad	U	0.41	0.05	ug/L

TABLE 2

Mortandad Canyon
Alluvial Ground Water Monitoring
Sample Type: water, filtered

Units: mg/L

Location	Sample Date: October, 1999					Sample Date: December, 1998					Sample Date: February, 1999				
	NO3-N	TKN	NH3	TDS	F	NO3-N	TKN	NH3	TDS	F	NO3-N	TKN	NH3	TDS	F
MCO-3	29.1	0.6	<0.2	507	1.1	36.4	0.7	<0.2	713	1.0	41.9	0.5	<0.2	595	0.9
MCO-4B	16.1	0.4	<0.2	355	1.3	14.0	0.6	<0.2	343	1.4	37.8	0.4	<0.2	505	1.0
MCO-6	13.7	0.4	<0.2	350	1.7	14.8	0.6	<0.2	374	1.7	17.0	0.4	<0.2	357	1.4
MCO-6 duplicate	NA	NA	NA	NA	NA	15.0	0.6	<0.2	378	1.6	17.8	0.4	<0.2	362	1.4
MCO-7	16.0	0.4	<0.2	355	1.7	14.0	0.6	<0.2	368	1.8	13.8	0.3	<0.2	354	1.7

Notes:

NA means that no duplicate sample was collected during this sampling event.

ATTACHMENT 10.0

Revised Table 3.0. Proposed Monitoring Plan for the RLWTF Ground Water Discharge Plan

Revision No. 2. March 1999

Table 3.0. Proposed Monitoring Plan for the RLWTF Ground Water Discharge Plan Application [Revision 2. March 1999].

LOCATION	PARAMETER	NOTES	FREQUENCY
Discharge Point	Volume, in gallons	8	Per batch
RLWTF Effluent Tank	NO3-N, F, TDS	7, 8	1/week
Raw Feed Sample Tap (influent)	Organics	6, 9	1/week
RLWTF Effluent Tank	Health, Secondary, Irrigation Stds	3, 4, 5, 7, 8	1/month
NPDES Sampling Tap	Radiochemistry	2, 8	1/month
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Total Nitrogen, F, TDS, Water Level	1, 8	Quarterly
TW-8	Total Nitrogen, F, TDS	1, 8	Quarterly
MCO-6	Health, Secondary, Irrigation Stds	3, 4, 5, 8	Quarterly
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Radiochemistry	2, 9	Annual
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Health, Secondary, Irrigation Stds	3, 4, 5, 9	Annual
MCO-3, 4B, 5, 6, 7A, 7.5, 8.2, 13	Organics	6, 9	1 per 3 Years
TW-8	Radiochemistry	2, 9	Annual
TW-8	Health, Secondary, Irrigation Stds	3, 4, 5, 9	Annual
TW-8	Organics	6, 9	1 per 3 Years
GS-1 Gaging Station	Surface Flows	9	Continuous

Notes:

1. Total Nitrogen: TKN, Ammonia, NO3-N.
2. Radiochemistry (3103 A): Combined Ra-226 & Ra-228.
3. Health Standards (3103 A.): Ag, As, Ba, Cd, CN, Cr, F, Hg, NO3, Pb, Se, U.
4. Secondary Standards (3103 B.): Cl, Cu, Fe, Mn, SO4, Zn, TDS, and pH.
5. Irrigation Standards (3103 C.): Al, B, Co, Mo, Ni.
6. Volatile and Semivolatile Compounds, EPA SW 846 and Methods 8240 and 8270.
7. Flow proportioned composite sample from each treatment batch.
8. Data reported to NMED quarterly.
9. Data reported to NMED annually.
10. This Monitoring Plan includes only those wells available for sampling in March 1999. Future wells will be added to the Monitoring Plan as requested by the NMED GWQB.

ATTACHMENT 11.0

Location of Proposed Mortandad Canyon Bandelier Tuff Wells MCOBT-4.4 and MCOBT-8.5

Mortandad Canyon Work Plan
September 1997

- The three new regional aquifer wells and the existing well TW-8 completed in the regional aquifer will be sampled for analyses of low-level tritium and other chemical species to further evaluate impacts of Laboratory-derived contaminants on the regional aquifer. These analyses will also be used to test the hypothesis of mixing of young water (derived from shallow sources) with old water (regional aquifer) in Mortandad Canyon.

- Recommendations will be made regarding corrective measures to groundwater zones and monitoring strategies for the ER Project and/or Laboratory environmental surveillance.

Proposed alluvial wells, Bandelier Tuff wells, and regional aquifer wells are listed in Table 7.3.3-1, Table 7.3.3-2, and Table 7.3.3-3, respectively. Locations of the wells are shown in Figure 7.3.3-1 and Figure 7.3.3-2 (and also in Figure A-2 in Appendix A of this work plan).

TABLE 7.3.3-1

DESCRIPTION OF PROPOSED SURFACE WATER GAGING STATION AND ALLUVIAL/CERRO TOLEDO INTERVAL WELLS[a]

Well Designation[b]	Location[c]
GS-1.3	Proposed gaging station 1000 ft east of GS-1
MCO-3	Proposed replacement well for old MCO-3
MCO-0.6	Proposed observation well west of TA-50 RLWTF outfall
MCO-4B	Existing observation well east of TA-50 RLWTF outfall
TSCO-6A	Proposed well for lower Ten Site Canyon
MCO-7.2	Proposed well between MCO-7 and MCO-8 at sediment traps
MCO-6.8	Proposed well between MCO-6 and MCO-7 below confluence with Ten Site Canyon
MCO-13A and MCO-13B	Proposed wells near MCO-13

a. Alluvial/Cerro Toledo interval wells are listed in order of priority.
b. GS = gaging station, MC = Mortandad Canyon, O = observation, TSC = Ten Site Canyon
c. See Figure 7.3.3-1 for proposed locations.

TABLE 7.3.3-2

DESCRIPTION OF PROPOSED BANDELIER TUFF WELLS

Well Designation[a]	Location[b]
MCOBT-4.4	West of TW-8, near MCWB-4
MCOBT-8.5	East of MCO-8.2

a. MC = Mortandad Canyon, O = observation, BT = Bandelier Tuff
b. See Figure 7.3.3-2 for proposed locations.

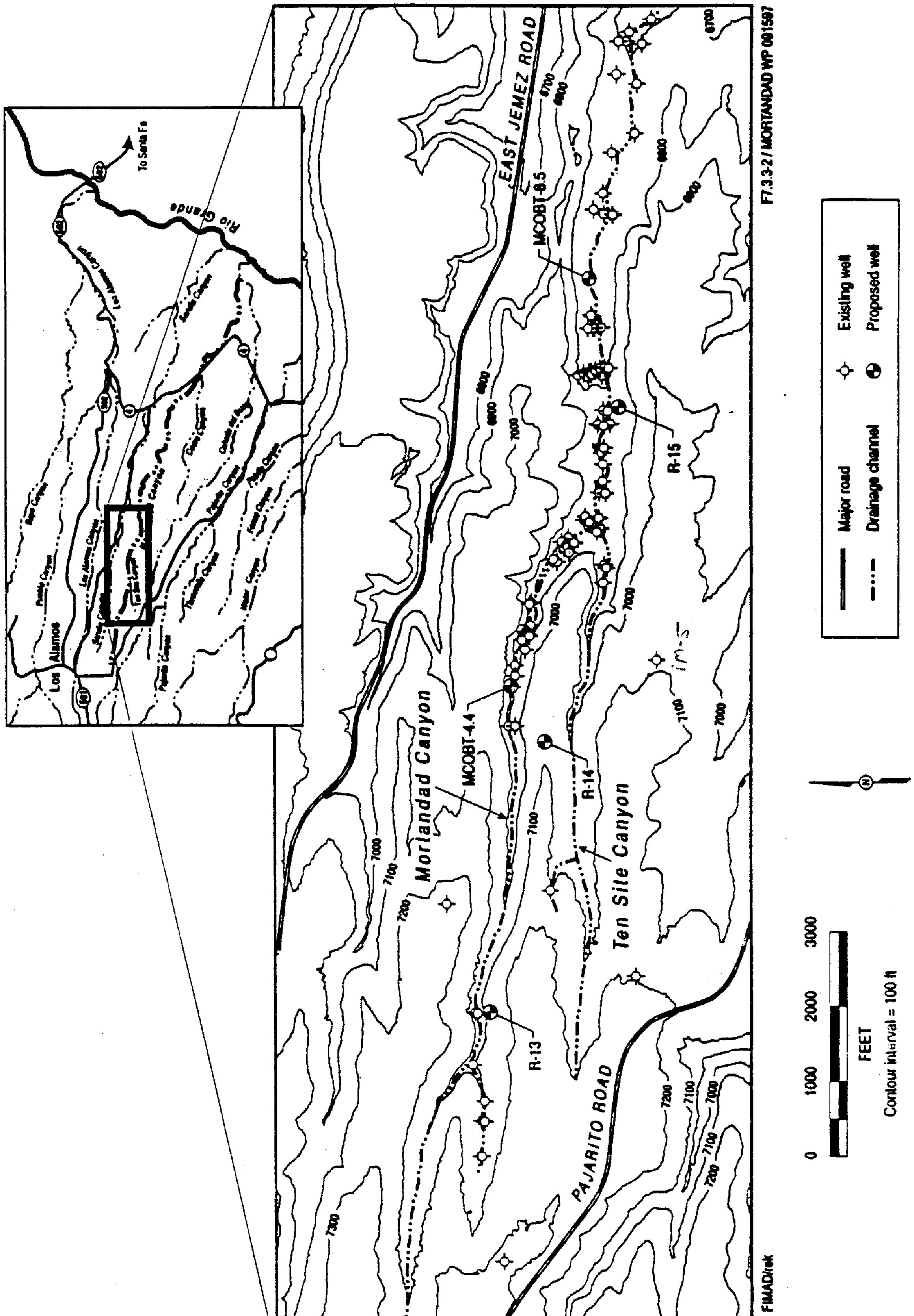

Figure 7.3.3-2. Locations of proposed Bandelier Tuff wells and regional aquifer wells.

:01431

State of New Mexico
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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
Secretary
PAUL R. RITZMA
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

PB Z 434 828 734
US Postal Service
Receipt for Certified Mail
No Insurance Coverage Provided.
Do not use for International Mail (See reverse)
Sent to: David Gurule, Area Manager
Street & Number: Dept. Of Energy, Los Alamos Area
528 35th Street
Post Office, State, & ZIP Code: Los Alamos, New Mexico 87544

Postage	$
Certified Fee	

January 31, 2000

David Gurule, Area Manager
Department of Energy, Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544

Dennis Erickson, Division Director
ESH-DO, Los Alamos National Laboratory
Mail Stop K491
Los Alamos, New Mexico 87544

RE: Status Update on the Discharge Permit Application for the Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Mr. Gurule and Mr. Erickson:

This letter is to update the Department of Energy, Los Alamos Area Office (DOE), and the Los Alamos National Laboratory (LANL) on the status of the discharge permit application (DP-1132) for the Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (RLWTF). In a letter to Mr. Gurule, dated June 30, 1999, the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) informed the DOE and LANL that the Secretary of the NMED had determined that there is significant public interest in DP-1132 and that a public hearing would be held.

Due to staff constraints at the GWQB, and the time requirements for completion of a thorough review of all information submitted as part of the discharge plan application and for preparation of a public hearing, the hearing has not yet been scheduled. NMED recognizes that the RLWTF discharges wastewater under an NPDES permit and requests that if LANL continues to discharge wastewater from the RLWTF that all discharges meet all Water Quality Control Commission (WQCC) Regulation 3103 standards as LANL committed to in letters dated November 20, 1998 and March 12, 1999. In addition, NMED requests that LANL continue to submit quarterly monitoring reports to the GWQB as described in the revised monitoring plan in the letter from DOE dated June 23, 1997.

While there is not a scheduled date for a public hearing, NMED will keep the DOE and LANL informed on the status of the permitting process including the scheduling of a public hearing. If you have any questions concerning this letter, please contact Phyllis Bustamante at 827-0166.

Sincerely,

Maura Hanning

Maura Hanning, Acting Program Manager
Ground Water Quality Bureau, Pollution Prevention Section

MH/PAB/pab

xc: Benito Garcia, District Manager, NMED District II
Steven Rae, LANL, Mail Stop K497, Los Alamos, New Mexico 87545
Susan Diane, P.O. box 9855, Santa Fe, New Mexico 87504
Joey Natseway, Tewa Women United, Rte 5 Box 298, Santa Fe, New Mexico 87501
Kathy Sanchez, President, Pi'ee Quiyo Inc., Rt. 5 Box 442-B, San Ildefonso Pueblo, Española, New Mexico 87532

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: February 18, 2000
In Reply Refer To: ESH-18/WQ&H:00-0054
Mail Stop: K497
Telephone: (505) 665-1859

RECEIVED
FEB 22 2000
GROUND WATER BUREAU

Ms. Maura Hanning, Acting Program Manager
Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: STATUS UPDATE ON THE GROUND WATER DISCHARGE PERMIT APPLICATION, LOS ALAMOS NATIONAL LABORATORY, RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, DP-1132

Dear Ms. Hanning:

Los Alamos National Laboratory is in receipt of your January 31, 2000, letter (attached) regarding the status of the Laboratory's Ground Water Discharge Permit Application for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. The Laboratory acknowledges the constraints that your agency is operating under and we recognize that a public hearing for DP-1132 cannot be scheduled until a thorough review of the discharge plan application has been completed. It is my understanding that the Laboratory has satisfied all requests for information submitted by your agency to date. Please let me know at your earliest convenience if any of your requests for information are outstanding.

The Laboratory remains committed to ensuring that all effluent discharge from the RLWTF meets New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards. In January 2000, the RLWTF completed the final two steps of the facility's Phase I and II upgrades, the Electrodialysis Reversal (EDR) and the interim mechanical evaporator. These treatment units provide the RLWTF with the capability to concentrate and treat the RO concentrate (reject) waste stream. With this capability in place, the Laboratory is confident that it can continue to meet NMWQCC Regulation 3103 standards into the future.

During 1999, the Laboratory submitted to your agency four quarterly reports for DP-1132. The Laboratory will continue to submit quarterly reports until such time as we are notified by your agency to do differently.

Please keep the Laboratory informed on the status of the permitting process including the scheduling of the public hearing. In addition, please notify Bob Beers of my staff at 667-7969 should you have questions or require additional information.

Sincerely,

Steven Rae, Group Leader
Water Quality and Hydrology Group

SR:BB/rm

Enclosures: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas
E. Spencer, USEPA, Region 6, Dallas, Texas
P. Bustamante, NMED GWQB, Santa Fe, New Mexico
J. Bearzi, NMED HRMB, Santa Fe, New Mexico
B. Hoditschek, NMED SWQB, Santa Fe, New Mexico
J. Vozella, DOE LAAO, MS A316
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T. Gunderson, DLDOPS, MS A100
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M. Johansen, DOE LAAO, MS A316
T. Gunderson, DLDOPS, MS A100
T. Stanford, FWO-DO, MS K492
B. Ramsey, FWO-DO, MS K492
D. Mclain, FWO-RLW, MS J595
S. Hanson, FWO-DO, MS J595
D. Moss, FWO-RLW, MS E518
R. Alexander, FWO-WFM, E518
P. Worland, FWO-RLW, MS E518
D. Erickson, ESH-DO, MS K491
S. Rae, ESH-18, MS K497
M. Saladen, ESH-18, MS K497
D. Woitte, LC/GL, MS A187
WQ&H File, MS K497
CIC-10, MS A150

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GOVERNOR

PETER MAGGIORE
Secretary
PAUL R. RITZMA
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

January 31, 2000

David Gurule, Area Manager
Department of Energy, Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544

Dennis Erickson, Division Director
ESH-DO, Los Alamos National Laboratory
Mail Stop K491
Los Alamos, New Mexico 87544

RE: Status Update on the Discharge Permit Application for the Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility, DP-1132

Dear Mr. Gurule and Mr. Erickson:

This letter is to update the Department of Energy, Los Alamos Area Office (DOE), and the Los Alamos National Laboratory (LANL) on the status of the discharge permit application (DP-1132) for the Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (RLWTF). In a letter to Mr. Gurule, dated June 30, 1999, the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) informed the DOE and LANL that the Secretary of the NMED had determined that there is significant public interest in DP-1132 and that a public hearing would be held.

Due to staff constraints at the GWQB, and the time requirements for completion of a thorough review of all information submitted as part of the discharge plan application and for preparation of a public hearing, the hearing has not yet been scheduled. NMED recognizes that the RLWTF discharges wastewater under an NPDES permit and requests that if LANL continues to discharge wastewater from the RLWTF that all discharges meet all Water Quality Control Commission (WQCC) Regulation 3103 standards as LANL committed to in letters dated November 20, 1998 and March 12, 1999. In addition, NMED requests that LANL continue to submit quarterly monitoring reports to the GWQB as described in the revised monitoring plan in the letter from DOE dated June 23, 1997.

While there is not a scheduled date for a public hearing, NMED will keep the DOE and LANL informed on the status of the permitting process including the scheduling of a public hearing. If you have any questions concerning this letter, please contact Phyllis Bustamante at 827-0166.

Sincerely,

Maura Hanning, Acting Program Manager
Ground Water Quality Bureau, Pollution Prevention Section

MH/PAB/pab

xc: Benito Garcia, District Manager, NMED District II
Steven Rae, LANL, Mail Stop K497, Los Alamos, New Mexico 87545
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Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
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Date: April 26, 2000
In Reply Refer To: ESH-18/WQ&H:00-0162
Mail Stop: K497
Telephone: (505) 667-7969

RECEIVED
MAY 0 1 2000
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, FIRST QUARTER, 2000

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from January 1 through March 31, 2000. In December 1998, the Laboratory proposed to submit quarterly reports to the New Mexico Environment Department's Ground Water Quality Bureau on a voluntary basis. These quarterly reports include effluent and monitoring well analytical results as well as a progress report on the planned upgrades to the RLWTF.

Attachment 1.0, Table 1.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the first quarter of 2000 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS).

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the first quarter of 2000 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 6.0 mg/L, 0.4 mg/L, and 1.5 mg/L.

Attachment 2.0, Table 2.0, presents the analytical results from sampling at the Laboratory's Mortandad Canyon alluvial monitoring wells on February 24, 2000. All of the sample results from MCO-3, MCO-6, and MCO-7 were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of the nitrate result at MCO-7 (12.5 mg/L). No sample results are available for MCO-4B because insufficient water was available for sample collection. MCO-4B has not had sufficient water for sampling since October 1999. Attachment 3.0, Figure 1.0, has been presented to illustrate the decline in nitrate concentrations in Mortandad Canyon alluvial ground water since March 21, 1999, when nitrate restrictions were initiated at the Laboratory.

Since the RO treatment unit returned to service on December 10, 1999, the RLWTF's effluent has consistently met the U.S. Department of Energy's Derived Concentration Guide (DCG) for gross alpha particle activity of 30 pCi/L. Worth noting, in February 2000 the RLWTF discharged a batch of effluent from the Reverse Osmosis (RO) treatment unit with a gross alpha particle activity of 0 piC/L (+/- 2 piC/L).

In January 2000, the Electrodialysis Reversal (EDR) treatment unit completed its start-up phase and was placed into permanent service. The feed water to the EDR is the reject stream from the RO treatment unit. The EDR houses a series of charge-sensitive membranes sandwiched between plates that produce an electric field. The electric field drives ions through the membranes. As a result, the EDR is capable of achieving a 5-6 fold concentration of the RO reject stream. The reject stream from the EDR is transferred to storage for eventual treatment by the interim mechanical evaporator.

On January 31, 2000, the interim mechanical evaporator at the RLWTF was placed into service. The interim evaporator treats the EDR reject water by reducing the volume 4:1 (e.g., 80,000 gallons of EDR reject water is reduced to 20,000 gallons of evaporator bottoms). The distillate from the evaporator is being stored in the two 20,000 gallon temporary storage tanks recently installed at the RLWTF. To date, all discharges from the distillate tanks through NPDES Outfall 051 have met all NPDES, NMWQCC, and Department of Energy's DCG limits.

With the completion of the interim mechanical evaporator, the RLWTF has finished the second phase of a two-phased project to upgrade the facility's treatment units. Phase I, installation of the Tubular Ultrafiltration (TUF) and Reverse Osmosis (RO) treatment units, was completed in March 1999. The Phase I upgrades were critical steps towards compliance with U.S. Department of Energy's DCG limits. The Phase II upgrade, installation of the interim mechanical evaporator, was a critical step towards compliance with New Mexico Water Quality Control Commission Regulation 3103 ground water standards and the Laboratory's future goal of zero liquid discharge.

Please contact me at 667-7969 if you would like additional information regarding this report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Enclosures: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas, w/enc.
E. Spencer, USEPA, Region 6, Dallas, Texas, w/enc.
B. Hoditschek, NMED/SWQB, Santa Fe, New Mexico, w/enc.
J. Bearzi, NMED/HRMB, Santa Fe, New Mexico, w/enc.
J. Parker, NMED/DOE-OB, Santa Fe, New Mexico, w/enc.
R. Ford-Schmid, NMED/DOE-OB, Santa Fe, New Mexico, w/enc.

Cy (continued):
M. Johansen, DOE/LAAO, w/enc., MS A316
T. Gunderson, DLDOPS, w/enc., MS A100
B. Stine, ALDNW, w/enc., MS A105
D. Erickson, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
T. Stanford, FWO-DO, w/enc., MS K492
B. Ramsey, FWO-DO, w/enc., MS K492
S. Hanson, FWO-DO, w/enc., MS J595
D. Moss, FWO-RLW, w/enc., MS E518
P. Worland, FWO-RLW, w/enc., MS E518
R. Alexander, FWO-WFM, w/enc., MS E518
D. Woitte, LC/GL, w/enc., MS A187
S. Yarbro, NMT-2, w/enc., MS E511
WQ&H File, w/enc., MS K497
CIC-10, w/enc., MS A150

Table 1.0. RLWTF Weekly Effluent Monitoring Analytical Results, January-March, 2000.

Monitoring Period	RLWTF Weekly Effluent Monitoring Analytical Results		
	NO3-N (mg/L)	F (mg/L)	TDS (mg/L)
JANUARY	0.10	0.00	2
	0.07	0.00	54
	0.36	0.01	48
	0.29		70
FEBRUARY	0.22	0.02	116
	0.13	0.09	58
	0.19	0.04	72
	0.27	0.05	92
	0.17	0.05	83
MARCH	0.51	0.04	96
	0.25	0.03	100
	1.05	0.19	458
	0.29	0.07	472
1st Quarter 2000 Averages (mg/L)	**0.30**	**0.05**	**147**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

Table 2.0. Analytical Results, Mortandad Canyon Alluvial Monitoring Wells (mg/L)

Sampling Location	**Sample Date: February 24, 2000**				
	NO3-N	**TKN**	**NH3**	**TDS**	**F**
MCO-3	1.4	<0.2	<0.2	211	0.7
MCO-4B	NS	NS	NS	NS	NS
MCO-6	5.4	0.3	<0.2	392	1.1
MCO-7	12.5	0.3	<0.2	365	1.4
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*

Notes:
NA means that no sample was collected during this sampling event.
NS means that no sample was collected at this well due to insufficient water.
All units: mg/L

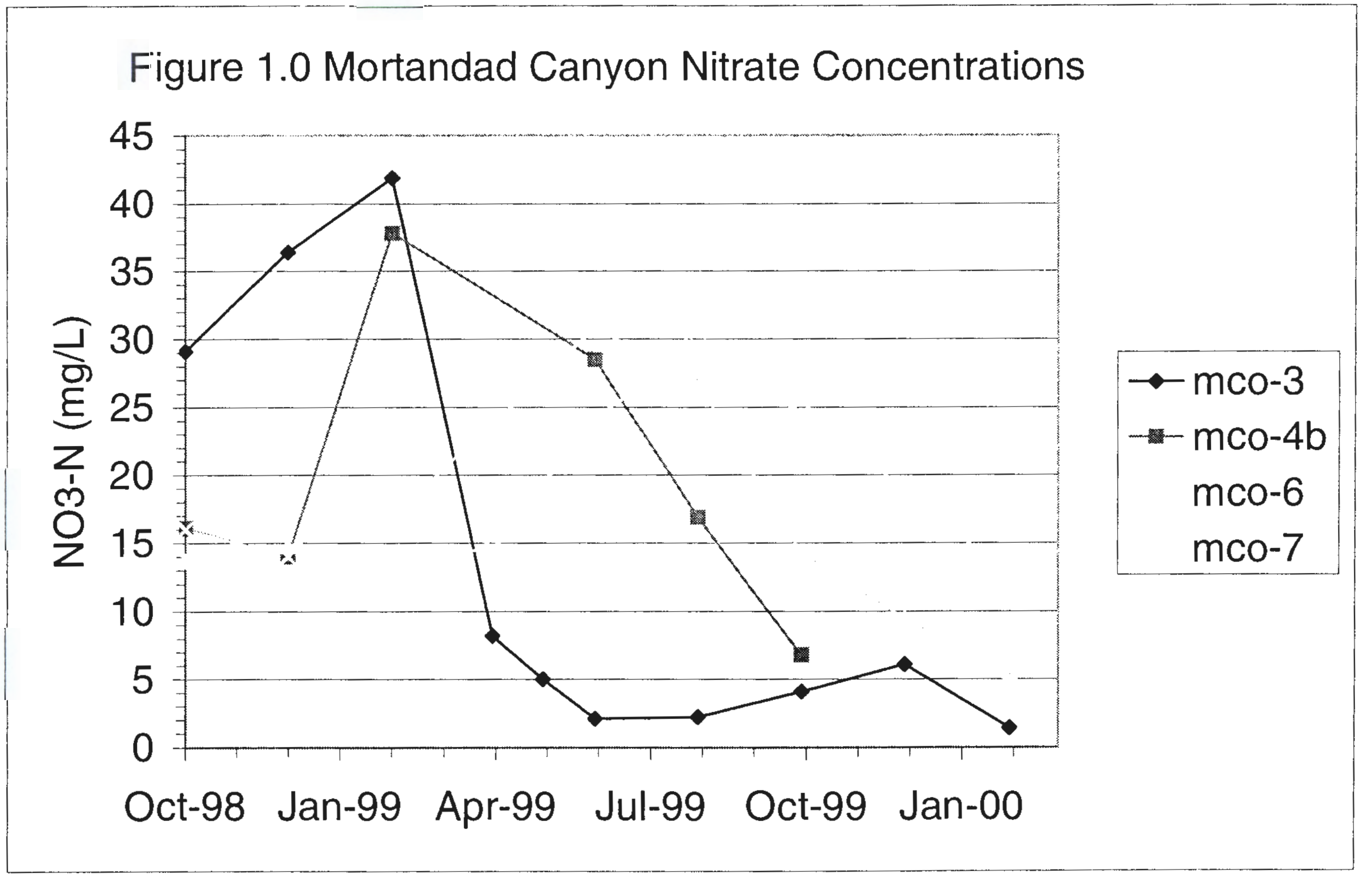
Figure 1.0 Mortandad Canyon Nitrate Concentrations
NO3-N (mg/L)
45
40
35
30
25
20
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5
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Oct-98
Jan-99
Apr-99
Jul-99
Oct-99
Jan-00
mco-3
mco-4b
mco-6
mco-7

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: July 31, 2000
In Reply Refer To: ESH-18/WQ&H:00-0248
Mail Stop: K497
Telephone: (505) 667-7969

RECEIVED
JUL 31 2000
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, SECOND QUARTER, 2000

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's Ground Water Discharge Plan (DP-1132) quarterly report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from April 1 through June 30, 2000. Los Alamos National Laboratory has provided your agency with voluntary quarterly reports since January 1999. Each report provides your agency with analytical results from effluent and ground water monitoring and a status report on RLWTF operations.

In the last quarterly report (April 26, 2000, ESH-18/WQ&H:00-0162), the Laboratory announced the successful completion of the Phase I and II upgrades at the RLWTF. By completing these upgrades, the Laboratory has satisfied the commitments it made to your agency in the August 16, 1996, Ground Water Discharge Plan Application. This quarter, the Laboratory is pleased to announce another significant accomplishment, the reduction of nitrate concentrations in Mortandad Canyon's alluvial ground water to below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standard of 10 mg/L.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells on April 17 and June 23, 2000. All of the analytical results from the June 23, 2000, samples from MCO-3, MCO-6, and MCO-7 were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). No sample results are available for MCO-4B because insufficient water was available for sample collection. MCO-4B has not had sufficient water for sampling since October 1999.

Nitrate concentrations in Mortandad Canyon's alluvial ground water have been steadily declining since March 21, 1999, when nitrate concentrations in the RLWTF's effluent were reduced to less than 10 mg/L. The basis for this decline was first proposed by the respected Laboratory geologist William Purtymun in 1977 and presented by the Laboratory in its 1996 Ground Water Discharge Plan Application; once concentrations of nitrates in the effluent are reduced then concentrations in the alluvial ground water will naturally attenuate due to the relatively rapid turn-over of water and chemicals in storage.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the second quarter 2000 were below NM WQCC Regulation 3103 standards for nitrate (NO3-N) fluoride (F), and total dissolved solids (TDS) with the exception of an elevated nitrate sample in June (11.4 mg/L). The RLWTF believes that this sample result is not representative of the effuent due to a mix-up during the preparation of the composite sample. The highest nitrate concentration seen in a screening sample (see below) during the same week was 9.3 mg/L. The quarterly average for nitrate in the RLWTF effluent was 1.84 mg/L.

In addition to weekly composite sampling, each batch of effuent is screened for nitrates prior to discharge using a HACH Kit. Operational screening of effluent samples collected during the second quarter 2000 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 9.3 mg/L, 1.5 mg/L, and 3.3 mg/L.

Please contact me at (505) 667-7969 if you would like additional information regarding this report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Enclosures: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas, w/enc.
E. Spencer, USEPA, Region 6, Dallas, Texas, w/enc.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/enc.
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, New Mexico, w/enc.
J. Bearzi, NMED/HRMB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
M. Johansen, DOE/LAAO, w/enc., MS A316
T. Gunderson, DLDOPS, w/enc., MS A100
B. Stine, ALDNW, w/enc., MS A105
S. Yarbro, NMT-2, w/enc., MS E511
T. Stanford, FWO-DO, w/enc., MS K492
B. Ramsey, FWO-DO, w/enc., MS K492
S. Hanson, FWO-DO, w/enc., MS J595
D. Moss, FWO-RLW, w/enc., MS E518
R. Alexander, FWO-WFM, w/enc., MS E518
P. Worland, FWO-RLW, w/enc., MS E518
D. Erickson, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
D. Woitte, LC/GL, w/enc., MS A187
WQ&H File, w/enc., MS K497
CIC-10, w/enc., MS A150

Table 1.0. Analytical Results, Mortandad Canyon Alluvial Monitoring Wells (mg/L).

Sampling Location	Sample Date: June 23, 2000					Sample Date: April 17, 2000				
	NO3-N	TKN	NH3	TDS	F	NO3-N	TKN	NH3	TDS	F
MCO-3	3.6	0.5	<0.2	354	0.9	2.4	0.4	0.2	370	0.8
MCO-4B	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MCO-6	6.9	0.6	<0.2	374	1.1	5.6	0.4	<0.2	442	1.1
MCO-7	8.9	0.6	<0.2	376	1.3	10.8	0.4	<0.2	311	1.3
MCO-7 duplicate	9.2	0.6	<0.2	361	1.3					
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*	*10*			*1000*	*1.6*

Notes:
NS means that no sample was collected at this well due to insufficient water.
All units: mg/L

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, April-June, 2000.

Monitoring Period	RLWTF Weekly Effluent Monitoring Analytical Results		
	NO3-N (mg/L)	**F (mg/L)**	**TDS (mg/L)**
APRIL	0.26	0.08	280
	0.24	0.09	536
	0.43	0.14	266
	0.95	0.14	224
	0.7	0.11	214
MAY	0.34	0.14	262
	0.16	0.09	270
	<0.01[1]	0.12	130
	0.67	0.23	292
JUNE	2.08	0.88	364
	2.89	0.07	174
	1.99	0.09	108
	11.4[2]	0.22	212
2nd Quarter 2000 Averages (mg/L)	**0.97**	**0.18**	**256**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

Notes:

[1]Sample invalidated due to matrix effect.

[2]Sample result is suspect due to sample compositing errors.

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: October 27, 2000
In Reply Refer To: ESH-18/WQ&H:00-0352
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, THIRD QUARTER, 2000

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from July 1 through September 30, 2000. 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 and a status report on RLWTF operations.

For the second consecutive quarter, nitrate concentrations in Mortandad Canyon's alluvial ground water remained below the New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standard of 10 mg/L. The Laboratory will continue to monitor alluvial ground water in Mortandad Canyon bimonthly.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells on August 15, 2000. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). No sample results are available for MCO-4B because insufficient water was available for sample collection. MCO-4B has not had sufficient water for sampling since October 1999.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the third quarter 2000 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrates in the RLWTF's effluent was 3.29 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the third quarter 2000 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 8.3 mg/L, 1.0 mg/L, and 4.37 mg/L.

Please contact me at 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Enclosures: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas, w/enc.
E. Spencer, USEPA, Region 6, Dallas, Texas, w/enc.
J. Parker, NMED DOE/OB, Santa Fe, New Mexico, w/enc.
R. Ford-Schmid, NMED DOE/OB, Santa Fe, New Mexico, w/enc.
J. Bearzi, NMED HRMB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED-SWQB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/LAAO, w/enc., MS A316
M. Johansen, DOE/LAAO, w/enc., MS A316
T. Gunderson, DLDOPS, w/enc., MS A100
T. Stanford, FWO-DO, w/enc., MS K492
B. Ramsey, FWO-DO, w/enc., MS K492
S. Hanson, FWO-DO, w/enc., MS J595
D. McLain, FWO-WFM, w/enc., MS E518
D. Moss, FWO-RLW, w/enc., MS E518
R. Alexander, FWO-WFM, w/enc., MS E518
P. Worland, FWO-RLW, w/enc., MS E518
D. Erickson, ESH-DO, w/enc., MS K491
L. McAtee, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
D. Woitte, LC/GL, w/enc., MS A187
WQ&H File, w/enc., MS K497
CIC-10, w/enc., MS A150

Table 1.0. Analytical Results, Mortandad Canyon Alluvial Monitoring Wells (mg/L).

Sampling Location	**Sample Date: August 15, 2000**				
	NO3-N	**TKN**	**NH3**	**TDS**	**F**
MCO-3	3	0.2	<0.2	447	0.9
MCO-4B	NS	NS	NS	NS	NS
MCO-6	5.4	0.2	<0.2	342	1.3
MCO-7	9.4	0.2	<0.2	396	1.5
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*

Notes:
NS means that no sample was collected at this well due to insufficient water.
All units: mg/L

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, July-September, 2000.

Monitoring Period	**RLWTF Weekly Effluent Monitoring Analytical Results**		
	NO3-N (mg/L)	**F (mg/L)**	**TDS (mg/L)**
JULY	5.91	0.49	450
	3.34	0.22	292
	3.87	0.26	378
	2.1	0.21	320
	2.31	0.39	246
AUGUST	1.68	0.22	346
	3.11	0.34	388
	2.71	0.15	326
	2.87	0.26	468
SEPTEMBER	3.59	0.53	416
	4.16	0.74	338
	3.84	0.62	282
	4.69	0.95	496
3rd Quarter 2000 Averages (mg/L)	**3.29**	**0.41**	**365**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: August 18, 2000
In Reply Refer To: ESH-18/WQ&H:00-0264
Mail Stop: K497
Telephone: (505) 667-7969

RECEIVED
AUG 29 2000
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau, Pollution Prevention Section
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN APPLICATION DP-1132, RADIOACTIVE LIQUID WASTE TREATMENT FACILITY AT TA-50

Dear Ms. Bustamante:

As you are aware, during the second week of May 2000, the Cerro Grande Wildfire burned across portions of Los Alamos National Laboratory forcing a two-week closure of the facility. In the months that followed, routine operations at the Laboratory were disrupted as personnel dedicated their efforts almost exclusively to fire related projects. Normal communications between ESH-18 and your agency were also interrupted. As a result, I wanted to take this opportunity to inquire if any additional information is needed at this time for the Laboratory's Ground Water Discharge Plan Application (DP-1132) for the RLWTF at TA-50.

Please contact me at 667-7969 if you have any questions.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

SR/rm

Cy: M. Leavitt, NMED/GWQB, Santa Fe, New Mexico
J. Vozella, DOE/LAAO, MS A316
M. Johansen, DOE/LAAO, MS A316
D. Erickson, ESH-DO, MS K491
S. Rae, ESH-18, MS K497
M. Saladen, ESH-18, MS K497
B. Ramsey, FWO-DO, MS K492
D. McLain, FWO-WFM, MS E518
R. Alexander, FWO-WFM, MS E518
D. Moss, FWO-WFM, MS E518
D. Woitte, LC-GL, MS A187
WQ&H File, MS K497
CIC-10, MS A150

:01458

MEMORANDUM OF MEETING OR PHONE CONVERSATION

[X] Telephone	[ ] Meeting	Time 2:30	Date 12/1/00

Individuals Involved

Jody Aarons	P. Bustamante
CCNS 986-1973	

Subject LANL - TA-50 - Public Hearings

Discussion Jody wanted to know what the status of the hearing was. Explained that as a program we have not had the time to fully commit to the hearing, however we have had LANL commit to operating for the past 1.5 years as if they were under a permit. I asked her if they had specific WQCC issues that needed ~~not~~ resolution. She wasn't sure what the specifics would be. I recommended they review the DP application and other documents to become more familiar with the permit. Also explained a little bit about our authority and the limitations ~~associated with~~ in the Act -

~~Conclusions~~ as they relate to the remediation under RCRA. She will review. We concluded that we should possibly have a meeting in Jan. to go over this

Distribution

Initialed PB

8/89

:01459

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: December 8, 2000
In Reply Refer To: ESH-18/WQ&H:00-0417
Mail Stop: K497
Telephone: (505) 667-7969

RECEIVED
DEC 12 2000
GROUND WATER BUREAU

Ms. Joni Arends
Waste Programs Director
Concerned Citizens For Nuclear Safety (CCNS)
107 Cienega St.
Santa Fe, New Mexico 87501

SUBJECT: LOS ALAMOS NATIONAL LABORATORY'S GROUND WATER DISCHARGE PLAN APPLICATION FOR THE TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

Dear Ms. Arends:

In accordance with your request, I have enclosed a copy of Los Alamos National Laboratory's Ground Water Discharge Plan Application for the Radioactive Liquid Waste Treatment Facility (RLWTF) at Technical Area (TA)-50. This application was prepared at the request of the New Mexico Environment Department (NMED) and submitted to the NMED's Ground Water Quality Bureau on August 18, 1996.

As we discussed during our December 5, 2000, telephone conversation, the RLWTF has upgraded its treatment units resulting in a significantly higher quality effluent. Consequently, the quality of the alluvial ground water in Mortandad Canyon has improved. In order to obtain a complete picture of the events that have transpired since 1996, you may wish to review the communications between the NMED and the Laboratory regarding the RLWTF Ground Water Discharge Plan Application in conjunction with your review of the enclosed document. Ms. Phyllis Bustamante, New Mexico Environment Department, Ground Water Quality Bureau, has indicated to me that the entire file is available for your review at their Santa Fe offices.

In closing, I would like to invite you to visit the RLWTF at your earliest convenience. A tour of the facility will allow you to see first-hand all of the upgrades that have been made over the past four years. Please contact me at (505) 667-7969 and I can make arrangements for a tour for you and your associates at CCNS.

I hope the information contain in the enclosed Ground Water Discharge Plan Application is beneficial. Please feel free to contact me should you have any questions or require any additional information.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/rm

Enclosures: a/s

Cy: M. Leavitt, NMED/GWQB, Santa Fe, New Mexico, w/o enc.
P. Bustamante, NMED/GWQB, Santa Fe, New Mexcio, w/o enc.
J. Vozella, DOE/LAAO, w/o enc., MS A316
M. Johansen, DOE/LAAO, w/o enc., MS A316
S. Yanicek, NMED DOE/OB, w/o enc., MS J993
T. Gunderson, DLDOPS, w/o enc., MS A100
T. Stanford, FWO-DO, w/o enc., MS K492
B. Ramsey, FWO-DO, w/o enc., MS K492
D. McLain, FWO-WFM, w/o enc., MS E518
R. Alexander, FWO-WFM, w/o enc., MS E518
D. Moss, FWO-WFM, w/o enc., MS E518
D. Erickson, ESH-DO, w/o enc., MS K491
L. McAtee, ESH-DO, w/o enc., MS K491
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M. Saladen, ESH-18, w/o enc., MS K497
C. Nylander, ESH-18, w/o enc., MS K497
P. Wardwell, LC-GL, w/o enc., MS A187
D. Woitte, LC-GL, w/o enc., MS A187
WQ&H File, w/o enc., MS K497
CIC-10, w/o enc., MS A150

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REPORT

RLWTF ANNUAL REPORT FOR 2000

AR-RLW-2000 Vol. 1,R.

EffectiveDate: 8/15/2001

RAE, S.
ESH-18
K497

01464

Los Alamos National Laboratory
Radioactive Liquid Waste Treatment Facility
Mail Stop E518, Los Alamos, NM 87545

AR-RLW-2000

RLWTF Annual Report for 2000

Effective Date: 8/15/01

Controlled Distribution Date: 8/15/01

Next Review Date: N/A

Implementation Plan Required? Yes ☐ No ☐ N/A ☐

USQ Determination Required? Yes ☐ No ☐ N/A ☐

	Signature	Date
Report Preparation		
Rich Hassman, FWO-IIM	R Hassman	1Aug01
Reviewer/Process Engineer		
J.C. Del Signore, FWO-WFM	JC Del Signore	8-4-01
Operations Manager		
Dave Moss, FWO-WFM	Wm David Moss	08-09-01
RWLTF Team Leader		
Rick Alexander, FWO-WFM	Rick Alexander	8-13-01
Facility Manager		
Dennis McLain, FWO-WFM	Dennis M McLain	8/13/01

01465

Table Of Contents

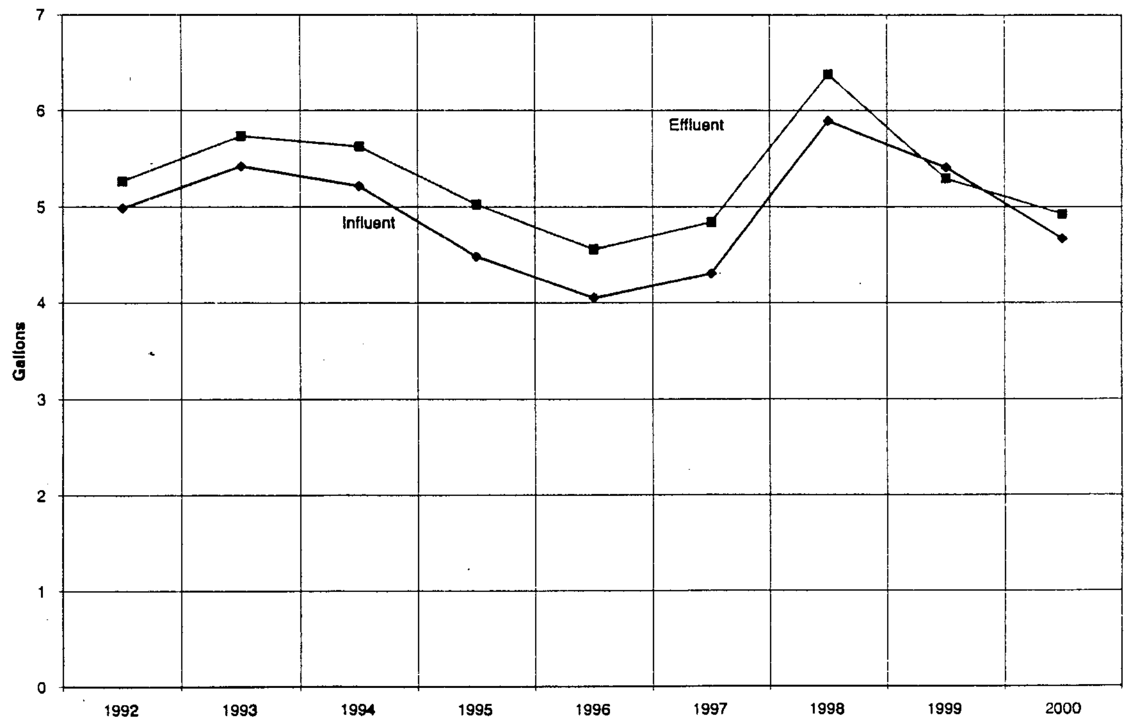
VOLUME 1

VOLUME II

Introduction

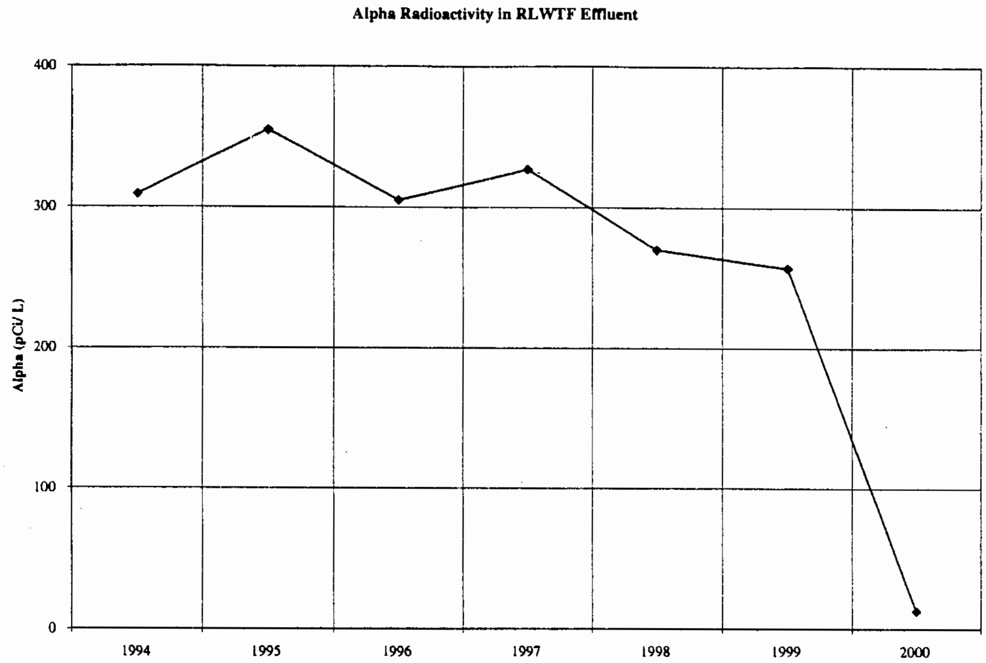
The Radioactive Liquid Waste Treatment Facility (RLWTF) at Technical Area 50 receives radioactive liquid wastes (RLW) from approximately 1800 generating points at LANL and treats these waters to remove radioactive and chemical impurities. Treated waters discharged into Mortandad Canyon are regulated by the Environmental Protection Agency, the State of New Mexico, and the Department of Energy.

RLW Volumes: Approximately 18 million liters (4.8 million gallons) of RLW were treated at the RLWTF during 2000. This volume is comparable to volumes received yearly during the past decade, as shown in the graph below:



Effluent Quality: During 2000, RLWTF made major improvements in the quality of waters discharged to the environment, as well as in waste minimization. There were zero violations of New Mexico water quality standards, zero violations of NPDES permit limits imposed by the Environmental Protection Agency, and zero exceedances of DOE-derived concentration guidelines for radioactive liquid discharges. In order to achieve this "triple crown," concentrations of two contaminants had to be reduced by more than an order of magnitude. Nitrate discharges were reduced from historical values of 60-80 mg/L to 3 mg/L in 2000. Radioactivity was reduced by more than a factor of 20 from discharges in recent years, and averaged just 13 picocuries per liter in 2000.

The graphs below illustrate these improvements:



The study started with a full-scale plant test. A 50,000-gallon batch of feed was prepared, then fed through the plant over a two-day period at normal throughput rates. The first day was used to flush process equipment, while the second was used to sample process streams at nine different locations over an eight-hour period. Nearly 400 samples were submitted to four different laboratories, each analyzed for as many as two dozen water quality parameters. The study led to a clearer understanding of the treatment process; to the construction of flow and material balances for many contaminants; and to recommendations for waste minimization.

Two recommendations of the secondary stream study were implemented during 2000:

- Reverse Osmosis Operation: The final treatment step in the RLWTF process, reverse osmosis, formerly rejected 20% of the waters fed to it, thus generating a secondary waste stream of 6,000 gallons per day. One study team recommendation was to change operations so that the unit ran at a 90% recovery rate. Implementation proceeded carefully in steps. Plant conditions were closely monitored, and process waters were sampled for several weeks as recovery rates were slowly increased. Tests proved successful. Today, the RO unit is routinely operated at 90% recovery. The volume of the RO reject stream has thus been halved whenever this unit is in operation.
- Reverse Osmosis Reject Stream: The plant test showed that permeate from the ultrafilter sometimes meets discharge limits and can, therefore, be discharged without further treatment in the reverse osmosis unit. The study team recommended that plant operation be modified to include the routine collection and sampling of ultrafilter permeate to assess if further treatment is required. This required the purchase of two 25,000-gallon tanks, changes to operating procedures, and additional water analyses. Now however, when analyses indicate that ultrafilter permeate meets water quality standards, waters are discharged to Mortandad Canyon instead of being sent to reverse osmosis for unnecessary treatment. This strategy has proven successful about half of the time, and has thus eliminated the RO reject stream about half the time.

These two process changes have been successful in reducing the generation of secondary wastes by about 4,000 gallons per day. This reduction frees operations and engineering personnel to focus on other process problems, thus contributing to improved effluent quality.

Pilot tests for additional process changes are underway, and other recommendations made by the study will be implemented in 2001.

Volume 1
Chapter

Flow Summary

TA-50 WM-1

FLOW SUMMARY (megaliters)

JAN-2000 through DEC-2000

Date	Influent	TA-21 Transfer	Discharged
JAN-2000	1.549	0.0	1.399
FEB-2000	1.905	0.0	1.914
MAR-2000	2.276	0.0	2.282
APR-2000	1.792	0.009	1.914
MAY-2000	1.255	0.071	1.252
JUN-2000	1.516	0.177	1.62
JUL-2000	1.57	0.089	1.841
AUG-2000	1.541	0.067	1.62
SEP-2000	1.154	0.0	1.174
OCT-2000	1.405	0.0	1.454
NOV-2000	1.112	0.0	1.094
DEC-2000	0.783	0.0	1.069
TOTAL	17.858	0.413	18.632

602,906 gal
19,449 gpd(a

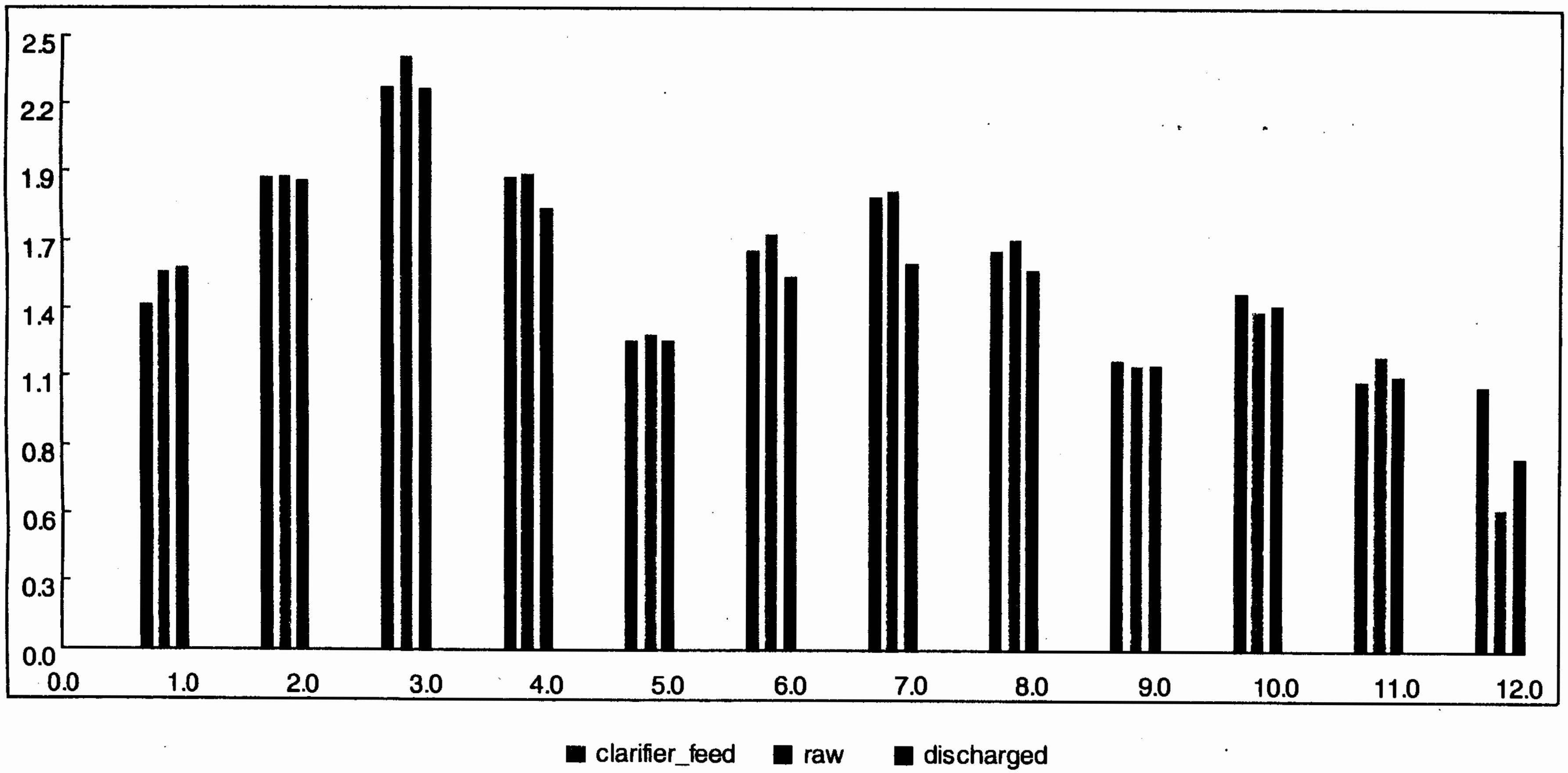
3.785 L/gal.

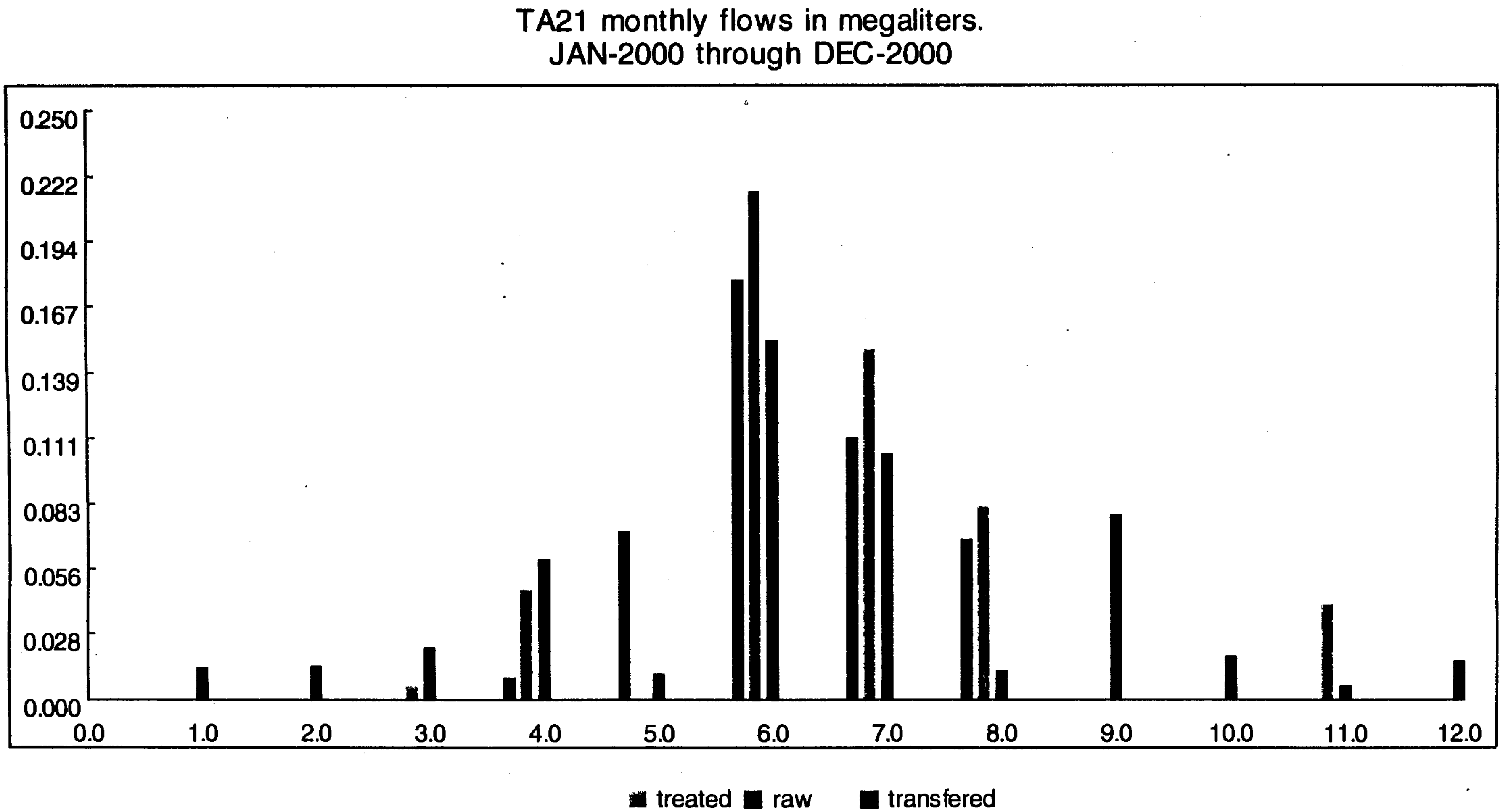
01470

Volume 1
Chapter

Flow Charts

TA50 monthly flows in megaliters.
JAN-2000 through DEC-2000




TA21 monthly flows in megaliters.
JAN-2000 through DEC-2000
0.250
0.222
0.194
0.167
0.139
0.111
0.083
0.056
0.028
0.000
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
treated
raw
transfered

5

Volume 1
Chapter

Gross Alpha Removal

TA-50 WM-1

Gross Alpha Removal

DATE	RAW (Ci)	RAW (gigaBq)	FINAL (Ci)	FINAL (gigaBq)	REMOVAL FACTOR 100x(INF - EFF)/INF
JAN-2000	0.026	0.96	2.088e-5	7.727e-4	99.92
FEB-2000	0.033	1.226	2.351e-5	8.7e-4	99.929
MAR-2000	0.04	1.463	3.374e-6	1.249e-4	99.991
APR-2000	0.084	3.099	1.141e-5	4.223e-4	99.986
MAY-2000	0.032	1.201	3.835e-5	0.001	99.882
JUN-2000	0.013	0.489	1.641e-5	6.073e-4	99.876
JUL-2000	0.023	0.867	1.307e-6	4.836e-5	99.994
AUG-2000	0.022	0.813	2.726e-5	0.001	99.876
SEP-2000	0.066	2.456	2.428e-5	8.985e-4	99.963
OCT-2000	0.022	0.815	1.171e-5	4.331e-4	99.947
NOV-2000	0.033	1.204	4.322e-6	1.599e-4	99.987
DEC-2000	0.008	0.299	9.374e-6	3.469e-4	99.884
TOTAL	0.402	14.891	1.922e-4	0.007	99.952 (average)

EPA-MCL: 15.0e-12 Ci/L

Volume of Flow:

Treated = 18,625,316.0 liters

Final = 18,632,173.0 liters

Volume 1
Chapter

Radionuclide Summary

TA-50 WM-1

RADIONUCLIDE SUMMARY

JAN, 2000 through DEC, 2000

	RAW Avg (Ci/L)	Maximum (Ci/L)	Minimum (Ci/L)	Number of Samples	Total (Ci)	FINAL Avg (Ci/L)	Maximum (Ci/L)	Minimum (Ci/L)	Number of Samples	Total (Ci)
ALPHA	22.878e-9	56.0e-9	9.0e-9	12.0	408.555e-3	11.744e-12	25.0e-12	2.4e-12	12.0	218.823e-6
Am-241	3.138e-9	8.2e-9	1.2e-9	12.0	56.031e-3	2.248e-12	5.4e-12	0.2e-12	12.0	41.881e-6
BETA	8.405e-9	54.0e-9	1.9e-9	12.0	150.1e-3	151.007e-12	780.0e-12	3.8e-12	12.0	2.814e-3
Cs-137	268.744e-12	4.0e-9	140.0e-12	12.0	4.799e-3	166.678e-12	370.0e-12	170.0e-12	12.0	3.106e-3
GAMMA*	1.187e-9	11.0e-9	11.0e-9	3.0	21.2e-3	No Data			1.0	
Mn-54	No Data			0.0		7.851e-12	110.0e-12	15.0e-12	2.0	146.275e-6
Nb-95	No Data			0.0		86.041e-12	1.5e-9	1.5e-9	1.0	1.603e-3
Pu-238	14.772e-9	40.0e-9	4.5e-9	12.0	263.792e-3	3.388e-12	8.9e-12	0.4e-12	12.0	63.132e-6
Pu-239	4.291e-9	9.2e-9	1.3e-9	12.0	76.623e-3	1.861e-12	4.4e-12	0.1e-12	12.0	34.676e-6
Rb-83	712.21e-12	6.4e-9	320.0e-12	2.0	12.719e-3	15.855e-12	270.0e-12	270.0e-12	1.0	295.422e-6
Rb-84	679.905e-12	6.3e-9	6.3e-9	1.0	12.142e-3	No Data			0.0	
Sr-89	38.693e-12	320.0e-12	4.8e-12	12.0	690.975e-6	17.855e-12	210.0e-12	0.7e-12	12.0	332.676e-6
Sr-90	70.882e-12	450.0e-12	3.5e-12	12.0	1.266e-3	9.131e-12	32.0e-12	2.5e-12	12.0	170.122e-6
TOTAL PLUTONIUM	13.598	210.0	5.8e-9	12.0	2.428e8	40.512	210.0	1.2e-12	12.0	7.548e8
TRITIUM**	1.498e-9	16.0e-9	16.0e-9	1.0	26.757e-3	48.713e-9	200.0e-9	5.0e-9	12.0	907.633e-3
Th-232	53.526e-12	220.0e-12	220.0e-12	2.0	955.857e-6	No Data			0.0	
U-234	323.573e-12	1.5e-9	71.0e-12	12.0	5.778e-3	1.985e-12	12.3e-12	1.0e-12	12.0	36.982e-6
U-235	13.39e-12	82.0e-12	12.0e-12	12.0	239.121e-6	0.856e-12	7.4e-12	0.25e-12	12.0	15.949e-6
U-238	80.164e-12	740.0e-12	740.0e-12	1.0	1.432e-3	0.539e-12	9.4e-12	9.4e-12	1.0	10.046e-6

15.0e-12 Ci/L EPA-MCL

~~5.0e-12 Ci/L WQCC~~

Volume of Flow: Influent = 17,857,966.0 liters Final = 18,632,173.0 liters

*Gamma results not reported after March.

Volume 1
Chapter

Mineral Summary

TA-50 WM-1

MINERAL SUMMARY

JAN, 2000 through DEC, 2000

	RAW Average	Maximum	Minimum	Number of Samples	Total (KG)	FINAL Average	Maximum	Minimum	Number of Samples	Total (KG)	WQCC (mg/l)
ALKALINITY-MO*	57.326	74.0	31.0	12.0	1023.72	231.424	430.0	41.0	12.0	4311.931	
ALKALINITY-P*	LDL*	LDL*	LDL*	12.0	LDL*	LDL*	LDL*	LDL*	12.0	LDL*	
ALUMINUM	0.559	4.7	0.15	12.0	9.983	0.123	0.2	0.1	12.0	2.301	5.0
AMMONIA-N	3.775	5.49	0.57	12.0	67.413	3.874	7.28	0.15	12.0	72.182	
ANTIMONY	0.006	0.047	6.0e-4	12.0	0.1	0.003	0.02	4.0e-4	12.0	0.047	
ARSENIC	7.543e-4	0.001	0.001	12.0	0.013	6.74e-4	0.001	9.0e-4	12.0	0.013	0.1
BARIUM	0.032	0.047	0.018	12.0	0.57	0.002	0.008	0.001	12.0	0.035	1.0
BERYLLIUM	0.003	0.011	0.001	12.0	0.047	0.001	0.002	0.001	12.0	0.019	
BORON	0.06	0.1	0.041	12.0	1.068	0.056	0.14	0.04	12.0	1.051	0.75
CADMIUM	0.003	0.028	0.002	12.0	0.045	0.001	0.003	0.002	12.0	0.02	0.01
CALCIUM	13.952	15.0	11.7	12.0	249.146	14.84	63.0	0.13	12.0	276.502	
CHLORIDE	25.138	104.0	12.8	12.0	448.919	9.583	32.2	0.45	12.0	178.551	250
COBALT	LDL*	LDL*	LDL*	12.0	LDL*	LDL*	LDL*	LDL*	12.0	LDL*	0.05
COD	53.621	107.0	16.0	12.0	957.555	13.866	32.0	5.0	12.0	258.347	125.0
CONDUCTIVITY*,**	280.252	615.0	102.0	11.0		472.262	882.0	78.1	11.0		
COPPER	0.245	1.18	0.044	12.0	4.377	0.018	0.064	0.004	12.0	0.338	1.0
CYANIDE	0.007	0.03	0.01	12.0	0.128	0.006	0.03	0.01	12.0	0.103	0.2
FLUORIDE	1.66	7.26	0.54	12.0	29.65	0.284	0.71	0.01	12.0	5.293	1.6
HARDNESS*	50.189	52.28	43.01	12.0	896.28	37.536	157.682	0.325	12.0	699.384	
IRON	1.094	4.04	0.45	12.0	19.54	0.074	0.33	0.02	12.0	1.373	1.0
LEAD	0.032	0.16	0.02	12.0	0.571	0.013	0.04	0.02	12.0	0.245	0.05
MAGNESIUM	3.728	3.8	3.35	12.0	66.577	0.264	1.9	0.04	12.0	4.915	
MERCURY	0.004	0.01	2.8e-4	12.0	0.066	8.79e-5	7.6e-4	2.0e-5	12.0	0.002	0.002
NICKEL	0.112	0.59	0.013	12.0	2.005	0.015	0.046	0.01	12.0	0.274	0.2
NITRATE-N	9.916	52.1	2.82	12.0	177.085	2.503	7.45	0.18	12.0	46.638	10.0
PHOSPHORUS	4.174	14.6	1.18	12.0	74.537	0.092	0.35	0.03	12.0	1.713	
POTASSIUM	4.628	6.5	3.7	12.0	82.651	2.36	6.0	0.33	12.0	43.968	
SELENIUM	0.001	0.003	0.001	12.0	0.022	0.001	0.002	0.001	12.0	0.022	0.05
SILICA DIOXIDE	69.644	86.0	9.0	12.0	1243.709	15.485	49.0	2.0	12.0	288.522	
SILICON	38.845	41.0	30.8	12.0	693.688	7.411	23.0	0.31	12.0	138.083	
SILVER	0.012	0.027	0.003	12.0	0.216	0.004	0.009	0.002	12.0	0.071	0.05
SODIUM	40.295	93.8	22.0	12.0	719.582	116.81	180.0	16.0	12.0	2176.416	
SULFATE**	28.49	125.0	12.32	11.0	508.774	40.379	188.0	1.04	11.0	752.357	600.0
TDS	331.181	538.0	202.0	12.0	5914.221	305.631	578.0	1.0	12.0	5694.569	1000.
THALLIUM	3.418e-4	8.0e-4	1.2e-4	12.0	0.006	1.308e-4	7.0e-4	4.0e-5	12.0	0.002	
TOTAL CATIONS*,**	2.885	5.36	2.25	11.0		5.427	9.04	0.82	11.0		
TOTAL CHROMIUM	0.024	0.123	0.011	12.0	0.423	0.004	0.01	0.003	12.0	0.077	0.05
TSS	7.991	34.0	1.0	12.0	142.705	1.664	8.0	1.0	12.0	31.002	
URANIUM	0.159	0.82	0.017	12.0	2.838	0.007	0.027	3.0e-5	12.0	0.129	5.0
VANADIUM	3.885e-4	0.006	0.006	12.0	0.007	3.152e-4	0.005	0.005	12.0	0.006	
ZINC	0.23	0.35	0.11	12.0	4.106	0.038	0.08	0.02	12.0	0.712	10.0
pH	7.905	9.21	6.95	12.0		7.945	8.4	7.18	12.0		6-9

Volume of Flow: Influent = 17,857,966.0 liters Final = 18,632,173.0 liters

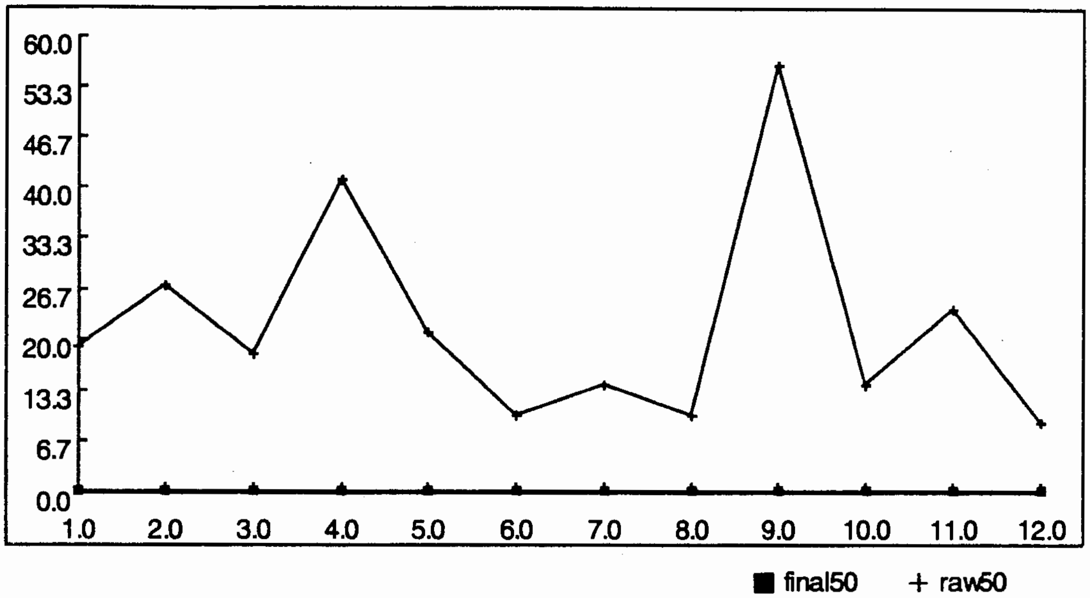
*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. *LDL: Less than Detection Limit. Otherwise: mg/l

**March sample was prematurely discarded.

Volume 1
Chapter

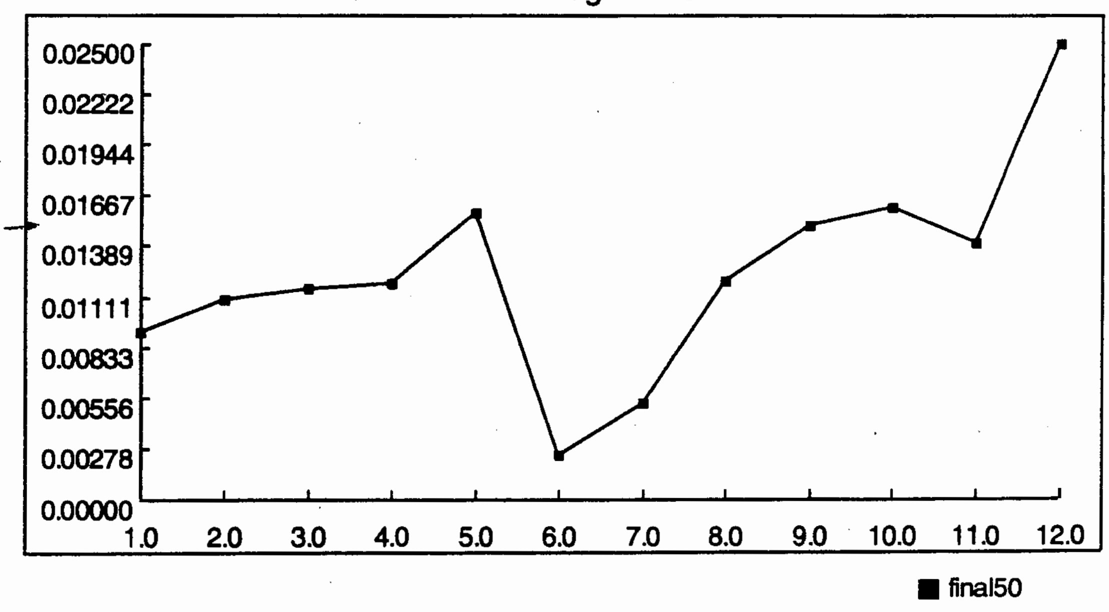
Concentration Charts

RAW50 and FINAL50
ALPHA concentration (nCi/L).
JAN-2000 through DEC-2000

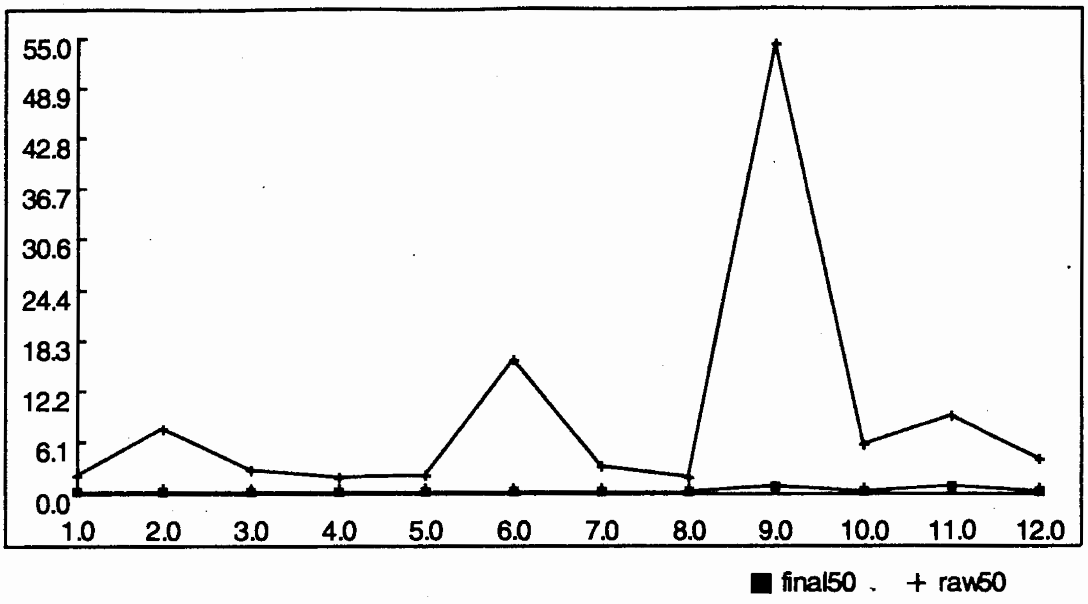


FINAL50
ALPHA concentration (nCi/L).
JAN-2000 through DEC-2000

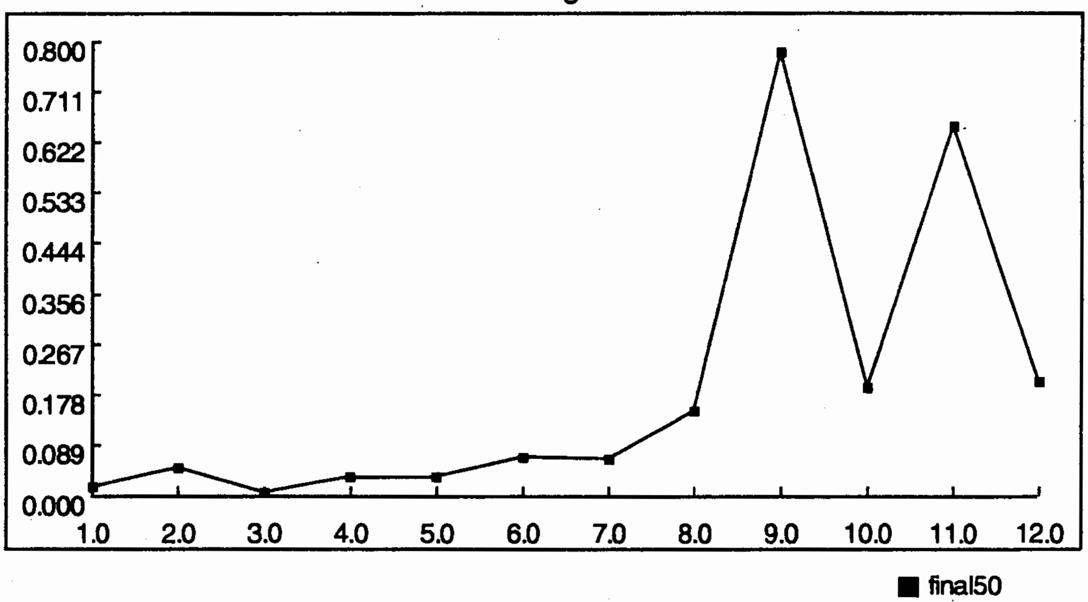
15.0 pCi/L
EPA/MCL



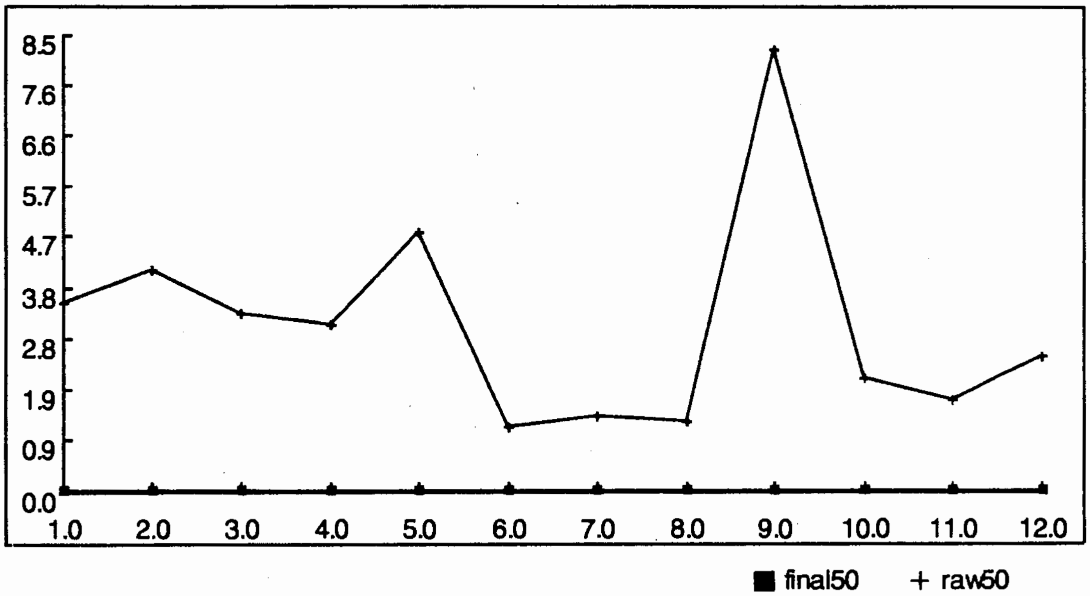
RAW50 and FINAL50
BETA concentration (nCi/L).
JAN-2000 through DEC-2000



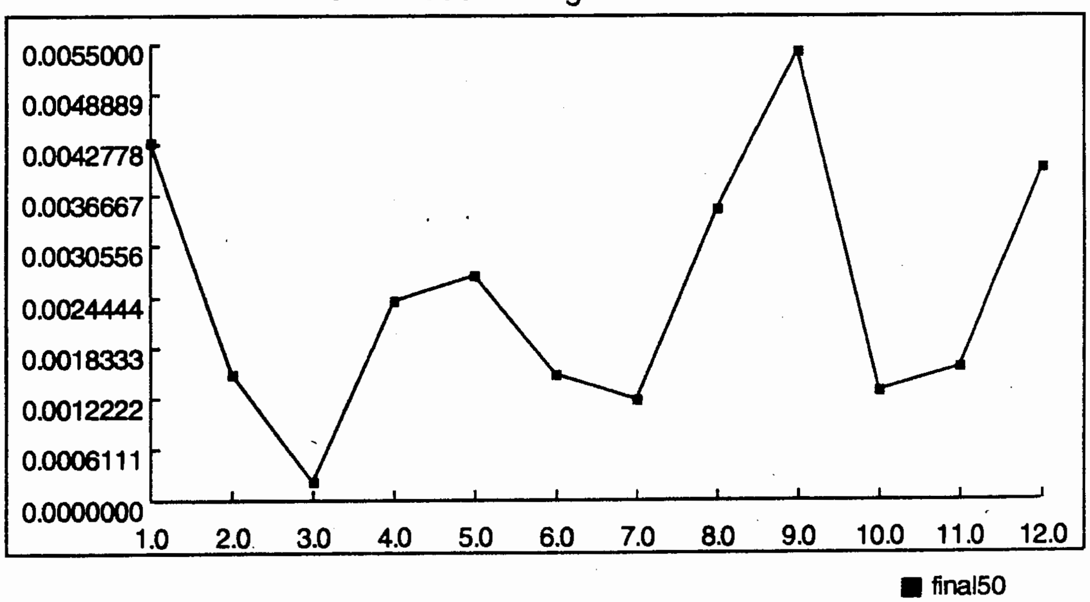
FINAL50
BETA concentration (nCi/L).
JAN-2000 through DEC-2000



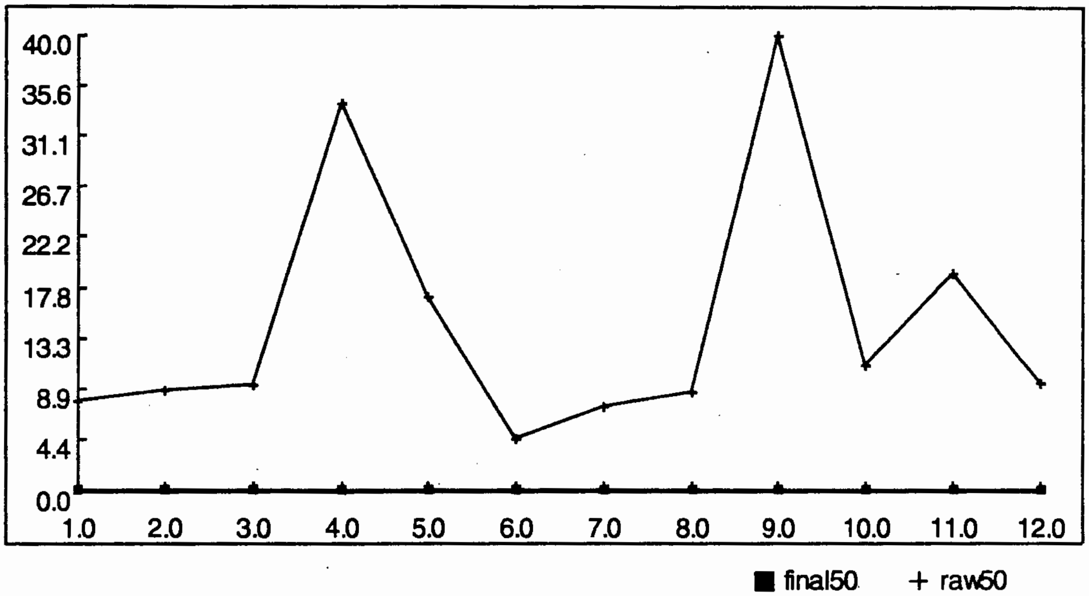
RAW50 and FINAL50
Am-241 concentration (nCi/L).
JAN-2000 through DEC-2000



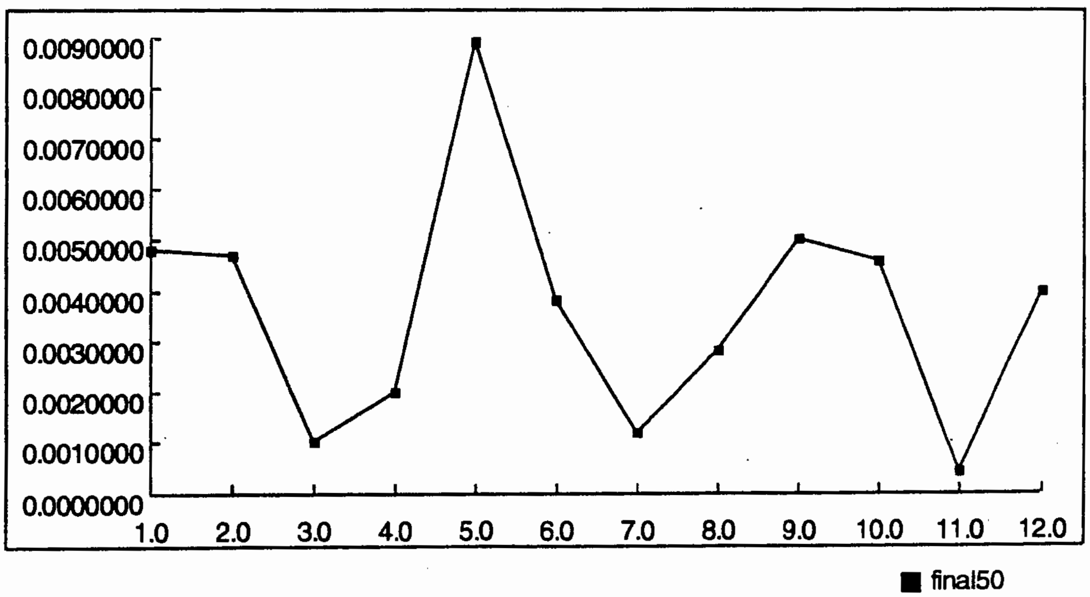
FINAL50
Am-241 concentration (nCi/L).
JAN-2000 through DEC-2000



RAW50 and FINAL50
Pu-238 concentration (nCi/L).
JAN-2000 through DEC-2000

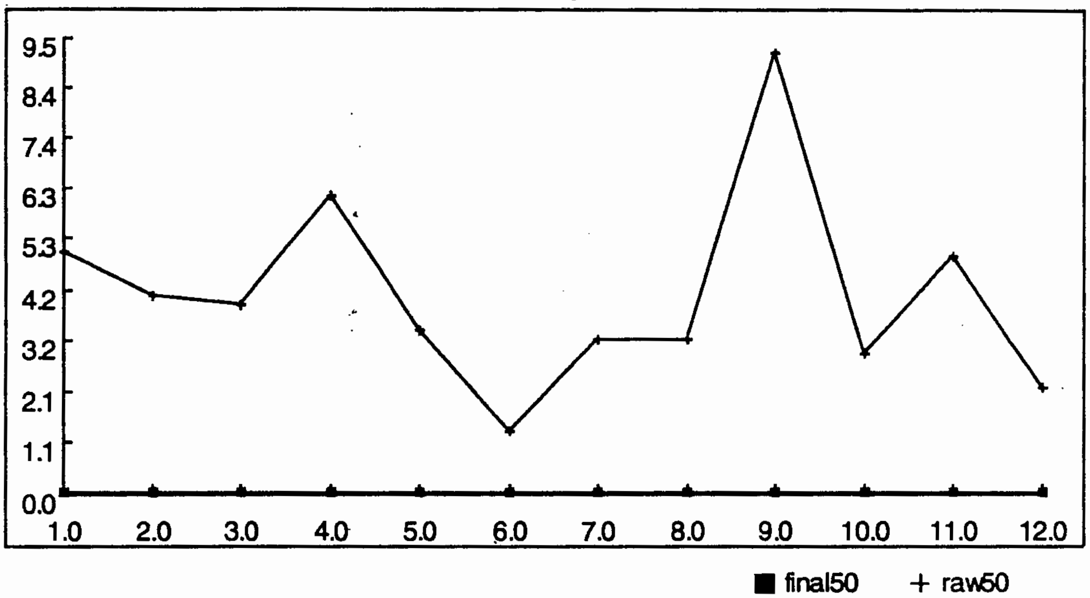


FINAL50
Pu-238 concentration (nCi/L).
JAN-2000 through DEC-2000

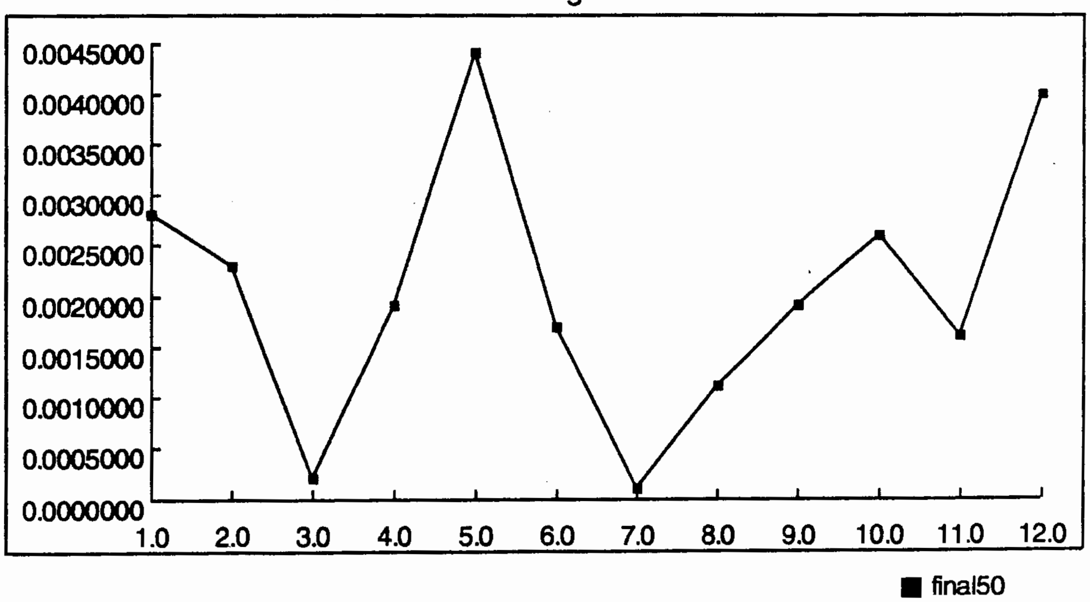


01484

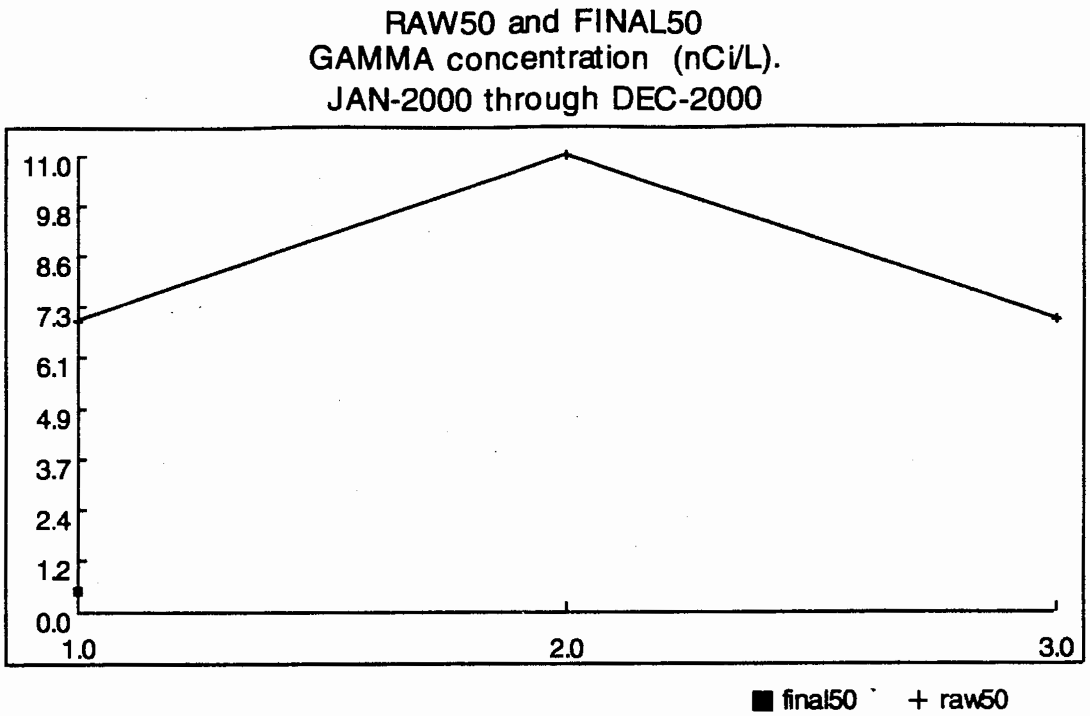
RAW50 and FINAL50
Pu-239 concentration (nCi/L).
JAN-2000 through DEC-2000

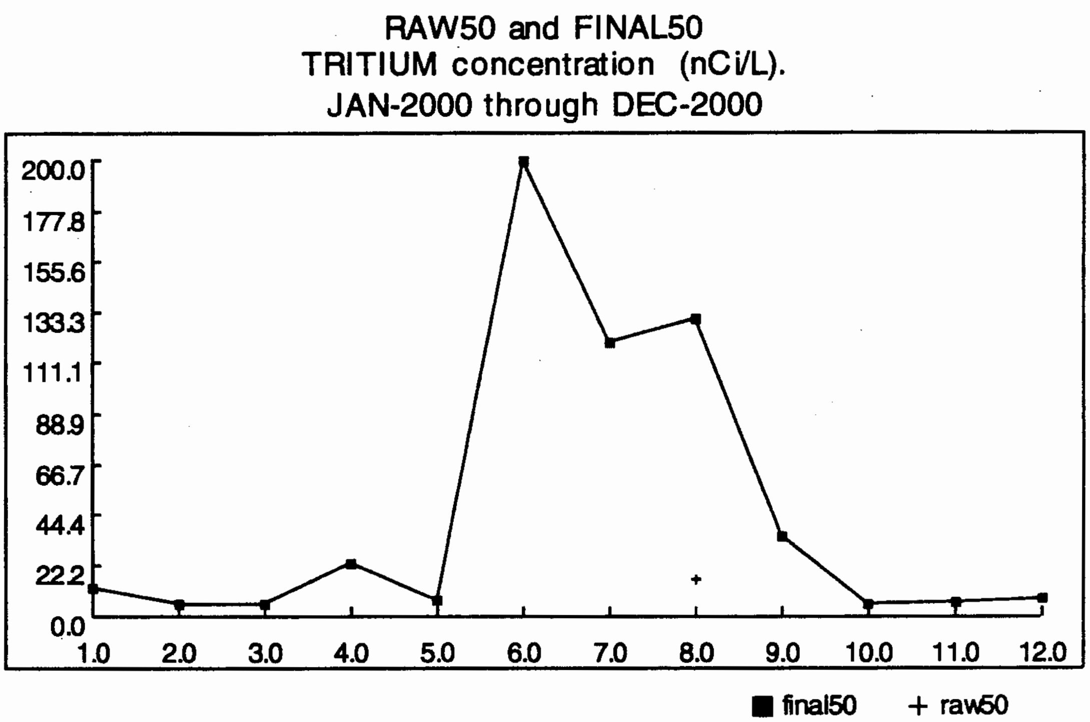


FINAL50
Pu-239 concentration (nCi/L).
JAN-2000 through DEC-2000



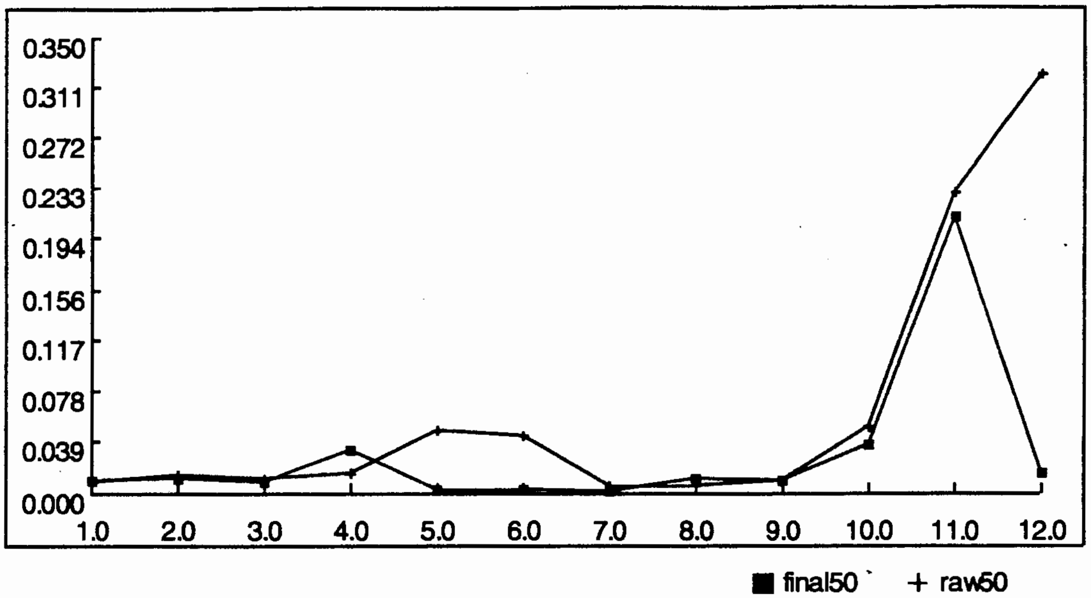
01495


RAW50 and FINAL50
GAMMA concentration (nCi/L).
JAN-2000 through DEC-2000
11.0
9.8
8.6
7.3
6.1
4.9
3.7
2.4
1.2
0.0
1.0
2.0
3.0
final50
+ raw50

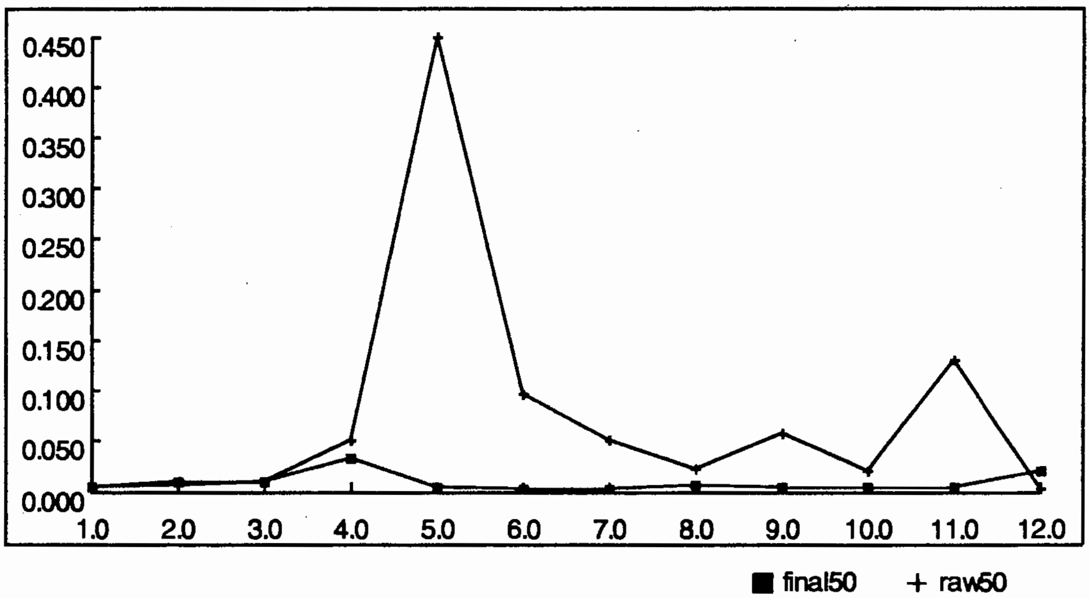

RAW50 and FINAL50
TRITIUM concentration (nCi/L).
JAN-2000 through DEC-2000
200.0
177.8
155.6
133.3
111.1
88.9
66.7
44.4
22.2
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
final50
+ raw50

01486

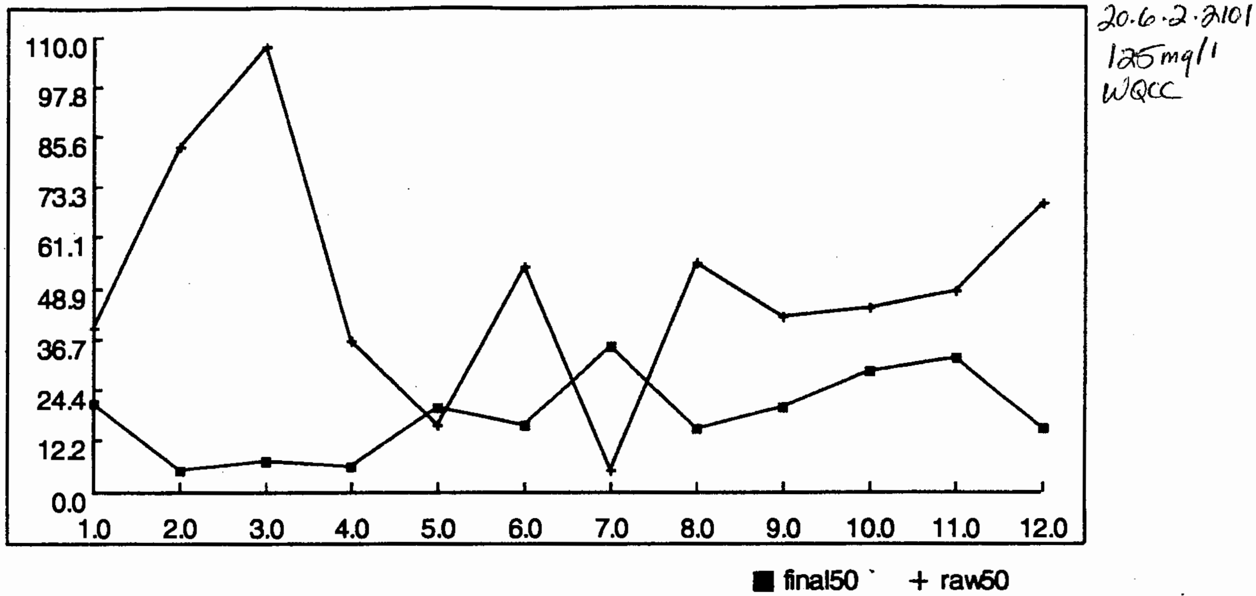
RAW50 and FINAL50
Sr-89 concentration (nCi/L).
JAN-2000 through DEC-2000



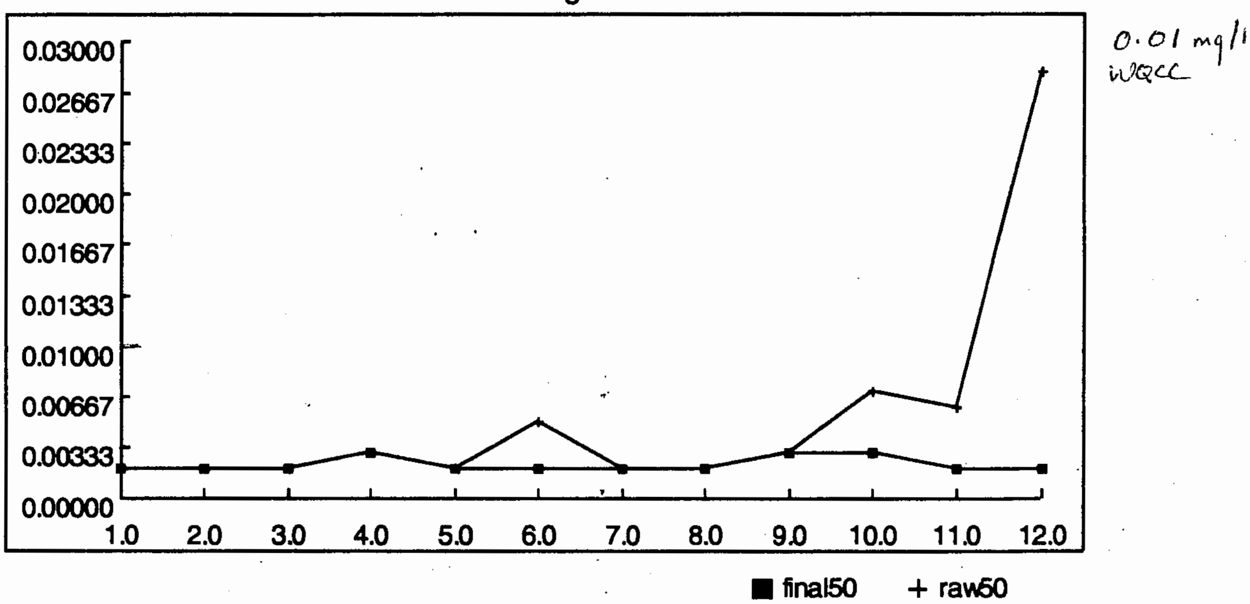
RAW50 and FINAL50
Sr-90 concentration (nCi/L).
JAN-2000 through DEC-2000



RAW50 and FINAL50
COD concentration (mg/L).
JAN-2000 through DEC-2000

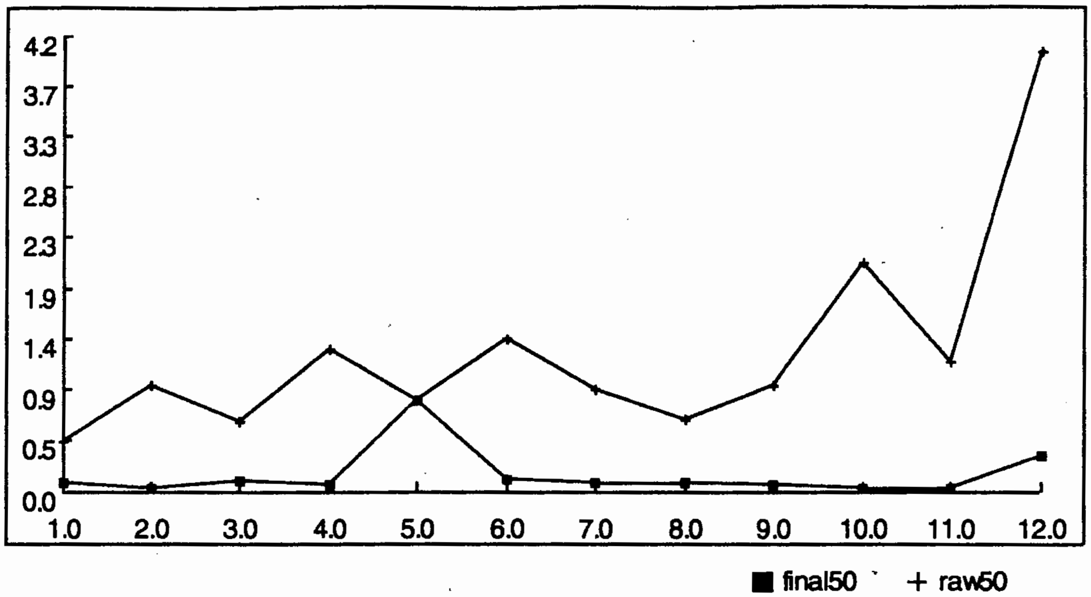


RAW50 and FINAL50
CADMIUM concentration (mg/L).
JAN-2000 through DEC-2000



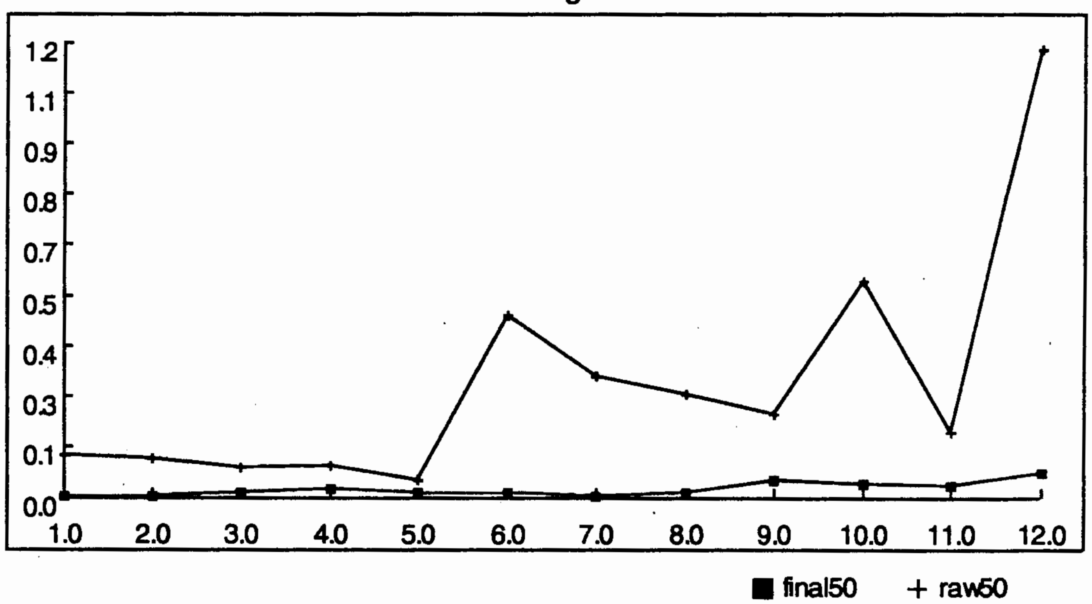
01488

RAW50 and FINAL50
IRON concentration (mg/L).
JAN-2000 through DEC-2000



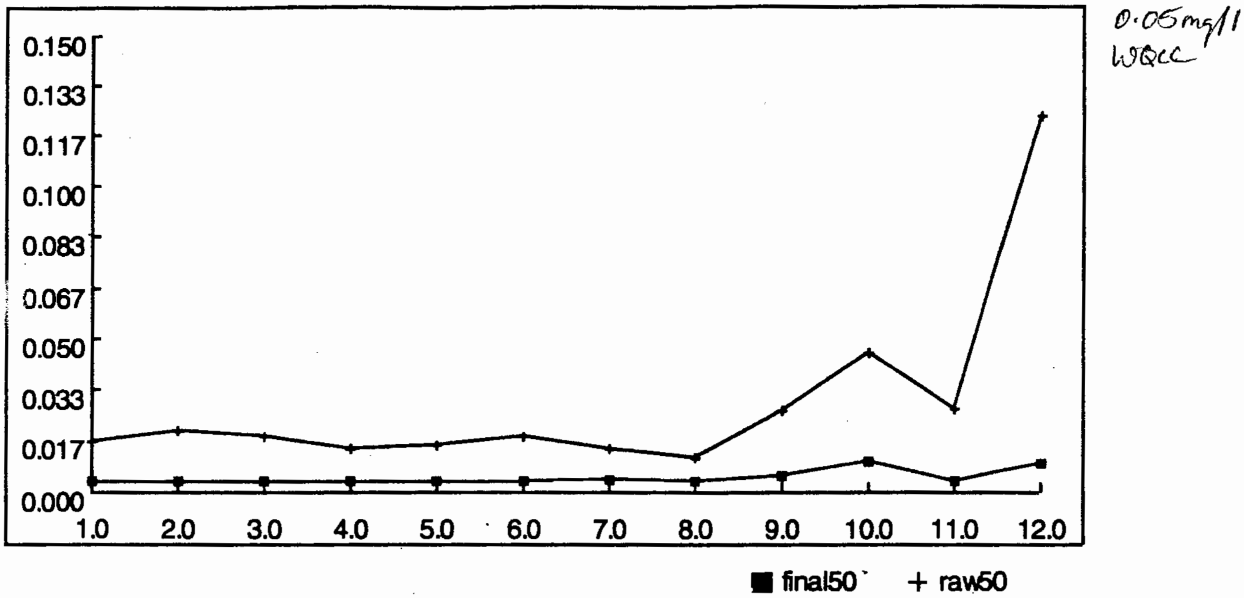
1.0 mg/L WQCC

RAW50 and FINAL50
COPPER concentration (mg/L).
JAN-2000 through DEC-2000

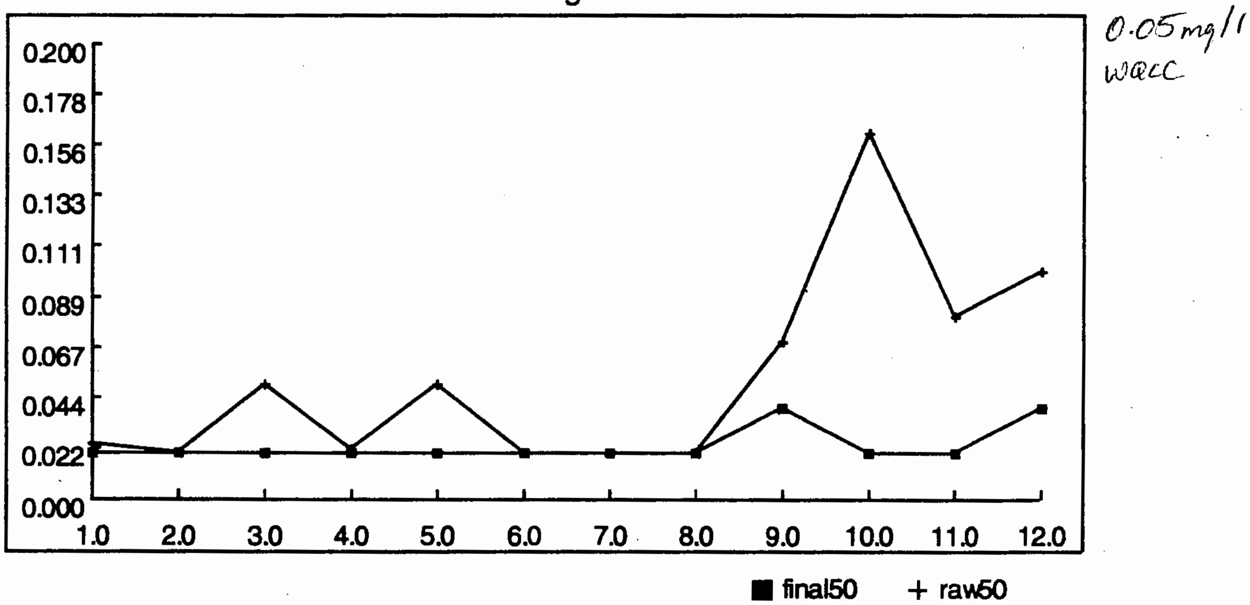


1.0 mg/l WQCC

RAW50 and FINAL50
TOTAL_CHROMIUM concentration (mg/L).
JAN-2000 through DEC-2000

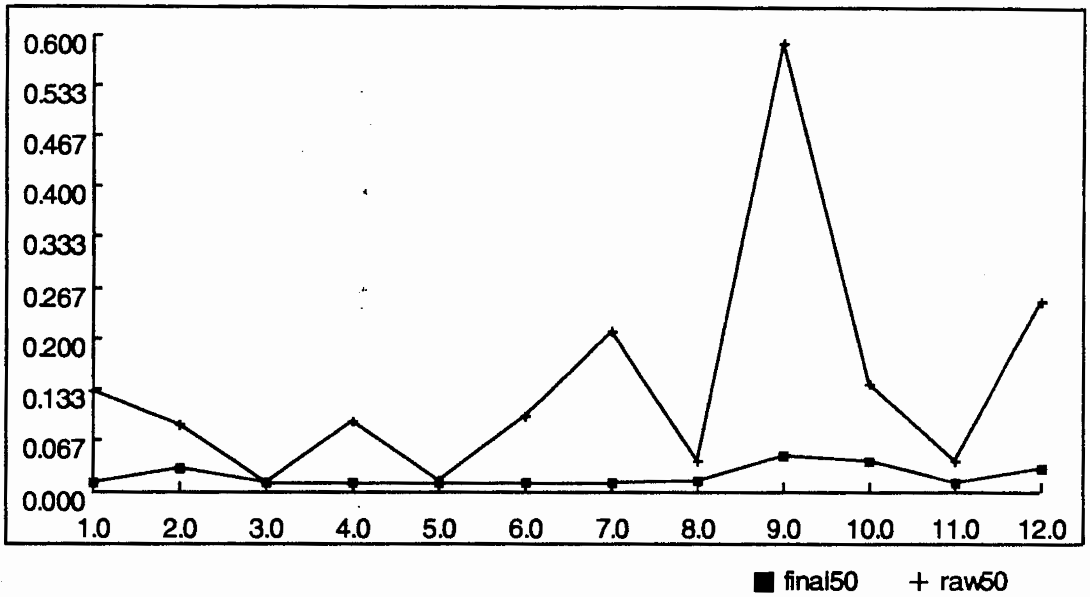


RAW50 and FINAL50
LEAD concentration (mg/L).
JAN-2000 through DEC-2000



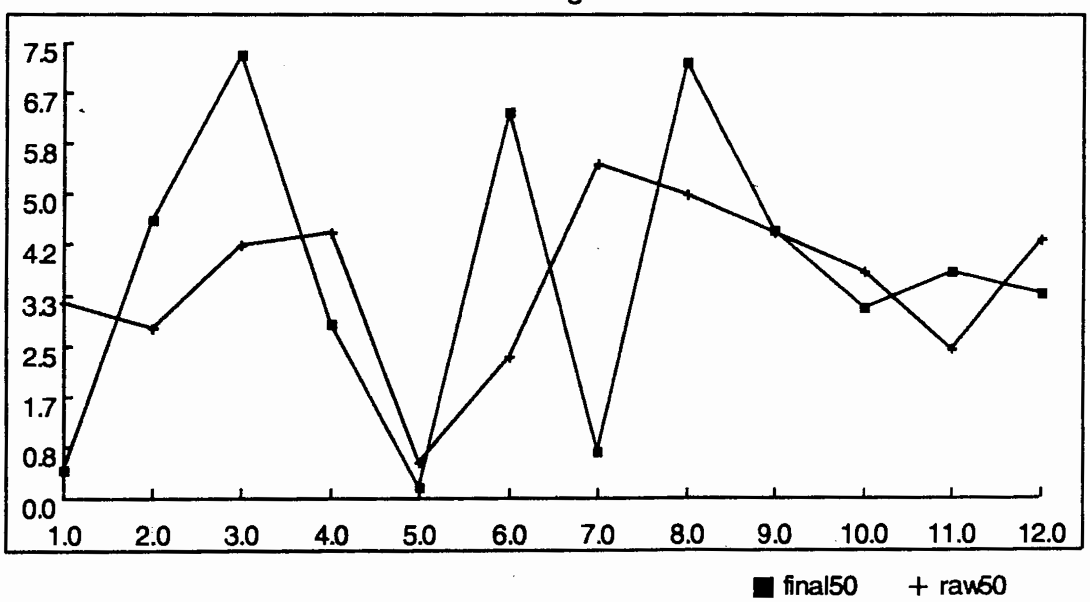
01490

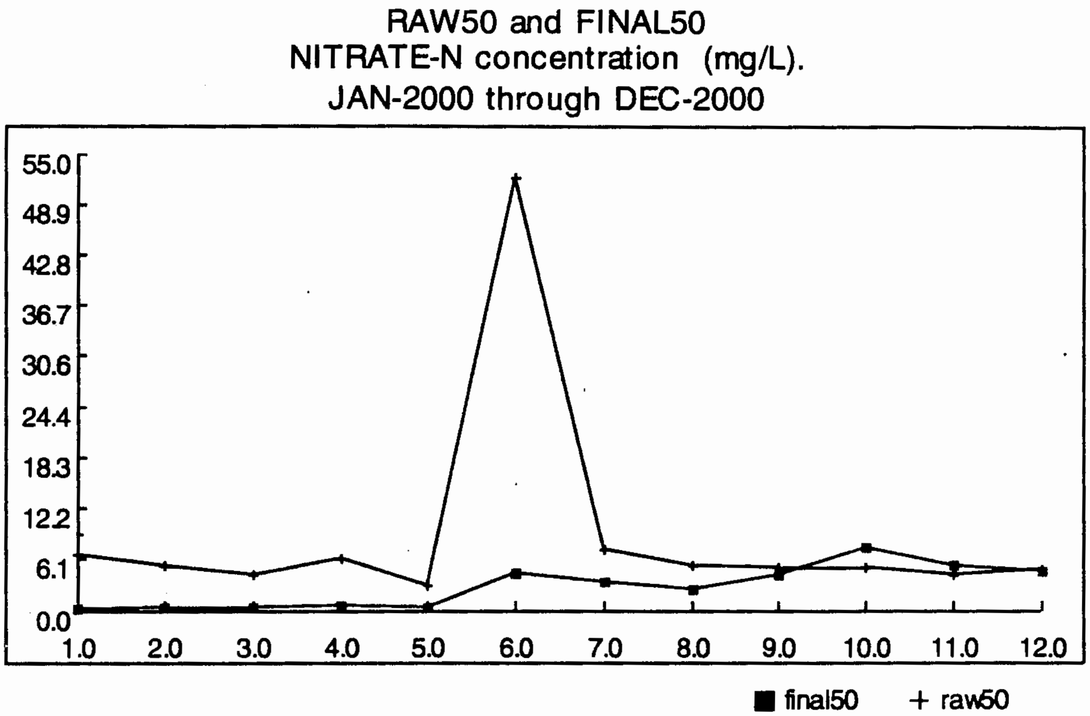
RAW50 and FINAL50
NICKEL concentration (mg/L).
JAN-2000 through DEC-2000

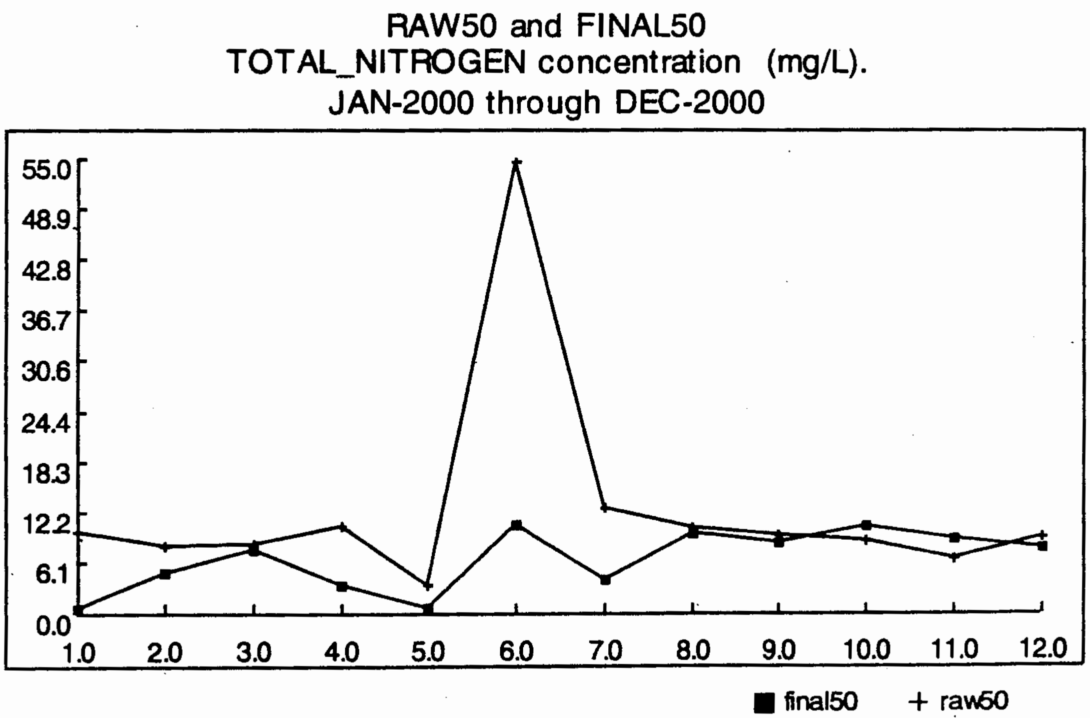


0.2 mg/l
WQCC

RAW50 and FINAL50
AMMONIA-N concentration (mg/L).
JAN-2000 through DEC-2000




RAW50 and FINAL50
NITRATE-N concentration (mg/L).
JAN-2000 through DEC-2000
55.0
48.9
42.8
36.7
30.6
24.4
18.3
12.2
6.1
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
final50
+ raw50


RAW50 and FINAL50
TOTAL_NITROGEN concentration (mg/L).
JAN-2000 through DEC-2000
55.0
48.9
42.8
36.7
30.6
24.4
18.3
12.2
6.1
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
final50
+ raw50

01492

Volume 1
Chapter

Kilograms Discharged

Average Kilograms per Discharge

DATE	CADMIUM	COD	COPPER	IRON	LEAD	MERCURY	TOTAL CHROMIUM	TSS	ZINC	NITRATE-N
JAN-2000	1.554e-4	1.632	3.108e-4	0.005	0.002	4.663e-6	2.331e-4	0.078	0.006	0.014
FEB-2000	1.74e-4	0.435	3.48e-4	0.002	0.002	5.22e-6	2.61e-4	0.087	0.003	0.019
MAR-2000	2.075e-4	0.726	0.001	0.009	0.002	4.15e-4	3.112e-4	0.104	0.005	0.037
APR-2000	3.022e-4	0.604	0.002	0.006	0.002	6.045e-6	3.022e-4	0.101	0.004	0.049
MAY-2000	1.669e-4	1.669	0.001	0.069	0.002	1.168e-5	2.503e-4	0.083	0.003	0.033
JUN-2000	1.8e-4	1.44	8.998e-4	0.009	0.002	1.8e-6	2.699e-4	0.09	0.004	0.402
JUL-2000	1.937e-4	3.39	3.875e-4	0.007	0.002	1.937e-6	3.875e-4	0.097	0.003	0.32
AUG-2000	1.905e-4	1.429	0.001	0.008	0.002	7.622e-6	2.858e-4	0.095	0.003	0.235
SEP-2000	2.349e-4	1.566	0.003	0.004	0.003	3.132e-6	3.915e-4	0.235	0.002	0.327
OCT-2000	2.566e-4	2.48	0.003	0.003	0.002	5.132e-6	8.553e-4	0.684	0.003	0.637
NOV-2000	1.683e-4	2.693	0.003	0.003	0.002	6.733e-6	2.525e-4	0.168	0.003	0.445
DEC-2000	1.943e-4	1.457	0.006	0.032	0.004	7.384e-5	8.744e-4	0.097	0.003	0.443

Volume 1
Chapter

Quality of Effluent Compared with DCG 5400.5

TA-50 WM-1

EFFLUENT COMPARED WITH DCG 5400.5

JAN, 2000 through DEC, 2000

Radioactive Isotopes	Mean Concentration (picoCi/L)	DCG 5400.5 (picoCi/L)	Conc./DCG Ratio
Am-241	2.248	30.0	0.075
Co-56		10000.0	
Co-57		1.0e5	
Co-58		40000.0	
Co-60		50000.0	
Cs-137	166.678	3000.0	0.056
Mn-54	7.851	50000.0	1.57e-4
Pu-238	3.388	40.0	0.085
Pu-239	1.861	30.0	0.062
Pu-240		30.0	
Rb-83	15.855	20000.0	7.928e-4
Rb-84		10000.0	
Se-75		20000.0	
Sr-85		70000.0	
Sr-89	17.855	20000.0	8.927e-4
Sr-90	9.131	1000.0	0.009
TRITIUM	48713.201	2.0e6	0.024
U-234	1.985	500.0	0.004
U-235	0.856	600.0	0.001
U-238	0.539	600.0	8.987e-4
Y-88		30000.0	

Volume 1
Chapter

Room 116B, Vacuum Filter Operations

RADIOACTIVE LIQUID WASTE

TA-50-1-116, Vacuum Filter Drums Shipped For Disposal

01-JAN-2000 through 31-DEC-2000

MONTH	NO of DRUMS	TOTAL VOLUME (Liters)	GROSS WEIGHT (KG)	U-235 (Curies)	PU-238 (Curies)	PU-239 (Curies)	AM-241 (Curies)
JAN-2000	0	0	0	0	0	0	0
FEB-2000	17	3536.0	2901.0	6.612e-6 +/- 11.311e-6	52.204e-3 +/- 6.961e-3	79.176e-3 +/- 8.701e-3	78.306e-3 +/- 5.22e-3
MAR-2000	81	16848.0	16934.0	111.428e-6 +/- 77.986e-6	222.239e-3 +/- 24.108e-3	178.845e-3 +/- 21.557e-3	68.349e-3 +/- 6.773e-3
APR-2000	17	3536.0	3199.0	9.156e-6 +/- 12.937e-6	37.817e-3 +/- 4.976e-3	29.855e-3 +/- 3.981e-3	34.831e-3 +/- 3.981e-3
MAY-2000	12	2496.0	2276.0	LDL	16.144e-3 +/- 1.899e-3	11.87e-3 +/- 1.424e-3	13.295e-3 +/- 1.424e-3
JUN-2000	48	9984.0	8811.0	LDL	184.84e-3 +/- 16.628e-3	162.964e-3 +/- 15.578e-3	70.848e-3 +/- 9.944e-3
JUL-2000	0	0	0	0	0	0	0
AUG-2000	85	17680.0	17238.0	LDL	138.293e-3 +/- 16.985e-3	112.921e-3 +/- 13.997e-3	117.587e-3 +/- 12.32e-3
SEP-2000	0	0	0	0	0	0	0
OCT-2000	39	8112.0	6196.0	LDL	155.713e-3 +/- 13.989e-3	141.724e-3 +/- 13.314e-3	82.571e-3 +/- 11.056e-3
NOV-2000	0	0	0	0	0	0	0
DEC-2000	0	0	0	0	0	0	0
TOTAL	299	62192.0	57555.0	127.196e-6 +/- 102.234e-6	807.248e-3 +/- 85.545e-3	717.355e-3 +/- 78.551e-3	465.786e-3 +/- 50.718e-3

Issued 30 Jul 2001 3:46:34 p.m.

3
Volume 1
Chapter

TA-21, Vacuum Filter Operations

RADIOACTIVE LIQUID WASTE

TA-21-DP-257, Vacuum Filter Drums Shipped For Disposal

01-JAN-2000 through 31-DEC-2000

MONTH	NO of DRUMS	TOTAL VOLUME (Liters)	GROSS WEIGHT (KG)	U-235 (Curies)	PU-238 (Curies)	PU-239 (Curies)	AM-241 (Curies)
JAN-2000	0	0	0	0	0	0	0
FEB-2000	0	0	0	0	0	0	0
MAR-2000	0	0	0	0	0	0	0
APR-2000	0	0	0	0	0	0	0
MAY-2000	0	0	0	0	0	0	0
JUN-2000	0	0	0	0	0	0	0
JUL-2000	0	0	0	0	0	0	0
AUG-2000	0	0	0	0	0	0	0
SEP-2000	0	0	0	0	0	0	0
OCT-2000	0	0	0	0	0	0	0
NOV-2000	0	0	0	0	0	0	0
DEC-2000	0	0	0	0	0	0	0
TOTAL	0	0.0	0.0	0.0 +/- 0.0	0.0 +/- 0.0	0.0 +/- 0.0	0.0 +/- 0.0

Issued 27 Mar 2001 7:14:05 a.m.

Volume 1
Chapter

Summary of Solid Wastes Generated

RADIOACTIVE LIQUID WASTE

SUMMARY OF SOLID WASTE DRUMS SHIPPED FOR DISPOSAL

JAN, 2000 through DEC, 2000

PLANT SLUDGE	TA-50	TA-21-DP-257
Total Sludge Volume	62,192.0 Liters	0.0 Liters
Drums of Sludge (retrievable)	0 bbl's	0 bbl's
Drums of Sludge (non-retrievable)	299 bbl's	0 bbl's
Total Cement Paste Volume	------	-------
Drums of Cement Paste (retrievable)	-------	-------
Misc. Drums (Grit, etc.)(retrievable)		-------
SLUDGE ACTIVITY	**TOTAL (Ci)**	**TOTAL (Ci)**
U-235	127.196e-6 +/- 102.234e-6	------
Pu-238	807.248e-3 +/- 85.545e-3	------
Pu-239	717.355e-3 +/- 78.551e-3	------
Am-241	465.786e-3 +/- 50.718e-3	LDL
CEMENT PASTE ACTIVITY	**TOTAL (Ci)**	
U-235	------	-------
Pu-238	-------	-------
Pu-239	-------	-------
Am-241	-------	-------

Issued 30 Jul 2001 11:14:04 a.m.

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: January 30, 2001
In Reply Refer To: ESH-18/WQ&H:01-023
Mail Stop: K497
Telephone: (505) 665-1859

RECEIVED
FEB 01 2001
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, FOURTH QUARTER, 2000

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from October 1 through December 31, 2000. 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 and a status report on RLWTF operations.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells on October 30, 2000. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of the fluoride result from MCO-7. Fluoride in MCO-7 was 2.13 mg/L, a marked increase from the fluoride concentrations seen in the first three quarters of 2000. Attachment 3.0, Figure 1.0, shows the fluoride concentrations in Mortandad Canyon alluvial ground water during 2000. With the exception of the referenced result, all fluoride results in 2000 were below the state ground water standard of 1.6 mg/L.

No sample results are available for MCO-4B because insufficient water was available for sample collection. MCO-4B has not had sufficient water for sampling since October 1999.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the fourth quarter 2000 were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrates in the RLWTF's effluent was 4.75 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the fourth quarter 2000 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 7.6 mg/L, 1.8 mg/L, and 5.61 mg/L.

Please contact me at 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/rm

Enclosures: a/s

Cy: E. Spencer, USEPA, Region 6, Dallas, Texas, w/enc.
J. Bearzi, NMED HRMB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/LAAO, w/enc., MS A316
M. Johansen, DOE/LAAO, w/enc., MS A316
J. Parker, NMED/DOE/OB, w/enc., MS J993
R. Ford-Schmid, NMED/DOE/OB, w/enc., MS J993
T. Gunderson, DLDOPS, w/enc., MS A100
T. Stanford, FWO-DO, w/enc., MS K492
B. Ramsey, FWO-DO, w/enc., MS K492
S. Hanson, FWO-DO, w/enc., MS K492
D. McLain, FWO-WFM, w/enc., MS J593
R. Alexander, FWO-WFM, w/enc., MS E518
D. Moss, FWO-WFM, w/enc., MS E518
P. Worland, FWO-WFM, w/enc., MS E518
D. Erickson, ESH-DO, w/enc., MS K491
L. McAtee, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
D. Woitte, LC/GL, w/enc., MS A187
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

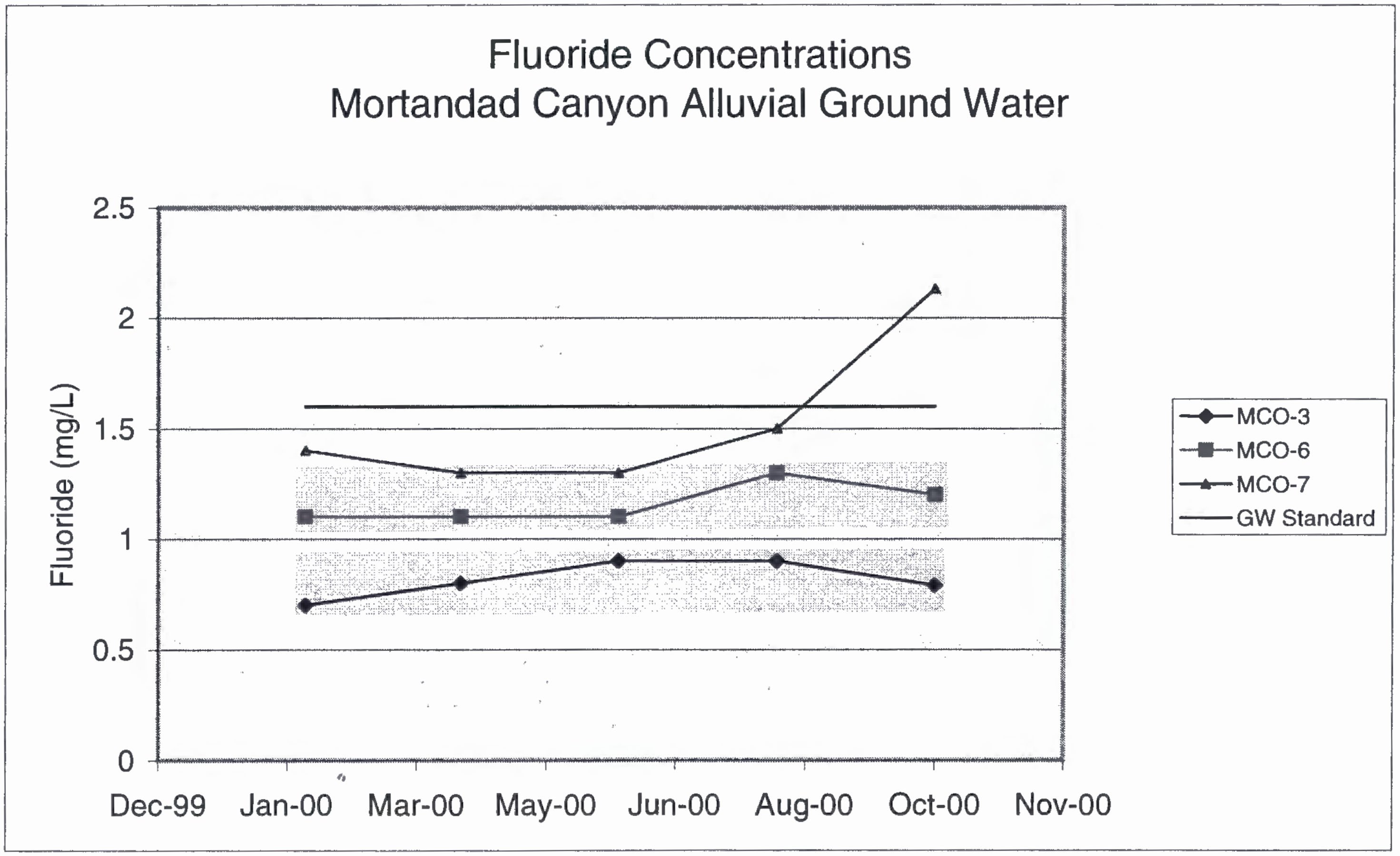
Table 1.0. Analytical Results, Mortandad Canyon Alluvial Monitoring Wells (mg/L), October-December, 2000.

Sampling Location	Sample Date: October 30, 2000				
	NO3-N	**TKN**	**NH3**	**TDS**	**F**
MCO-3	2.69	0.230	<0.029	462	0.794
MCO-4B	NS	NS	NS	NS	NS
MCO-6	6.09	0.170	<0.029	349	1.2
MCO-7	5.01	0.220	<0.029	267	2.13
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*

Notes:
NS means that no sample was collected at this well due to insufficient water.
All units: mg/L

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, October-Decemer, 2000.

Monitoring Period	RLWTF Weekly Effluent Monitoring Analytical Results		
	NO3-N (mg/L)	F (mg/L)	TDS (mg/L)
OCTOBER	3.96	0.78	298
	4.06	0.77	448
	4.14	0.68	432
	5.76	0.71	534
	5.01	0.69	806
NOVEMBER	6.18	0.47	662
	3.45	0.24	396
	3.36	0.54	512
	6.21	0.54	566
DECEMBER	6.03	0.71	402
	5.53	0.5	492
	3.35	0.31	322
	5.47	0.5	532
4th Quarter 2000 Averages (mg/L)	**4.75**	**0.57**	**492**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*


Fluoride Concentrations
Mortandad Canyon Alluvial Ground Water
Fluoride (mg/L)
2.5
2
1.5
1
0.5
0
Dec-99
Jan-00
Mar-00
May-00
Jun-00
Aug-00
Oct-00
Nov-00
MCO-3
MCO-6
MCO-7
GW Standard

01508

Phyllis

CCNS

Concerned Citizens for Nuclear Safety

February 8, 2001

RECEIVED
FEB 12 2001
GROUND WATER BUREAU

Ms. Marcy Leavitt, Chief
Ground Water Quality Bureau
New Mexico Environment Department
P. O. Box 26110
Santa Fe, NM 87502

Re: Groundwater Discharge Plan for the Los Alamos National Laboratory Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132

Dear Ms. Leavitt:

This is a request under the New Mexico Freedom of Information Act (FOIA). On behalf of Concerned Citizens for Nuclear Safety (CCNS), I request the opportunity to review the Groundwater Discharge Plan Application and related correspondence and reports for the Los Alamos National Laboratory (LANL) Radioactive Liquid Waste Treatment Facility (TA-50), DP-1132. **I have scheduled a review session with Phyllis Bustamante for Monday, February 12, 2001 at 2 p.m.** I understand that I may review the documents, photocopy up to 25 pages at no charge and if necessary, go to a copy facility with an Environment Department employee to copy any additional pages.

CCNS is a community-based, non-profit, tax-exempt, public policy research and information environmental organization. CCNS makes information available to thousands of citizens by means of its numerous and varied publications, educational programs, seminars, and public-interest litigation. The information disclosed pursuant to the request will be made directly available to the public and others engaged in policy analysis and research, including historians, area specialists, and journalists.

I appreciate your help in obtaining this information. Should you need further information concerning CCNS or this request, I would appreciate your contacting me by phone at 986-1973 in order to speed consideration of this matter.

Sincerely,

Joni Arends

Joni Arends
Waste Programs Director

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: March 20, 2001
In Reply Refer To: ESH-18/WQ&H:01-100
Mail Stop: K497
Telephone: (505) 667-7969

RECEIVED
MAR 22 2001
GROUND WATER BUREAU

Ms. Joni Arends
Waste Programs Director
Concerned Citizens For Nuclear Safety (CCNS)
107 Cienega St.
Santa Fe, New Mexico 87501

SUBJECT: REQUEST FOR INFORMATION, GROUND WATER DISCHARGE PLAN APPLICATION FOR THE RADIOACTIVE LIQUID WASTE TREATMENT FACILITY AT TA-50

Dear Ms. Arends:

On February 28, 2001, you telephoned Bob Beers of the Laboratory's Water Quality and Hydrology Group and requested the following information: (1) a copy of Los Alamos National Laboratory's Work Plan for Mortandad Canyon; (2) a copy of the Radioactive Liquid Waste Treatment Facility's (RLWTF) Sampling and Analysis Plan (SAP); and, (3) a map showing the location of monitoring well MCO-8 in Mortandad Canyon. In accordance with your request, I have enclosed a copy of the Work Plan for Mortandad Canyon (Environmental Restoration Project Report, September 1997, LA-UR-97-3291) and a map showing the location of MCO-8 with respect to the other MCO wells referenced in the Laboratory's Ground Water Discharge Plan Application for the RLWTF at TA-50. The RLWTF's SAP is currently being revised to reflect the Laboratory's new NPDES Permit (Permit No. NM0028355). The revised SAP should be available in mid-April 2001. I will forward a copy to you as soon as it becomes available.

I hope the enclosed information is beneficial in your review of the Laboratory's Ground Water Discharge Plan Application. Please call me at 665-1859 or Bob Beers at 667-7969 if additional information would be helpful.

Sincerely,

Steven Rae
Water Quality and Hydrology Group

SR:BB/tml

01512

Enclosures: a/s

Cy: P. Bustamante, NMED/GWQB, Santa Fe, New Mexico, w/o enc.
J. Vozella, DOE/LAAO, w/o enc., MS A316
M. Johansen, DOE/LAAO, w/o enc., MS A316
S. Yanicek, NMED DOE/OB, w/o enc., MS J993
T. Gunderson, DLDOPS, w/o enc., MS A100
T. Stanford, FWO-DO, w/o enc., MS K492
B. Ramsey, FWO-DO, w/o enc., MS K492
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R. Alexander, FWO-WFM, w/o enc., MS E518
D. Moss, FWO-WFM, w/o enc., MS E518
D. Erickson, ESH-DO, w/o enc., MS K491
L. McAtee, ESH-DO, w/o enc., MS K491
J. Bartlit, ESH-DO, w/o enc., MS K491
B. Beers, ESH-18, w/o enc., MS K497
M. Saladen, ESH-18, w/o enc., MS K497
C. Nylander, ESH-18, w/o enc., MS K497
D. Woitte, LC-GL, w/o enc., MS A187
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

No DAte
Post May. 2001
See p. 15

(19)

LA-UR-01-5353
Approved for public release; distribution is unlimited.

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

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

Submitted to: Rick Alexander, FWO-WFM

TABLE OF CONTENTS

EXECUTIVE SUMMARY

As the result of a high volume daily base flow received by the Radioactive Liquid Wastewater Treatment Facility (RLWTF) during the Cerro Grande Fire (May 8-20, 2000), personnel were required to man the plant to treat wastewater during this general emergency shut down. This posed personnel safety risks and brought to light that a large percentage of the flow was associated with facility functions other than programmatic work.

In an effort to identify the sources of this base flow, the Environmental Stewardship Office (ESO) funded and managed an RLWTF Influent Minimization Study. The Study reviewed all historical documentation on RLW connections at other facilities and then performed a walkthrough to verify connections. Of the 20,000,000 Liters per year (LPY) of annual flow to the RLWTF, a total of approximately 8,700,000 LPY of potential reductions were identified. Of this total, the ESO identified two significant wastewater reduction opportunities that accounted for almost 3,500,000 LPY of flow, the TSTA cooling tower and TA-48 Boiler. Removal of these sources of influent is now being implemented and will reduce the total flow to the plant by 17%.

RLWTF is now installing additional tankage for influent flows. This tankage will aid in alleviating the need to man the plant during emergency shut down situations. The other reduction opportunities identified in this report must be weighed against an increase in contaminant concentrations, how the increase will increase plant operational costs and the cost to implement proposed influent reductions.

LA-UR-01-5353

1.0 Introduction

1.1 Background

The Radioactive Liquid Wastewater Treatment Facility (RLWTF) has been treating aqueous low-level wastewaters at Los Alamos National Laboratory (LANL) facilities since 1963. The plant treats approximately 20,000,000 liters per year (LPY) of wastewater. There are 1,800 drains attached to the RLW industrial collection system that connect 15 technical areas, 13 facility management units, and 62 buildings to the TA-50 plant. Technical Area 54 does not have direct connections to the main RLW industrial waste line and wastes from this area are trucked to the TA-50 plant. RLW-WFM also operates a treatment facility at TA-53. The remainder of technical areas discharge wastewater directly to RLWTF through the plant's main industrial line.

During the Cerro Grande fire general emergency stand down (May 8-20, 2000), the plant received an average of approximately 29,000 liters per day (LPD) of base flow into the plant via the main industrial line (Figure 1). The site-wide suspension of operations at LANL required all facilities to discontinue facility and programmatic work for approximately two weeks, yet this base flow was received at RLWTF. To ensure State and Federal permit compliance, TA-50 staff was required to treat this daily flow even though the Laboratory was under general emergency shutdown conditions.

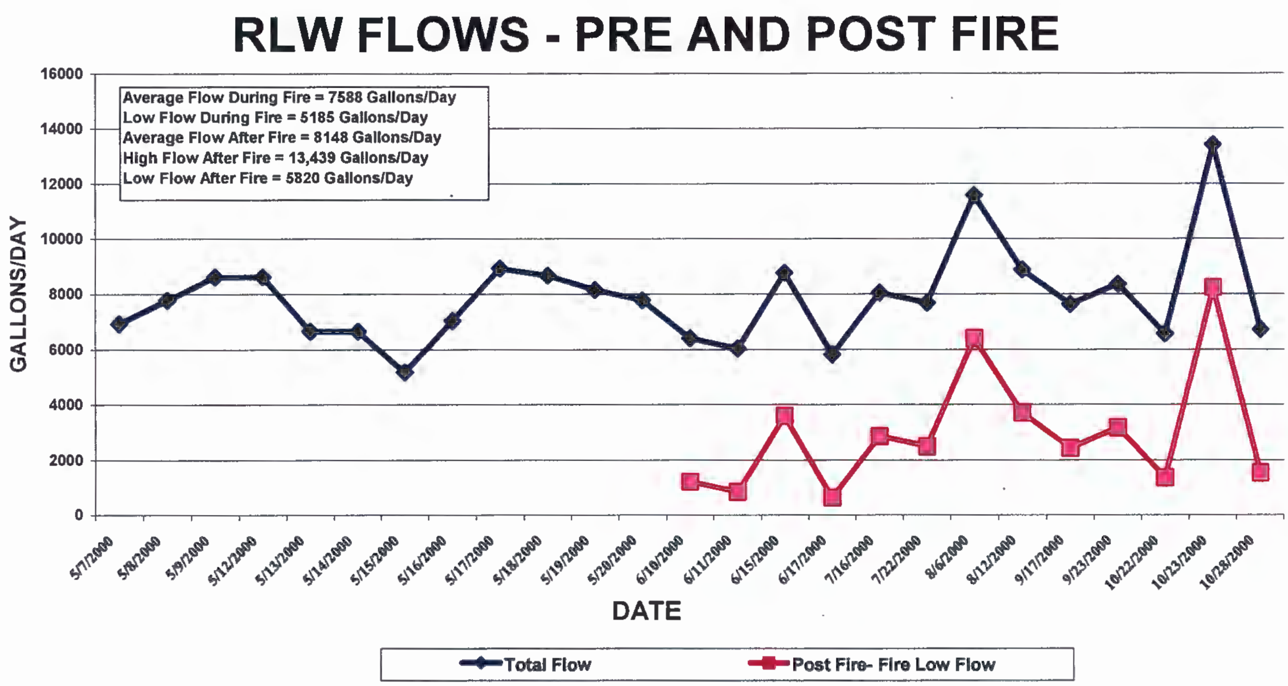


Figure 1: ***Influent into the RLWTF via the Plant's Industrial Line - Pre and Post Fire.***

RLW-WFM has reasoned that this flow was generated from facility equipment such as boilers and other facility support equipment that were not shutdown during the fire. After the general emergency had been lifted, LANL was placed under "normal operations", line management reviewed facility programmatic work and a staged restart of this work was initiated. Post-fire flows to RLWTF remained approximately the same until early August when programmatic functions began operations and the RLWTF began to see programmatic supported flows (Figure 1).

As can be seen in Figure 2 below, a base flow of approximately 21,000 Liters/day were received at the plant during the Christmas and New Year holiday shut down. This flow rate was close to the flows seen during the Cerro Grande Fire.

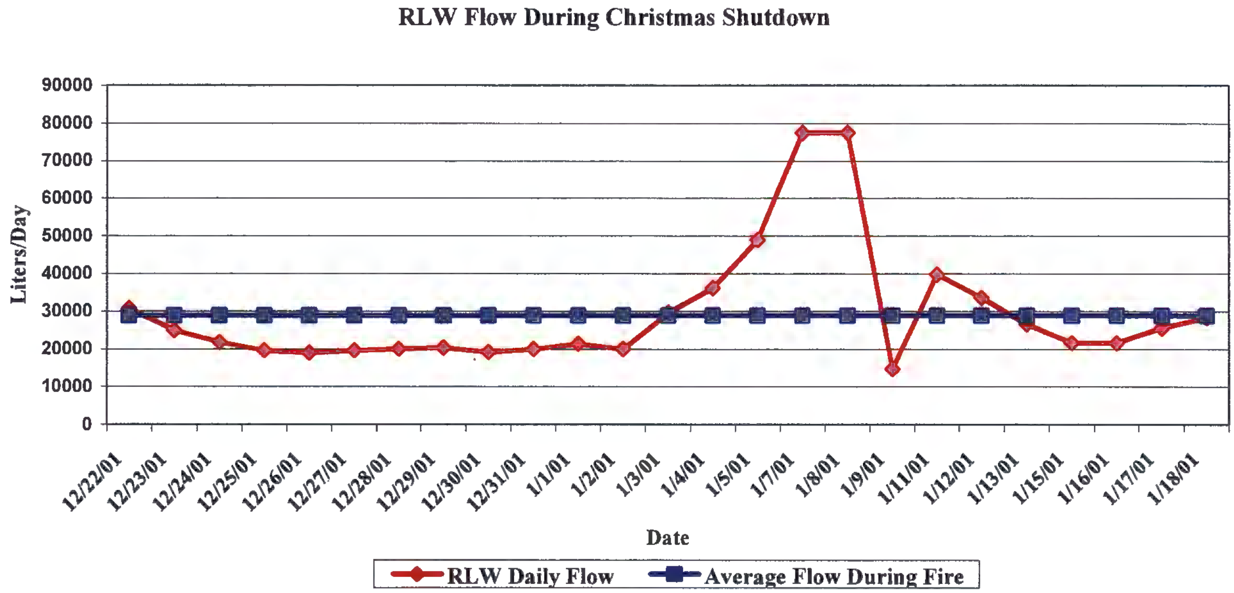


Figure 2: ***Base Flows Received by RLWTF during Laboratory-Wide Christmas Shutdown.***

Most of the connections to the main industrial line have been in place for over 35 years. Laboratory mission needs have changed over the years and some connections within technical areas previously used for discharges to RLW are no longer needed. In addition, operational issues that required various facility equipment to discharge to RLWTF are no longer valid. This study will focus on identifying facility drains that could be taken off of the RLWTF system due to programmatic changes and identifying facility equipment connected to TA-50 that could be taken off of the system with the application of engineering controls or equipment replacement.

1.2 Purpose

The focus of the Influent Minimization Study was to review facilities/activities at LANL that discharge effluent into radioactive waste drains. A compilation of candidate sources for removal from the RLWTF is the deliverable for this project with a list of recommended actions to eliminate these flows. The sources and recommended actions are noted in this report for management review.

The project goal was to identify approximately 3,800,000 LPY (or 20% of total flow) of influent wastewater that could be eliminated from the RLWTF system. This decrease in flow could result in the reduction of unnecessary operational costs, personnel risk, and would reduce the volume of wastewater treated at TA-50. Because most operational costs are a yearly fixed cost, the return on investment to implement changes is not expected to be significant. Reducing influent flows may increase the amount of reverse osmosis (RO) concentrates requiring processing (See Attachment A). These costs will tend to keep the overall operational costs constant.

1.3 Scope

The scope of this study was to identify sources of non-radioactive wastewater discharged to the RLWTF collection system, review if there was still a requirement for the source waste to be discharged to TA-50 for treatment, and provide recommendations to RLW-WFM for source elimination.

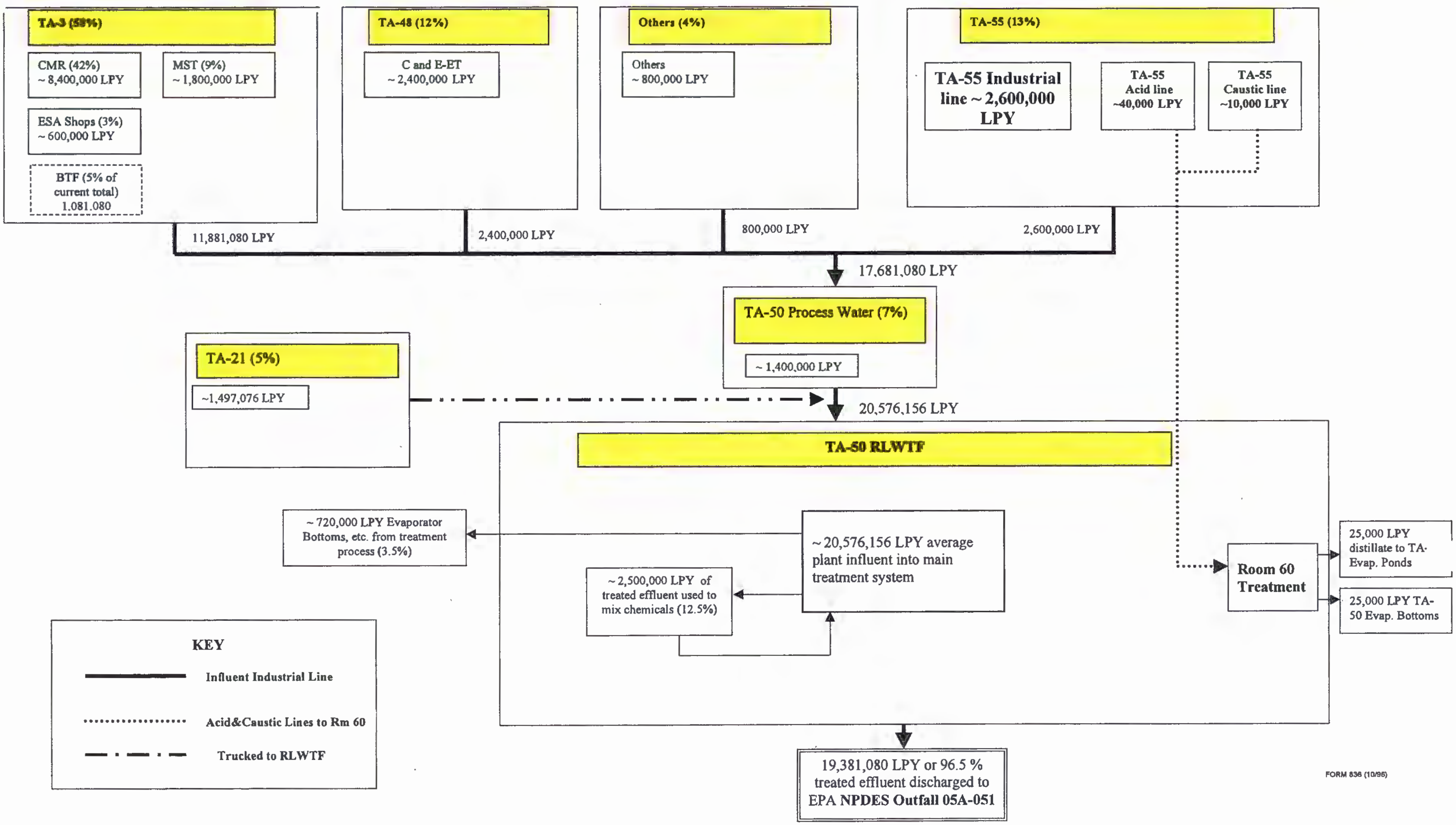
The Environmental Stewardship Office (ESO) sponsored the Influent Minimization Study where $100,000 was budgeted for completion of this task in fiscal year 2001. Monies from this budget not used to perform the study have been earmarked to provide funding for source elimination. Two sources of non-radioactive wastewater have been identified for elimination using these monies and RLW-WFM has requested ESO to fund the removal of these source waters. Therefore, the scope of this project has been expanded to include funding and project management of the rerouting project to ensure the elimination of these two wastewater sources are completed. As a result of the study and its recommendation, other rerouting projects that are considered high priority for removal from the RLW collection system should be funded by the activities responsible for implementing the recommended actions.

2.0 RLWTF Influent Minimization Study Findings

2.1 Current Influent – Flow Diagram

The following flow diagram (Figure 3) illustrates the yearly flow volumes from each major facility connected to the RLWTF. The telemetry units at most facilities are not operational and the exact volume of wastewater discharged from

FIGURE 3 - RLWTF ESTIMATED INFLUENT FLOW DIAGRAM



each facility is unknown. Hence, this diagram is an estimate. The average influent volume of 20,000,000 LPY is used. Relative percentages of radioactive liquid waste influent discharged by the various generator facilities at LANL were estimated by the RLWTF.

2.2 Influent Reduction Opportunities and Recommendations

Table 1 lists the opportunities for reduction found during the facility walkarounds and recommended changes for management review. Because it is unknown how much flow is contributed from each facility, and because of difficulties in making measurements for the conditions found, the flow rates and volumes are estimates and may not accurately reflect actual rates and volumes.

Table 1: ***RLWTF Influent Minimization Study Findings and Recommendations.***

FMU	ID	Location (TA-Bldg-Room)	Description	Estimated Flow	Estimated Volume	Recommendation
73	03-1	03-66-P100	Electroplating baths – Steam is used to heat the baths; condensate is routed to RLW	8.3 LPM to bring average number of baths (6) up to temperature. 4.2 LPM to maintain average number of baths at temperature.	Assume bath heating 1 hr to bring bath up to temp 11 hrs to maintain temperature. This is a 5 day/week 12 hr/day operation 850,200 LPY	NO RAD ASSOCIATED This waste stream was routed to RLW because of concern that heat exchanger would fail and allow acid and/or cyanide waste to be returned to Steam Plant boiler. Recommend that a review be performed to deduce whether condensate must continue to go to RLW or if it can be sent back to the Steam Plant. Perhaps an engineering change to ensure heat exchanger breakthrough does not occur. This system is run manually.
73	03-2	03-66-P100	Water Fountain	Nil	Nil	NO RAD ASSOCIATED Fountain is used infrequently. Determine whether it can be disconnected. If not, determine whether it would be worth the cost to reroute.
73	03-3	03-66-H107	Slate Saw – Water-cooled.	7.6 LPM intermittent	Assume saw is used 5 hr/week 2280 LPY	NO RAD ASSOCIATED Sanitary collection line runs close to saw. Costs for rerouting saw should be minimal.
73	03-4	03-66-H107	Table Planer	Not Used	Not Used	NO RAD ASSOCIATED Disconnect.
73	03-5	03-34-BSMT	Chemical Hoods	Not Used	Not Used	Disconnect.
73	03-6	03-34-111	Lab Sink	Not Used	Not Used	Disconnect.

FMU	ID	Location (TA-Bldg-Room)	Description	Estimated Flow	Estimated Volume	Recommendation
73	03-7	03-34-108	Water Cooled Welder	7.6 LPM	Assume welder is used 5 hr/week 2280 LPY	NO RAD ASSOCIATED Bldg. 34 has a chilled water process loop. Researcher (John Sarrao) did not want to use loop due to water quality. FM installed a filter, regulator, and flow meter and instructed researcher to use closed loop system. Provide informational training to ensure researcher(s) use closed loop system.
73	03-07	03-141-108B	Washing Machine	8.7 LPM	Total daily volume expected to be 4158 LPD or 1,081,080 LPY	NO RAD ASSOCIATED. This washing machine launders beryllium contaminated PPE's. This is a new flow to RLWTF. There is an approved WPF. However, chemicals in washing detergents were not descriptive enough and some of these chemicals are not compatible with RLWTF process (dispersant and sequestering agent). Recommend that facility re-evaluate sending laundry out as launderables, or setting up a pretreatment unit to remove organics, or evaluate if beryllium can be filtered out and send waste steam to SWSC.
73	03-8	03-141-SUMP	Sump Basin	Runoff	Runoff	NO RAD ASSOCIATED This sump collects wastewater from drains in building 141 and pumps the waste to building 66 where waste is routed to the RLWTF industrial line. The enclosure sump basin seal is leaking allowing runoff to collect in the sump basin. FM is rectifying this problem.
65	03-9	3-29-1100 – Wing 1	Water Fountain	Nil	Nil	NO RAD ASSOCIATED Disconnect or reroute. Wing 1 converted to office space. As-builds should be updated and provided to RLWTF.

FMU	ID	Location (TA-Bldg-Room)	Description	Estimated Flow	Estimated Volume	Recommendation
65	03-10	3-29-2124-Wing 2	Condenser	4 LPH	Assume 5 day/week, 24 hr/day 24,960 LPY	RAD ASSOCIATED Condenser used for experimental work in controlled lab. Experimenter claims that the flow is 4 LPH, however this was not verified. Experimenter claimed that the use of a chiller was not considered because of contamination issues. Re-evaluate if a chiller could be used.
65	03-11	3-29-2023-Wing 2, Wing 5, Wing 7	2 vacuum pumps per Wing that provide vacuum for process operations, one on-line at all times, one on stand-by.	1.3LPM	Assume vacuum is supplied to glove boxes 365 day/yr, 24 hr/day 683,280 LPY All Wings with same assumption 2,049,840 LPY	RAD ASSOCIATED During walkthrough, observed Wing 2 vacuum pump was in operation and discharging water to a RLWTF drain. Observation was not made in Wings 5 or 7. CMR Operations Center personnel have stated that these pumps are on a closed loop system and there is no discharge associated with them. The flow rate and volume in this report is a rough estimate and the actual discharge needs to be further investigated. If needed and if appropriate, pump replacement or engineering change. In Wings 3, 4, and 9, these pumps are not expected to be used again.
65	03-12	3-29-Wing 2, Wing 3, Wing 4, Wing 5, Wing 7	Water Fountain in hallway outside controlled laboratories	Nil	Nil	NO RAD ASSOCIATED Disconnect if practical.

FMU	ID	Location (TA-Bldg-Room)	Description	Estimated Flow	Estimated Volume	Recommendation
65	03-13	3-29-- Wing 2, Wing 7	Cooling Water Evaporators	3.78 LPM	High estimate that assumes a load is supplied to one wing CWE 8 hr/day, 5 day/week, 51 week/yr 462,672 LPY Same assumption for both wings currently operating: 925,344 LPY	RAD ASSOCIATED During walkthroughs, Wing 2 CWE in room 2195 was discharging. The CWE in room 2295 was not discharging, nor were any of the other CWEs in other wings. Blow down is dependent on load from laboratories. The discharge from these units can be quite significant. In Wings 4, 5, and 3, the CWEs have been dismantled and in Wing 9, they do not use the CWE and don't have plans to use. Review if an engineering change such as an alarm system and automatic shutdown on the heat exchanger could be installed. May be able to be operated off of a conductivity meter.
65	03-14	3-29- Wing 2, Wing 7	CWE re-circulating water loop	Unknown	Unknown	RAD ASSOCIATED The chilled water coming from the CWEs is stored in a water tank in basements of wing 2, 5, and 7. Chilled water is circulated to laboratories from the water tank. If power is lost, water is gravity drained to water tank. If the tank is full, the tank overflows into the RLW industrial line.
65	03-15	3-29- Wing 2, 3, 4, 5, 7, 9	Showers in equipment rooms (adjacent to rooms where CWEs are located)	None	None	NO RAD ASSOCIATED Showers are not used for decontamination any longer and in fact are not used at all. One shower was leaking. Disconnect.

FMU	ID	Location (TA-Bldg-Room)	Description	Estimated Flow	Estimated Volume	Recommendation
70	03-16	3-102-Tech Shop	Shower	30.24 LPM	Shower is used every day by 5 workers (5 day/week, 51 week/yr). Assume average shower length is 10 minutes. 385,560 LPY	RAD OPERATIONAL ISSUE Tech shops work with depleted uranium. Machinists wear PPE's and monitor before going to shower area. Recommend showers be rerouted to Sanitary. If reroute is impractical, switch showerheads to low flow that would reduce flow to as low as 5.67 LPM or 72,330 LPY (81% reduction from this source).
71	3-17	3-65	Drains	None	None	NO RAD ASSOCIATED This building is being converted to office space. Six drains in this building should be rerouted to the SWSC or removed.
70	21-1	21-420	Cooling Tower	2.8 LPM	Assume blow down discharges 24 hr/day, 365 day/yr 1,490,076 LPY	RAD OPERATIONAL ISSUE No contamination issues associated with blowdown. The recommendation was to reroute this cooling tower to an existing 03A outfall. This job is has been initiated (start date June 18, 2001) and will be completed by June 30, 2001 as per RLWTF request.
73	35-1	35-213-C105	Vacuum Pump	7.6 LPM	Assume pump is used 4 weeks/year, 7 days/week and 24 hr/day 306,432 LPY	NO RAD ASSOCIATED Vacuum pump is installed in a small (approx. 5' wide and 14' long) room. Because of this, a chiller was deemed impractical. To decrease flow, researcher put flow regulator on, but discharge is still quite substantial. The contaminant in pump is acid and researcher uses this type of pump to address the low pH. Determine if recirculating and maintaining smaller bleed can decrease flow. Research if other types of pump can replace.

FMU	ID	Location (TA-Bldg-Room)	Description	Estimated Flow	Estimated Volume	Recommendation
66	48-1	48-1-244	Boiler	3.2 LPM (as high as 4.11 LPM). Different flow rates reflect skimmer valve adjustments by boiler crew.	Assume 7 days/week, 24 hr/day, 365 day/yr 1,677,312 LPY (low est.) 2,154,297 LPY (high est.)	RAD OPERATIONAL ISSUE No contamination issues associated with blow down. The recommendation was to reroute the boiler blow down and drain to the Sanitary. This job will be initiated and completed this FY as per RLWTF request.
66	48-2	48-1-various	Laboratory Sinks Rooms 309, 310, 414, 414B, 412	0.315 LPM	Assume 7 days/week, 24 hr/day, 365 day/yr and sink is leaking 1 gallon/hr 165,110 LPY	RAD ASSOCIATED Provide this information to C-FM for maintenance activities.
66	48-3	48-1- 1st floor hallway	Ice Machine	None	None	NO RAD ASSOCIATED This ice machine is an air-cooled unit. However, the dump valve could fail which would lead to signification volumes of water being discharged to the RLW system. Recommend that this ice machine be rerouted to the Sanitary.
66	48-4	48-1-16	Unknown	Unknown	Unknown	UNKNOWN RAD ISSUE ¼" hose running from room 16 to an RLW drain. Could not access room. Recommend that this source be identified and volume determined.
66	48-5	48-1-Hot Cells	Condensers	1.9 LPM intermittent	Assume 3 condensers are being used 4 weeks/yr, 5 days/wk, and 12 hr/day. 81,648 LPY	RAD ASSOCIATED Recommend supplying chillers.

FMU	ID	Location (TA-Bldg-Room)	Description	Estimated Flow	Estimated Volume	Recommendation
71	59-1	59-1-B7, B8F, B8H	Sinks	Nil	Nil	NO RAD ASSOCIATED Recommend reroute to Sanitary for B7 and disconnect sinks in B8F and B8H. Sink in B7 is in janitor's closet, but is not in a controlled area. Sinks in B8F and B8H are labs that have been converted to office space.
71	59-2	59-1-roof	Air Scrubber	Unknown	Unknown	Verify how this system is operated and PMs. Verify discharge volume and determine if volume can be reduced.
71	59-3	59-1	Unknown	40 LPM every 1.5 hrs.	640 LPD or 233,600 LPY	According to RLWTF flow meter for TA-59-1, approximately 40 LPM is discharged from TA-59 about every 1.5 hrs. This would be indicative of the 20-gallon sump filling up and then pumping. No source for this regular release was found during the walkthrough. Recommend dye tests be run on the drains that were rerouted from 03A098 outfall during the outfall reduction program to ensure they were not routed to RLW.

2.3 Current Influent Minimization Efforts

Two rerouting projects are currently underway, that will eliminate approximately 3,500,000 LPY from the RLW system. The successful elimination of these two sources will meet the project goal of eliminating approximately 20% of the influent from the RLW system. Specifically the two projects scheduled for rerouting are the TA-21 TSTA cooling tower and the TA-48, Building 1 boiler.

At this time, no other influent minimization projects are underway. After review of the findings and recommendations, RLWTF management will determine if continued efforts to eliminate flows are necessary or desirable.

2.4 Scheduled Influent Projects – Flow Diagram

The following flow diagram (Figure 4) represents what the estimated flow into TA-50 after the two scheduled rerouting projects have been completed (see Section 2.3). Potential reduction opportunities from Section 2.2 are also listed on the flow diagram. The estimated relative percentages of average influent volumes from each facility have been recalculated from the RLWTF estimate.

2.5 Other Significant Findings

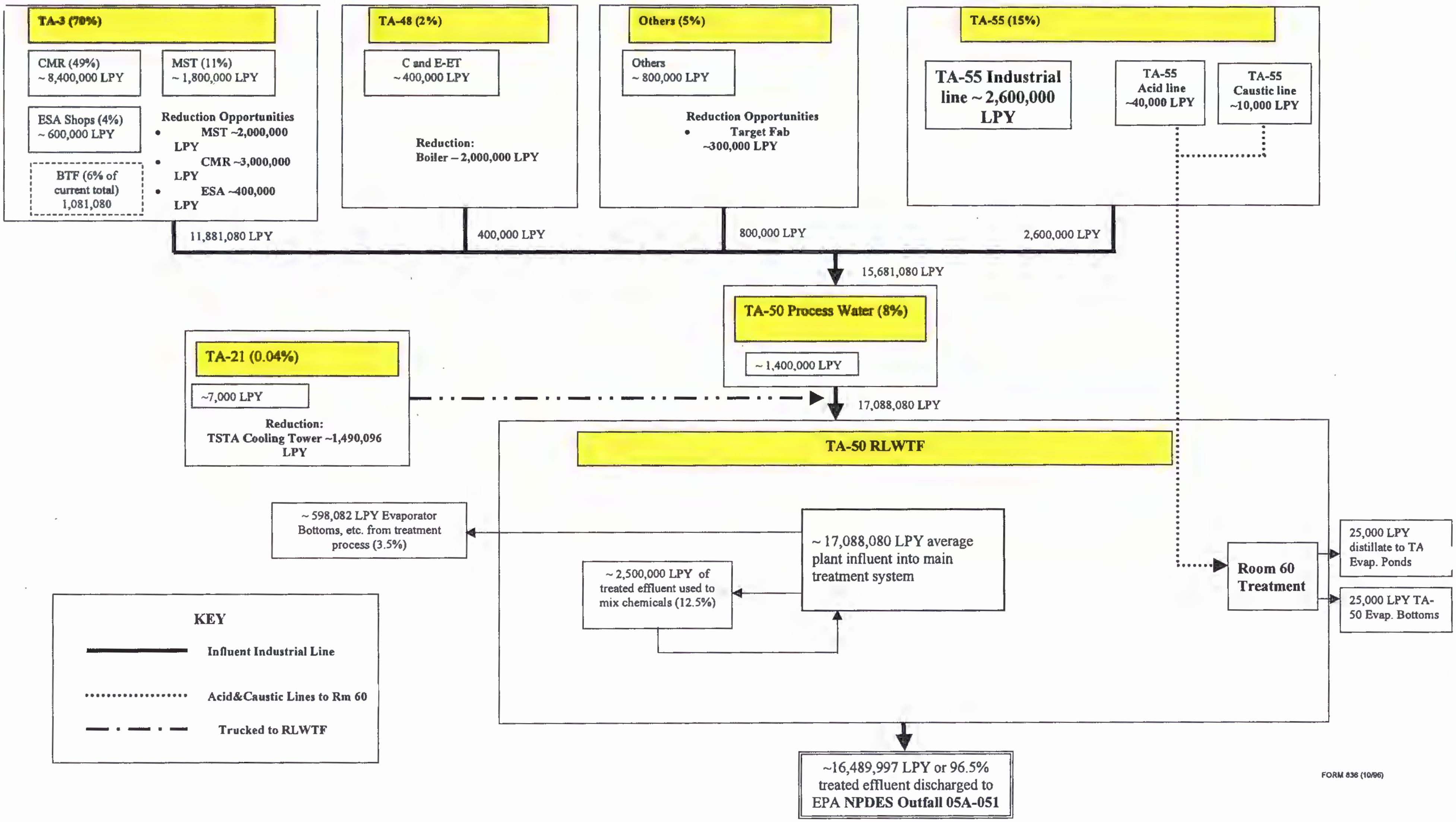
During the course of this study, the investigator found other conditions that are not related to wastewater discharge reductions, but were deemed noteworthy for inclusion in this report. The following lists those findings:

- RLWTF telemetry units were not operational in most of the facilities visited.
- The connections to the RLWTF for the following facilities do not correctly reflect the 1994 Wastewater Stream Characterization reports and RLWTF should request new facility connection drawings from the appropriate FMUs:
  - Beryllium Treatment Facility,
  - Target Fabrication Facility,
  - Sigma (need to identify which drains go to the cyanide tank and which drains go into acid tank), and
  - CMR all Wings.
- Wastewater for all CMR Wings go directly into the industrial wastewater line, and no longer goes into holding basins.
- CMR duct washing system is not being used. However, they plan to bring this operation back on line once they have an approved WPF in place. This will greatly increase the flow going into the RLWTF industrial line.
- CMR Air Handlers do not discharge to the RLWTF. They are permitted to a 03A NPDES outfall.
- CMR is the only facility that has a waste profile form in place for janitorial wastes. Waste profile forms for all facilities should be in place or a laboratory-wide waste profile form should be developed.

3.0 Conclusions

As a result of this study and the funding allocated for its completion, the influent treated at the RLWTF will be reduced by 17% by the end of fiscal year 2001. This reduction is resultant of the TA-21 cooling tower blow down reroute and the TA-48 boiler reroute. Additional opportunities for wastewater elimination are possible and could result in reductions as much as 43% of the total average flow received on a yearly basis. However, future wastewater elimination efforts must be weighed with costs the facility may incur by treating a more concentrated waste stream.

FIGURE 4 – RLWTF ESTIMATED INFLUENT FLOW DIAGRAM WITH TA-21 AND TA-48 REROUTES



4.0 Need for Future Work

The investigator was unable to set-up a walkthrough of TA-55-PF4. Because TA-55 is a major contributor to the main industrial line, this walkthrough should be completed.

The washing machine at the Beryllium Treatment Facility is a major new source of wastewater to RLWTF. If the discharge from this new system cannot be eliminated from the RLWTF, options to decrease the flow, and options to replace chemicals that are counterproductive to the plant's treatment process should be thoroughly investigated.

A waste profile form for all janitorial wastes should be pursued by RLWTF. The SWSC has a general waste profile form in place for all janitorial wastes and this new profile form could be modeled from the SWSC.

ATTACHMENT 1
Cost Analysis of Reducing Influent Flow to the RLWTF

Effluent tanks discharged from 6/1/00 – 5/31/01

	No. of Tanks	% of Tanks	Volume (liters)
All TUF Permeate	93	41.5	6,818,219
All RO Permeate	54	24.1	3,959,496
Mix of TUF/RO Permeate	67	29.9	4,912,404
Evaporator Distillate	10	4.5	739,325
Totals	**224**	**100**	**16,429,444**

Effluent tanks discharged from 6/1/00 – 5/31/01 with TUF/RO mix tank volumes separated

	No. of Tanks	% of Tanks	Volume (liters)
All TUF Permeate + TUF from Mixed Tanks ***Total TUF Tanks***	93 + 36.75 *129.75*	57.9	9,512,648
All RO Permeate + RO from Mixed Tanks **Total RO Tanks**	54 + 30.25 *84.25*	37.6	6,177,471
Evaporator Distillate	10	4.5	739,325
Totals	**224**	**100**	**16,429,444**

Average of RDF monthly composite samples from June, 2000 through May, 2001:

Nitrate-Nitrogen = 8.5 mg/L
Gross Alpha = 19.6 nCi/L

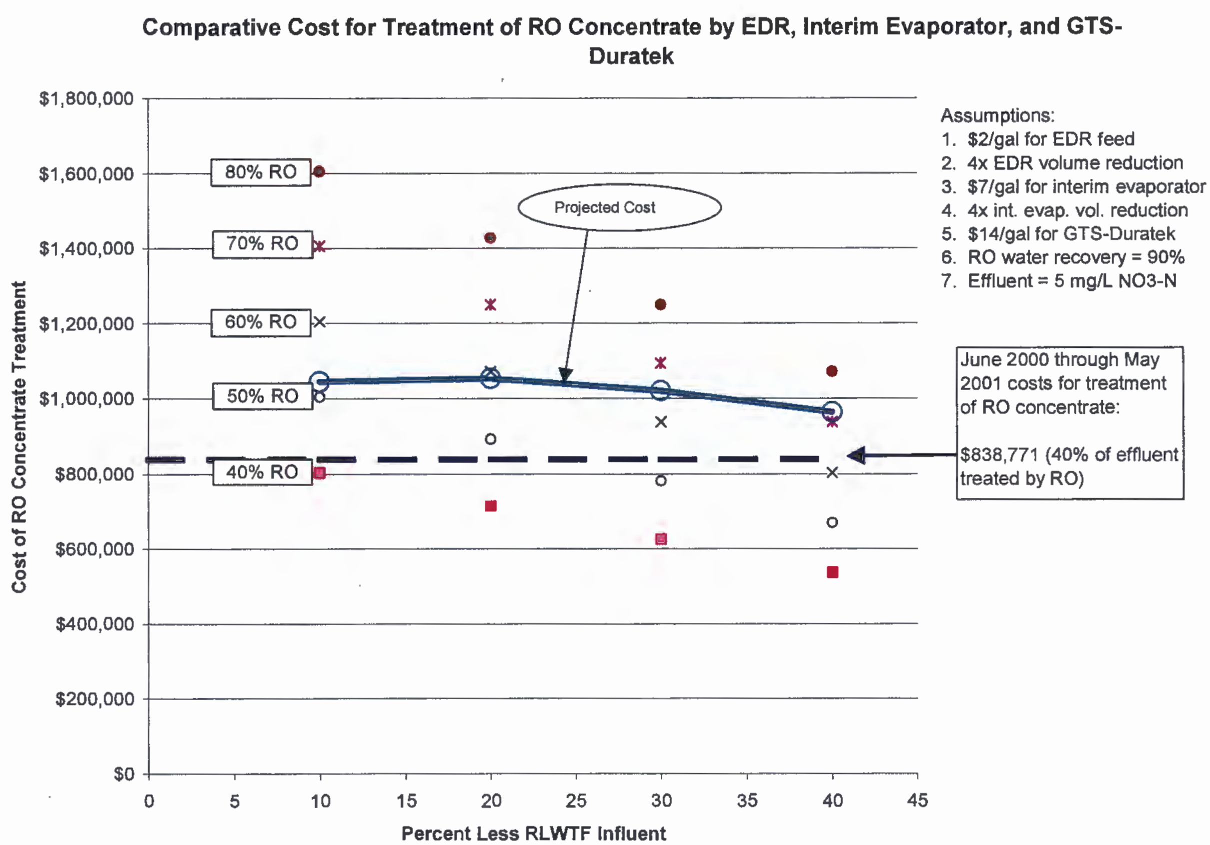
The costs for handling RO concentrate for the past 12 months (6/1/00 – 5/31/01) was estimated at approximately $850,000. During this time period, the total flow discharged from the plant was 16.5 million liters and the effluent was 60% tubular ultrafilter permeate and 40% reverse osmosis permeate.

If non-alpha and low nitrate flows decrease (for example the TA-21 cooling tower blowdown and the TA-48 boiler are taken off line), then the average concentration of nitrate and gross alpha will increase. This will increase the percentage of time that water must be processed by the RO (see Table 1 below). The increase in RO usage will increase the production of RO concentrate. This increase in RO concentrate will increase the usage of the EDR with a volume reduction factor of 4.0 ($2/gallon), operation of the interim evaporator with a volume reduction factor of 4.0 ($7/gallon), and shipment of bottoms to GTS ($14/gallon).

Table 1 RO Usage as a Function of RLWTF Influent Flow Reduction

Percent Flow Reduction	Percent RO Usage
0	**40**
10	**52**
20	**59**
30	**65**
40	**72**

The following chart exhibits the costs associated with handling the RO concentrate stream when the non-alpha and low nitrate flows are reduced. It is expected that the removal of these flows from the RLWTF influent will increase the use of the RO unit in processing the RLWTF effluent. The chart indicates that no cost savings, in processing the RO concentrate secondary stream, will occur by reducing the flow to the RLWTF.



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Los Alamos National Laboratory
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Date: April 24, 2001
In Reply Refer To: ESH-18/WQ&H:01-121
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RECEIVED
APR 27 2001
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, FIRST QUARTER, 2001

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from January 1 through March 31, 2001. 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 and a status report on RLWTF operations.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells on March 12, 2001. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of a fluoride result at MCO-7 of 1.61 mg/L (NM WQCC Regulation 3103 standard for fluoride is 1.6 mg/L).

No sample results are available for MCO-4B. Due to heavy winter snows the road to MCO-4B was impassable during the first quarter of 2001. MCO-4B will be sampled in the second quarter of 2001.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the first quarter 2001 were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrates in the RLWTF's effluent was 5.21 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the first quarter 2001 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 9.3 mg/L, 2.1 mg/L, and 5.65 mg/L.

Please contact me at 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Attachments: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas, w/att.
E. Spencer, USEPA, Region 6, Dallas, Texas, w/att.
J. Bearzi, NMED/HRMB, Santa Fe, New Mexico, w/att.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/att.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
J. Vozella, DOE/LAAO, w/att., MS A316
M. Johansen, DOE LAAO, w/att., MS A316
T. Gunderson, DLDOPS, w/att., MS A100
T. Stanford, FWO-DO, w/att., MS K492
B. Ramsey, FWO-DO, w/att., MS K492
D. Mclain, FWO-WFM, w/att., MS J593
R. Alexander, FWO-WFM, w/att., MS E518
D. Moss, FWO-WFM, w/att., MS E518
P. Worland, FWO-WFM, w/att., MS E518
D. Erickson, ESH-DO, w/att., MS K491
L. McAtee, ESH-DO, w/att., MS K491
S. Rae, ESH-18, w/att., MS K497
D. Rogers, ESH-18, w/att., MS K497
M. Saladen, ESH-18, w/att., MS K497
D. Woitte, LC/GL, w/att., MS A187
WQ&H File, w/att., MS K497
IM-5, w/att., MS A150

Table 1.0. Analytical Results, Mortandad Canyon Alluvial Monitoring Wells (mg/L), 1st Quarter, 2001.

Sampling Location	**Sample Date: March 12, 2001**				
	NO3-N	**TKN**	**NH3**	**TDS**	**F**
MCO-3	1.46	0.38	<0.05	259	0.79
MCO-4B	NS	NS	NS	NS	NS
MCO-6	4.77	0.33	<0.05	289	1.43
MCO-7	9.05	0.26	<0.05	331	1.61
MCO-7 duplicate	9.2	0.27	<0.05	330	1.56
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*

Notes:
NS means that no sample was collected at this well.
All units: mg/L

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 1st Quarter, 2001.

Monitoring Period	**RLWTF Weekly Effluent Monitoring Analytical Results**		
	NO3-N (mg/L)	**F (mg/L)**	**TDS (mg/L)**
JANUARY	3.7	1.24	770
	6.9	0.97	536
	9.0	0.91	532
	5.9	0.87	504
FEBRUARY	5.2	1.11	520
	5.4	1.02	600
	5.4	0.50	294
	6.2	0.54	370
MARCH	3.54	0.45	358
	2.13	0.35	296
	3.9	0.49	352
	1.38	0.34	308
1st Quarter 2001 Averages (mg/L)	**5.21**	**0.73**	**453**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

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Date: June 21, 2001
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Ms. Phyllis Bustamante
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New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

Ms. Joni Arends
Waste Programs Director
Concerned Citizens for Nuclear Safety
107 Cienega St.
Santa Fe, New Mexico 87501

SUBJECT: JUNE 11, 2001, TOUR OF MORTANDAD CANYON AND THE RADIOACTIVE LIQUID WASTE TREATMENT FACILITY AT TA-50

Dear Ms. Bustamante and Ms. Arends:

I would like to take this opportunity to thank you for taking time away from your busy schedules to tour Los Alamos National Laboratory's Mortandad Canyon and the Radioactive Liquid Waste Treatment Facility (RLWTF) at Technical Area (TA)-50. The tour of Mortandad Canyon allowed you to see first-hand the drilling of intermediate wells MCOBT-4.4 and MCOBT-8.5, the recently completed regional well, R-15, and the RLWTF's NPDES outfall in upper Mortandad Canyon.

The tour of the RLWTF was an excellent opportunity for you to become more familiar with the extensive upgrades and operational changes that the facility has implemented over the past several years. In addition, your visit provided the RLWTF with a forum to showcase the dramatic improvements in effluent quality that have occurred since December 1999.

As you recall, the tour was originally scheduled to include a visit to TA-55 to see the recently completed Nitric Acid Recycling System (NARS). Your decision not to see NARS was understandable given your time constraints. I hope that the briefing you received on NARS from Steve Schreiber (NMT-2) and Don Mullins (NMT-2) was satisfactory. Please feel free to contact me if you would like further information on NARS or if you would like for me to reschedule the tour.

At the RLWTF pre-tour briefing you were provided with copies of the following: (1) a tour agenda, (2) a 22-page informational handout that describes RLWTF operations and effluent quality, and (3) a copy of the RLWTF's current sampling and analysis plan titled, *Sampling for TA-50* (DOP-RLW-001, June 2001). Please do not hesitate to contact me should you have any questions regarding the above documents.

During the tour of lower Mortandad Canyon, Dave Broxton (EES-6), your tour guide, informed you that the recently published report, *Characterization Well R-15 Completion Report* (LA-13749-MS, May 2001), was available for distribution. Enclosed, please find a copy of this report as each of you requested. Please direct any questions that you might have regarding this report to me and I can forward them to Dave Broxton, as needed.

Ms. Bustamante, during the tour of lower Mortandad Canyon you inquired about the status of MCO-4, an alluvial well. I can confirm that MCO-4 has been plugged and abandoned. This was necessary due to the extensive erosion that was occurring around the well casing.

In closing, I hope the tour met your needs and provided you with the information you desired. Again, thank you for taking the time to visit Los Alamos National Laboratory and please contact me at (505) 667-7969 should you have any questions or concerns.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Enclosures: a/s

Cy: J. Vozella, DOE/LAAO, w/o enc., MS A316
M. Johansen, DOE/LAAO, w/o enc., MS A316
S. Yanicak, NMED DOE/OB, w/o enc., MS J993
T. Gunderson, DLDOPS, w/o enc., MS A100
D. McLain, FWO-FM, w/o enc., MS J593
R. Alexander, FWO-FM, w/o enc., MS E518
D. Moss, FWO-FM, w/o enc., MS E518
P. Worland, FWO-FM, w/o enc., MS E518
S. Schreiber, NMT-2, w/o enc., MS E511
D. Mullins, NMT-2, w/o enc., MS E511
D. Erickson, ESH-DO, w/o enc., MS K491
L. McAtee, ESH-DO, w/o enc., MS K491
S. Rae, ESH-18, w/o enc., MS K497
D. Rogers, ESH-18, w/o enc., MS K497
M. Saladen, ESH-18, w/o enc., MS K497
C. Nylander, ESH-18, w/o enc., MS K497
D. Broxton, EES-2, w/o enc., MS D462
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

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Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: REQUEST FOR CHANGE IN PROCEDURE, TOTAL DISSOLVED DETERMINATION

Dear Ms. Bustamante:

Under Ground Water Discharge Plan DP-1132 for the Radioactive Liquid Waste Treatment Facility (RLWTF), Los Alamos National Laboratory (Laboratory) routinely monitors for Total Dissolved Solids (TDS) in the RLWTF's effluent. Currently, the Laboratory analyzes for TDS using EPA Method 160.1, a gravimetric method that evaporates the sample, dries it in an oven, and then weighs the resulting residue. The Laboratory requests NMED's permission to change from the gravimetric method (EPA 160.1) to measurement of TDS through conductivity (meter). Please find the enclosed memo from Eva R. Birnbaum of the Laboratory's Analytical Chemistry Sciences Group. Ms. Birnbaum's memo describes in detail the rationale for the proposed change. This proposed change would apply to all TDS measurements made on the RLWTF's effluent. As a quality assurance measure, all TDS measurements equal to or greater than 800 mg/L would be confirmed using the gravimetric method.

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

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Enclosures: a/s

Cy: J. Vozella, DOE/LAAO, w/enc., MS A316
M. Johansen, DOE/LAAO, w/enc., MS A316
T. Gunderson, DLDOPS, w/enc., MS A100
D. Erickson, ESH-DO, w/enc., MS K491
L. McAtee, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
D. McLain, FWO-WFM, w/enc., MS J593
R. Alexander, FWO-WFM, w/enc., MS E518
D. Moss, FWO-WFM, w/enc., MS E518
P. Worland, FWO-WFM, w/enc., MS E518
E. Birnbaum, C-ACS, w/enc., MS E518
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

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To/cc: Peter Lindahl, MS K494
From/MS: Eva R. Birnbaum, C-ACS, MS E518
Phone/FAX: 7-7538/5-6561
Date: 6/13/01

Request for Change in Procedure for Total Dissolved Solids Determination

I would like to formally request to change the procedure by which we determine Total Dissolved Solids (TDS) in water samples related to discharges at Los Alamos National Laboratory. Currently, we analyze TDS by EPA Method 160.1, which involves evaporating a water sample, drying it in an oven at 180 degrees C, and weighing the resulting residue. This is the only allowed procedure that I have found in searching EPA sources and in Standard Methods (method 2450 C).

There are several problems with the current method. First, there is significant variability in replicate measurements of the same sample. I believe this stems from problems with the dishes absorbing water from air, even after careful drying in an oven and storage of the crucibles in a desiccator. This problem is also observed in "blank" samples; large negative readings may be obtained due to inconsistent loss of water from the dishes. Careful attention to detail during analysis does reduce this error, but analyses will often have to be repeated due to quality control (QC) failures even by an experienced analyst.

I propose to change to measurement of TDS through conductivity. This is allowed in Standard Method 2510. Specifically, the method states that it may be used to:

> "Estimate total dissolved solids (mg/L) in a sample by multiplying conductivity (in micromhos per centimeter) by an empirical factor. This factor may vary from 0.55 to 0.9, depending on the soluble components of the water and on the temperature of measurement. Relatively high factors may be required for saline or boiler waters, whereas lower factors may apply where considerable hydroxide or free acid is present. Even though the sample evaporation results in the change of bicarbonate to carbonate, the empirical factor is derived for a comparatively constant water supply by dividing dissolved solids by conductivity."

As TDS measurements in the sample streams generated with RLWTF have been historically rather consistent, these seem to be ideal samples in which to move to conductivity by meter. The meter also has the advantages of being faster, less expensive, and with considerably less exposure of the worker to potentially hazardous or radioactive samples.

Attached are several validation studies we have performed with the meter. The first page is a compilation of several months of Laboratory Control Sample (LCS) readings both by the meter and by the gravimetric method 160.1. The readings by the meter have excellent precision, with a standard deviation of 3.8. This is very impressive, at only 1% of the certified value. There is some bias in the meter method, with the meter reading slightly higher than the certified value of the LCS. This bias is within the parameters allowed by both our internal quality assurance procedures and by EPA standards (80 – 120% recovery). For comparison, the gravimetric LCS determinations have very poor precision, with a pooled standard deviation of 92. This large standard deviation means that the uncertainty on a TDS reading of 300 is 92 at the one sigma level. The average percent recovery is slightly better than the meter at 89%, but several of these batches had to be redone due to QC failure.

We also have compared meter and gravimetric determinations from actual samples from RLWTF over the past four months. These are shown in Attachment two. The reproducibility between the meter and the gravimetric determinations are fairly good, with an average relative percent deviation (RPD) of 11.0%. Again, the average bias of the meter is high, but not as great as in the LCS. This indicates that the empirical conversion factor we are using for these waters is better for the actual samples than it is for the lab control sample.

In summary, I believe there is ample evidence that using the meter is consistent with regulatory requirements, quality assurance requirements, and in the laboratory drivers of reducing costs and increasing worker safety. Please contact me if you wish to discuss this issue further.

TDS Study

By Meter			Standard Method 160.1 (Grav)		
LCS Reading (mg/L)	**True Value (mg/L)**	**% Recovery**	**LCS Reading (mg/L)**	**True Value (mg/L)**	**% Recovery**
394	328	120	364	328	111%
395	328	120	314	328	96%
394	328	120	52	328	16%
394	328	120	364	328	111%
393	328	120	52	328	16%
392	328	120	312	328	95%
395	328	120	394	328	120%
393	328	120	338	328	103%
393	328	120	262	328	80%
393	328	120	344	328	105%
387	328	118	298	328	91%
390	328	119	378	328	115%
389	328	119	308	328	94%
390	328	119	146	328	45%
387	328	118	84	328	26%
392	328	120	166	328	51%
390	328	119	322	328	98%
389	328	119	358	328	109%
388	328	118	316	328	96%
389	328	119	342	328	104%
390	328	119	752	754	100%
392	328	120	558	754	74%
389	328	119	479	430	111%
390	328	119	503	430	117%
389	328	119	418	430	97%
389	328	119	450	430	105%
388	328	118	506	430	118%
389	328	119	466	528	88%
387	328	118	485	528	92%
383	328	117	568	528	108%
383	328	117	511	528	97%
380	328	116	527	528	100%
383	328	117	352	528	67%
391	328	119	567	614	92%
396	328	121	583	614	95%
396	328	121	526	614	86%
394	328	120			
390	328	119		**Pooled**	
Average	**Std Dev**			**Std Dev**	
390.2	**3.76**	**119.0%**		**92.45**	**89.6%**

TDS Study

Date	Sample ID	Meter (mg/L)	Grav 160.1 (mg/L)	RPD
Feb	01.72202	178	176	1.1%
	01.72203	159	38	122.8%
	01.72302	497	474	4.7%
	01.72204	150	160	-6.5%
	01.71305	517	520	-0.6%
	01.71306	497	600	-18.8%
	01.71307	359	294	19.9%
	01.71308	450	370	19.5%
March	01.70309	360	360	0.0%
	01.71310	316	296	6.5%
	01.71311	329	308	6.6%
	01.71313	396	476	-18.3%
April	01.71314	410	452	-9.7%
	01.71315	268	254	5.4%
	01.71316	476	454	4.7%
	01.71317	313	256	20.0%
May	01.71318	366	314	15.3%
	01.71319	431	418	3.1%
	01.71320	474	412	14.0%
	01.72303	312	238	26.9%
	01.72304	381	282	29.9%
	01.72105	553	390	34.6%
	01.72205	154	170	-9.9%
	01.72305	431	468	-8.2%
			average RPD =	**11.0%**

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: July 25, 2001
In Reply Refer To: ESH-18/WQ&H:01-259
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, SECOND QUARTER, 2001

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period from April 1 through June 30, 2001. 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 and a status report on RLWTF operations.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells on May 24, 2001. All of the analytical results from MCO-3, MCO-6, MCO-4B, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of a fluoride result at MCO-7 of 1.74 mg/L (NM WQCC Regulation 3103 standard for fluoride is 1.6 mg/L).

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the second quarter 2001 were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrates in the RLWTF's effluent was 4.56 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the second quarter 2001 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 8.5 mg/L, 1.8 mg/L, and 5.09 mg/L.

During your June 11, 2001, tour of the RLWTF, you learned that the Nitric Acid Recycling System (NARS) at TA-55 was recently placed into service. However, I did not provide you with the actual start-up date. Please be informed that NARS became fully operational on March 1, 2001.

Please contact me at 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Attachments: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas, w/att.
E. Spencer, USEPA, Region 6, Dallas, Texas, w/att.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/att.,
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, New Mexico, w/att.,
J. Bearzi, NMED/HRMB, Santa Fe, New Mexico, w/att.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/att.,
J. Vozella, DOE/LAAO, w/att., MS A316
M. Johansen, DOE/LAAO, w/att., MS A316
T. Gunderson, DLDOPS, w/att., MS A100
D. Erickson, ESH-DO, w/att., MS K491
L. McAtee, ESH-DO, w/att., MS K491
S. Rae, ESH-18, w/att., MS K497
D. Rogers, ESH-18, w/att., MS K497
M. Saladen, ESH-18, w/att., MS K497
T. Stanford, FWO-DO, w/att., MS K492
B. Ramsey, FWO-DO, w/att., MS K492
D. Mclain, FWO-WFM, w/att., MS J593
R. Alexander, FWO-WFM, w/att., MS E518
D. Moss, FWO-WFM, w/att., MS E518
P. Worland, FWO-WFM, w/att., MS E518
D. Woitte, LC/GL, w/att., MS A187
S. Schreiber, NMT-2, w/att., MS E511
WQ&H File, w/att., MS K497
IM-5, w/att., MS A150

:01552

Table 1.0. Analytical Results, Mortandad Canyon Alluvial Monitoring Wells, 2nd Quarter, 2001.

	Sample Date: May 24, 2001				
Sampling Location	**NO3-N (mg/L)**	**TKN (mg/L)**	**NH3 (mg/L)**	**TDS (mg/L)**	**F (mg/L)**
MCO-3	2.72	1.05	<0.05	350	0.71
MCO-4B	4.22	0.51	<0.05	312	1.07
MCO-6	4.64	0.48	<0.05	313	1.44
MCO-6 duplicate	4.46	0.47	<0.05	314	1.51
MCO-7	6.88	0.43	<0.05	326	1.74
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*

:01553

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 2nd Quarter, 2001.

Monitoring Period	RLWTF Weekly Effluent Monitoring Analytical Results		
	NO3-N (mg/L)	F (mg/L)	TDS (mg/L)
APRIL	4.8	0.81	476
	4.8	0.64	452
	2.3	0.49	254
	3.6	0.73	454
	3.3	0.38	256
MAY	4.26	0.57	314
	5.61	0.99	418
	4.34	1.19	390
	2.69	0.74	374
JUNE	3.96	0.86	492
	7.53	0.26	426
	7.47	0.76	468
	5.60	1.12	526
2nd Quarter 2001 Averages (mg/L)	**4.56**	**0.73**	**408**
NM WQCC 3103 Ground Water Standards (mg/L)	*10*	*1.6*	*1000*

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: September 17, 2001
In Reply Refer To: ESH-18/WQ&H:01-312
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SEP 2? 2001
GROUND WATER BUREAU

SUBJECT: WITHDRAWAL OF REQUEST FOR CHANGE IN PROCEDURE, TOTAL DISSOLVED DETERMINATION

Dear Ms. Bustamante:

On July 23, 2001, the Laboratory sent you a letter (attached) requesting your permission to change the procedure used to determine the concentration of Total Dissolved Solids (TDS) in the Radioactive Liquid Waste Treatment Facility's (RLWTF) effluent. The letter requested a change from the current gravimetric method to a new method using conductivity (meter). Shortly after submitting this request, the Laboratory's Analytical Chemistry Sciences Group announced that it was no longer able to perform analytical work. As a result, beginning in August 2001, all compliance samples for the RLWTF's Ground Water Discharge Plan DP-1132 will be submitted to General Engineering Laboratories (GEL), Inc., Charleston, SC. Since GEL will measure TDS using the EPA-approved gravimetric method, the Laboratory wishes to withdraw the July 23, 2001, request referenced above.

I regret any inconvenience that this withdrawal may have caused you. Please contact me at (505) 667-7969 if you have any questions or concerns regarding this matter.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

01555

Enclosures: a/s

Cy: K. Agogino, DOE/ABQ, Albuquerque, New Mexico, w/enc.
J. Vozella, DOE/LAAO, w/enc., MS A316
T. Gunderson, DLDOPS, w/enc., MS A100
D. Erickson, ESH-DO, w/enc., MS K491
L. McAtee, ESH-DO, w/enc., MS K491
D. McLain, FWO-WFM, w/enc., MS J593
R. Alexander, FWO-WFM, w/enc., MS E518
D. Moss, FWO-WFM, w/enc., MS E518
P. Worland, FWO-WFM, w/enc., MS E518
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: July 23, 2001
In Reply Refer To: ESH-18/WQ&H:01-250
Mail Stop: K497
Telephone: (505) 667-7969

SEP 2? 2001
GROUND WATER BUREAU

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: REQUEST FOR CHANGE IN PROCEDURE, TOTAL DISSOLVED DETERMINATION

Dear Ms. Bustamante:

Under Ground Water Discharge Plan DP-1132 for the Radioactive Liquid Waste Treatment Facility (RLWTF), Los Alamos National Laboratory (Laboratory) routinely monitors for Total Dissolved Solids (TDS) in the RLWTF's effluent. Currently, the Laboratory analyzes for TDS using EPA Method 160.1, a gravimetric method that evaporates the sample, dries it in an oven, and then weighs the resulting residue. The Laboratory requests NMED's permission to change from the gravimetric method (EPA 160.1) to measurement of TDS through conductivity (meter). Please find the enclosed memo from Eva R. Birnbaum of the Laboratory's Analytical Chemistry Sciences Group. Ms. Birnbaum's memo describes in detail the rationale for the proposed change. This proposed change would apply to all TDS measurements made on the RLWTF's effluent. As a quality assurance measure, all TDS measurements equal to or greater than 800 mg/L would be confirmed using the gravimetric method.

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

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

01557

Enclosures: a/s

Cy: J. Vozella, DOE/LAAO, w/enc., MS A316
M. Johansen, DOE/LAAO, w/enc., MS A316
T. Gunderson, DLDOPS, w/enc., MS A100
D. Erickson, ESH-DO, w/enc., MS K491
L. McAtee, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
D. McLain, FWO-WFM, w/enc., MS J593
R. Alexander, FWO-WFM, w/enc., MS E518
D. Moss, FWO-WFM, w/enc., MS E518
P. Worland, FWO-WFM, w/enc., MS E518
E. Birnbaum, C-ACS, w/enc., MS E518
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

Los Alamos
NATIONAL LABORATORY
memorandum
CHEMISTRY

C-ACS, MS E518
667-3269, FAX 665-5982
Los Alamos, New Mexico 87545

To/MS: Bob Beers, MS K497
To/cc: Peter Lindahl, MS K494
From/MS: Eva R. Birnbaum, C-ACS, MS E518
Phone/FAX: 7-7538/5-6561
Date: 6/13/01

SEP 2 0 2001
GROUND WATER BUREAU

Request for Change in Procedure for Total Dissolved Solids Determination

I would like to formally request to change the procedure by which we determine Total Dissolved Solids (TDS) in water samples related to discharges at Los Alamos National Laboratory. Currently, we analyze TDS by EPA Method 160.1, which involves evaporating a water sample, drying it in an oven at 180 degrees C, and weighing the resulting residue. This is the only allowed procedure that I have found in searching EPA sources and in Standard Methods (method 2450 C).

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I propose to change to measurement of TDS through conductivity. This is allowed in Standard Method 2510. Specifically, the method states that it may be used to:

> "Estimate total dissolved solids (mg/L) in a sample by multiplying conductivity (in micromhos per centimeter) by an empirical factor. This factor may vary from 0.55 to 0.9, depending on the soluble components of the water and on the temperature of measurement. Relatively high factors may be required for saline or boiler waters, whereas lower factors may apply where considerable hydroxide or free acid is present. Even though the sample evaporation results in the change of bicarbonate to carbonate, the empirical factor is derived for a comparatively constant water supply by dividing dissolved solids by conductivity."

As TDS measurements in the sample streams generated with RLWTF have been historically rather consistent, these seem to be ideal samples in which to move to conductivity by meter. The meter also has the advantages of being faster, less expensive, and with considerably less exposure of the worker to potentially hazardous or radioactive samples.

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In summary, I believe there is ample evidence that using the meter is consistent with regulatory requirements, quality assurance requirements, and in the laboratory drivers of reducing costs and increasing worker safety. Please contact me if you wish to discuss this issue further.

TDS Study

By Meter			Standard Method 160.1 (Grav)		
LCS Reading (mg/L)	True Value (mg/L)	% Recovery	LCS Reading (mg/L)	True Value (mg/L)	% Recovery
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391	328	119	567	614	92%
396	328	121	583	614	95%
396	328	121	526	614	86%
394	328	120			
390	328	119			
Average	**Std Dev**			**Pooled Std Dev**	
390.2	**3.76**	**119.0%**		**92.45**	**89.6%**

TDS Study

Date	Sample ID	Meter (mg/L)	Grav 160.1 (mg/L)	RPD
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	01.71320	474	412	14.0%
	01.72303	312	238	26.9%
	01.72304	381	282	29.9%
	01.72105	553	390	34.6%
	01.72205	154	170	-9.9%
	01.72305	431	468	-8.2%
			average RPD =	**11.0%**

:01561

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: October 29, 2001
In Reply Refer To: ESH-18/WQ&H:01-363
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

OCT 31 2001
GROUND WATER BUREAU

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, THIRD QUARTER, 2001

Dear Ms. Bustamante:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period July 1 through September 30, 2001. 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.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells on September 7, 2001. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of a fluoride result from MCO-7 of 1.61 mg/L (NM WQCC Regulation 3103 standard for fluoride is 1.6 mg/L). No sample was collected from alluvial well MCO-4B because there was not sufficient water in the well. Please note that the analytical holding times for all TDS and fluoride samples were missed due to shipping delays incurred after September 11, 2001.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the third quarter were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrates in the RLWTF's effluent was 5.41 mg/L.

In a September 17, 2001, letter I reported to you that the Laboratory was changing to a new analytical laboratory (ESH-18/WQ&H: 01-312) for all DP-1132 analyses. Beginning in late August 2001, all weekly composite samples were shipped to General Engineering Laboratories (GEL), Inc., Charleston, South Carolina, for nitrate/nitrite, TDS, and F analysis. Information regarding GEL's performance and certifications are available upon your request. This change was necessary due to reorganization of the Laboratory's Chemistry Division and, as a result, a downsizing of environmental analytical services.

In addition to weekly composite sampling, the RLWTF also conducts operational screening (using a HACH Kit) for nitrates (NO3-N) in each batch of effluent. Operational screening of effluent samples collected during the third quarter 2001 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 9.8 mg/L, 1.8 mg/L, and 6.2 mg/L.

Please contact me at (505) 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tml

Attachments: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas, w/att.
E. Spencer, USEPA, Region 6, Dallas, Texas, w/att.
J. Bearzi, NMED HRMB, Santa Fe, New Mexico, w/att.
J. Davis, NMED-SWQB, Santa Fe, New Mexico, w/att.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
J. Vozella, DOE/LAAO, w/att., MS A316
K. Agogino, DOE/LAAO, w/att., MS A316
J. Holt, ADO, w/att., MS A104
T. Stanford, FWO-DO, w/att., MS K492
B. Ramsey, FWO-DO, w/att., MS K492
D. Mclain, FWO-WFM, w/att., MS J593
R. Alexander, FWO-WFM, w/att., MS E518
D. Moss, FWO-WFM, w/att., MS E518
P. Worland, FWO-WFM, w/att., MS E518
L. McAtee, ESH-DO, w/att., MS K491
P. Thullen, ESH-DO, w/att., MS K491
D. Stavert, ESH-DO, w/att., MS K491
S. Rae, ESH-18, w/att., MS K497
D. Rogers, ESH-18, w/att., MS K497
M. Saladen, ESH-18, w/att., MS K497
WQ&H File, w/att., MS K497
IM-5, w/att., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Wells Analytical Results (mg/L), 3rd Quarter, 2001.

	Sample Date: September 7, 2001				
Sampling Location	**NO3-N**	**TKN**	**NH3**	**TDS**	**F**
MCO-3	3.06	0.280	<0.0235	347[1]	0.667[1]
MCO-3 lab duplicate	3.06	0.240	<0.0235	336[1]	0.657[1]
MCO-4B	NS	NS	NS	NS	NS
MCO-6	4.02	0.310	<0.0235	319[1]	1.22[1]
MCO-7	5.37	0.220	<0.0235	308[1]	1.61[1]
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*

Notes:
[1]Holding times were missed for these samples due to shipping delays incurred after September 11, 2001.
NS means that no sample was collected at this well.
All units: mg/L

:01565

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 3rd Quarter, 2001.

Monitoring Period	Sample Date	Analytical Laboratory	RLWTF Weekly Effluent Monitoring Analytical Results (mg/L)		
			NO3/NO2 (as-N)	Fluoride	TDS
JULY	7/1/01	C-ACS	3.9	1.06	404
	7/8/01	C-ACS	5.2	0.98	426
	7/15/01	C-ACS	3.7	0.65	384
	7/22/01	C-ACS	5.1	0.67	350
	7/29/01	C-ACS	5.6	1.25	476
AUGUST	8/5/01	C-ACS	6.1	0.87	498
	8/12/01	C-ACS	6.3	0.63	290
	8/19/01	C-ACS	7.5	0.78	384
	8/23/01	GEL	6.7	NA	481
	8/26/01	C-ACS	4.8	0.85	328
	8/28/01	GEL	4.4	0.729	356
SEPTEMBER	9/4/01	GEL	3.3	0.712	486
	9/12/01	GEL	6.6	1.46	880
	9/19/01	GEL	6.5	0.957	531
	9/26/01	GEL	results pending	results pending	results pending
3rd Quarter Averages (mg/L)			**5.41**	**0.89**	**448**
NM WQCC 3103 Ground Water Standards (mg/L)			*10*	*1.6*	*1000*

Notes:

C-ACS means Los Alamos National Laboratory's Chemistry Division-Analytical Chemistry Sciences Group

GEL means the General Engineering Laboratory, Charleston, South Carolina.

:01566

The Radioactive Liquid Waste Treatment Facility at Los Alamos National Laboratory November 2001

Technical Area-50
Building 01

TA-50 RLW Treatment Facility

- Operating since 1963
- Additions in 1966, 1984, and 1999
- 55,000 square feet

tank being taken out of svc.

F. K Alexander
Facility Manager
TA-50

100,000 gal.

addnl. tanks

8,000 gpd

Gravity Sewer
Double-lined polyethylene.
Vault w/ leak detection probes
...m 10 ft.

influent includes
...chem. lab waste

M-F Batch runs

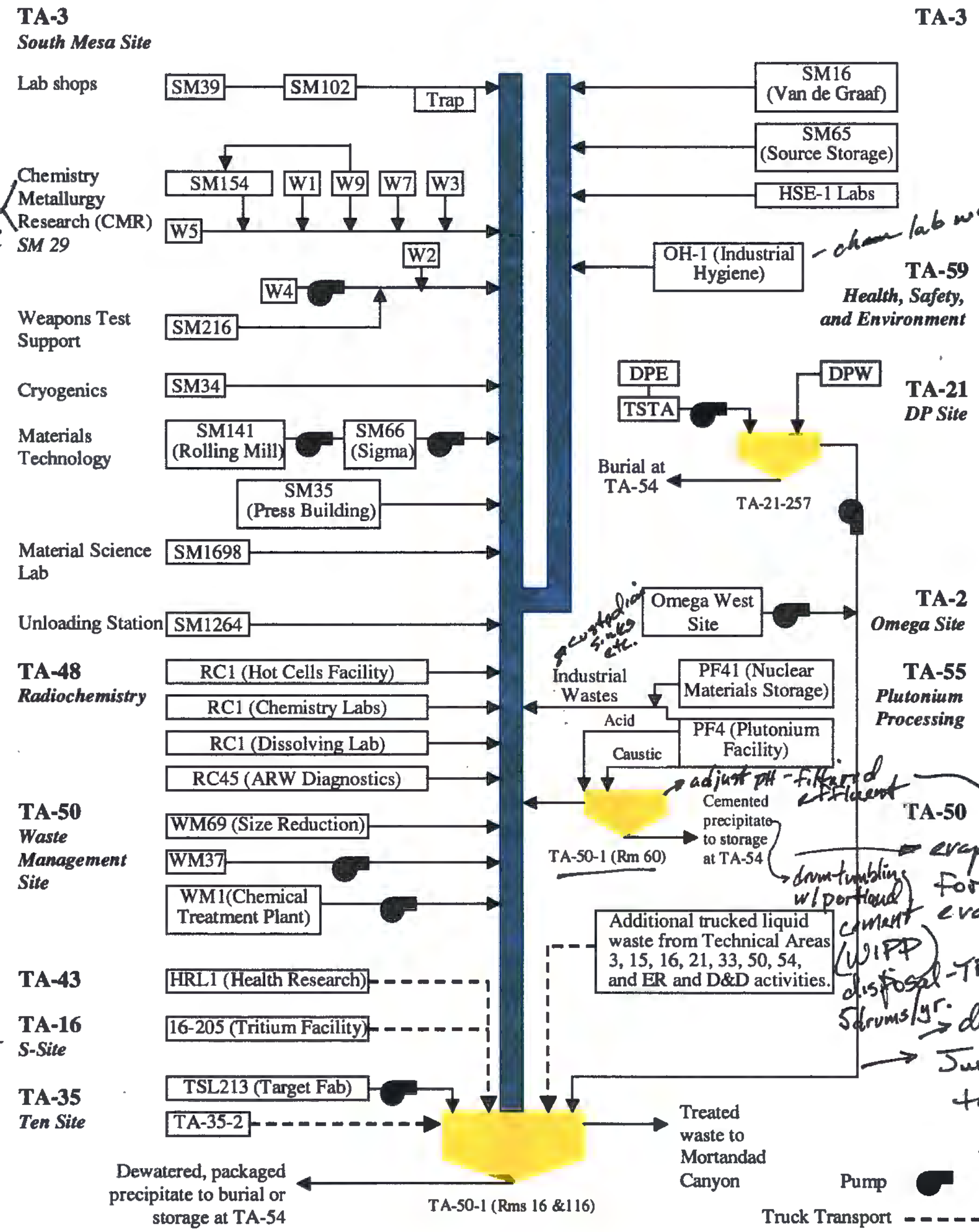
Plan:
new storage tanks
+ treatment process

015568

Radioactive Liquid Waste Collection System

76 cubic meters/day

20,000 cubic meters/year



high vol. lab waste

chem lab waste / samples

medical isotopes

cleaning wastewater

custodial sinks etc.

cleaning wastewater

adjust pH - filtered effluent

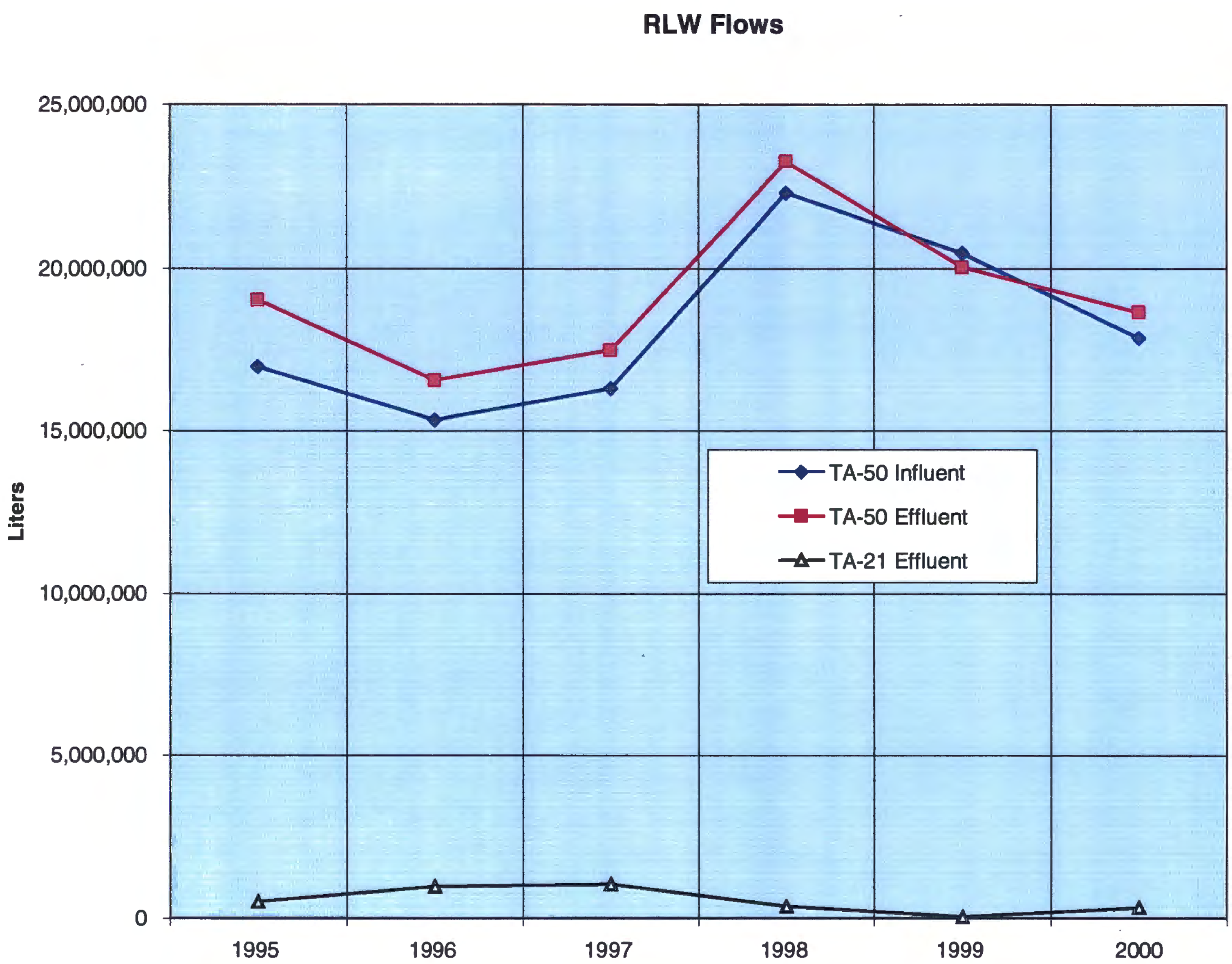
evaporator - treatise for tritium evap. lagoons

drum-tumbling w/ portland cement (WIPP) disposal - TRU 5 drums/yr.

drained to plant

June 1 - line taken out of svc. 16,000 gallons drained, use to flush cross-country line - contained tritium

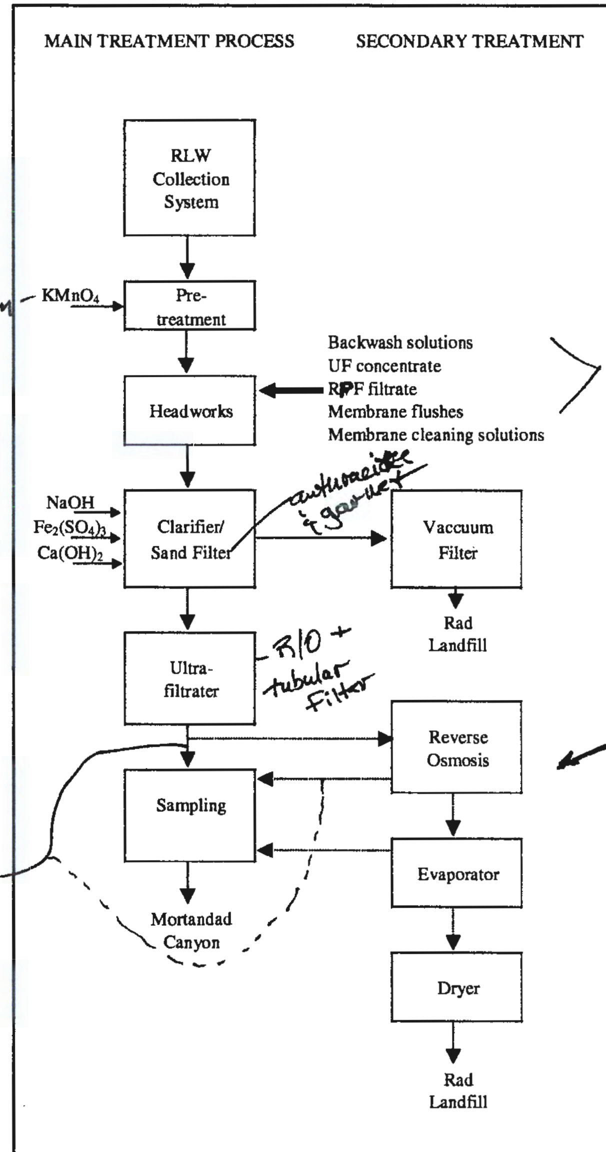
Nitric acid wastes - containerized shipped offsite for disposal


RLW Flows
Liters
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
1995
1996
1997
1998
1999
2000
TA-50 Influent
TA-50 Effluent
TA-21 Effluent

W. David Moss

RLW Process Flow Diagram

- Main Process: Three treatment steps
- Secondary Waste Streams:
  Treatment as Required



10 ppm

recirculation

anthracite & garnet

R/O + tubular filter

does not precipitate out
Pu 238 - heat source
Pu 239 - weapons

use R/O if: NO3 > 10 mg/l
Radionuclides, > 30 picocuries (DOE limit)
Fl & TDS also

7.1 pico curies per liter (avg.)

(new) ion exchange system (perchlorate removal)
March 31 goes on-line

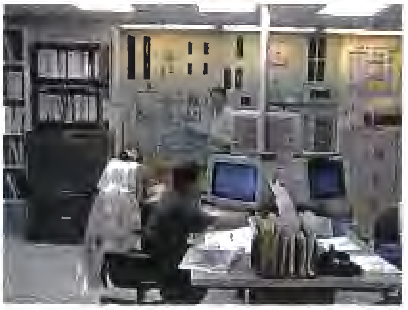
Run TCLP

*Cat. 3 (non-reactor) Nuclear Facility

TA-54 - landfills dried solids < 100 nano curies

Computer Control / SCADA

- Conversion from G2 to RS View operation/control system
- Remote monitoring and control



Clarifier/Sand Filter

- Conventional water treatment process
- Ferric sulfate + caustic soda addition
- Multimedia sand filter (quartz + anthracite)
- 200 sludge drums/year (42 cubic meters/year)

Tubular Ultrafilter

- Processing rate: 55 -60 gpm (12.5 cmh)
- Feed: clarifier/sand filter effluent
- Effluent quite often dischargeable
- ~~300~~ 350 tubular ultrafilter membranes

.08um pore size

Reverse Osmosis Unit

- Processing rate: 70 gpm (15.8 cmh)
- Feed: TUF permeate
- 2 stage (2:1 array)
- 90% water recovery
- Batch operation
- Silica management

70 ppb silica (background)

All filtration systems cleaned/backflushed daily

Clean-in-Place Skid

- Cleaning skid for tubular ultrafilter, centrifugal ultrafilter, and reverse osmosis units.

Evaporator

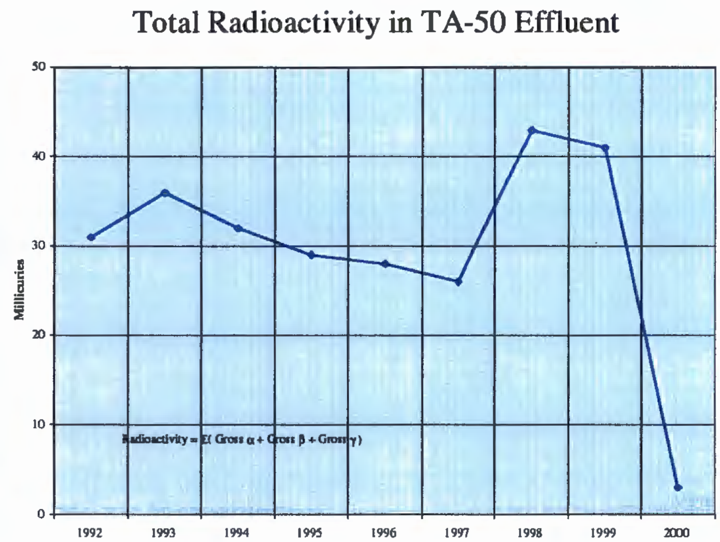
- Processing rate: 7 gpm (1.6 cmh)
- Feed: EDR concentrate
- 4 time volume reduction
- “Bottoms” to offsite location for evaporation to dryness
- Distillate to outfall

Discharge Limits for the RLWTF

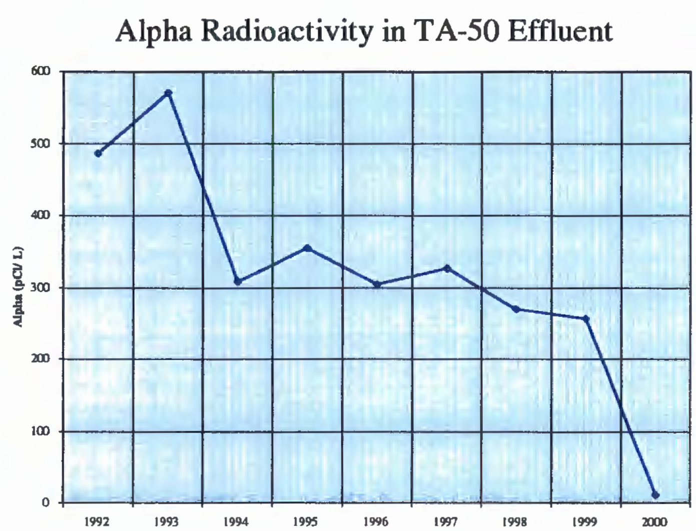
Parameter	Conc. Units	NMED [b]	NMED [c,d]	EPA [e]
Conventional:				
Ammonia (as N)	mg/L	---	---	---
Flow	---	---	---	---
pH	---	6-9	---	6-9
COD	mg/L	---	---	125
Total Nitrogen	mg/L	---	---	---
TDS	mg/L	1,000	---	---
Total residual chlorine	µg/L	---	11	---
TSS	mg/L	---	---	30
Metals:				
Aluminum	µg/L	5,000	5,000	5,000
Arsenic	µg/L	100	200	368
Barium	µg/L	1,000	---	---
Boron	µg/L	750	5,000	5,000
Cadmium	µg/L	10	50	50
Chromium	µg/L	50	1,000	1,340
Cobalt	µg/L	50	1,000	1,000
Copper	µg/L	1,000	500	1,393
Iron	µg/L	1,000	---	---
Lead	µg/L	50	100	423
Manganese	µg/L	200	---	---
Mercury	µg/L	2	0.77	0.77
Molybedenum	µg/L	1,000	---	---
Nickel	µg/L	200	---	f
Selenium	µg/L	50	5	5
Silver	µg/L	50	---	---
Uranium	µg/L	5,000	---	---
Vanadium	µg/L	---	100	100
Zinc	µg/L	10,000	25,000	4,370

Parameter	Conc. Units	NMED [c]	NMED [d,e]	EPA [e]
Anions:				
Chloride	mg/L	250	---	---
Cyanide	mg/L	0.2	5.2	---
Fluoride	mg/L	1.6	---	---
Nitrate-Nitrogen	mg/L	10	---	---
Perchlorate	µg/L	---	---	f
Sulfate	mg/L	600	---	---
Rad:				
Americium-241 (g)	pCi/L	---	---	30.0
Plutonium-238 (g)	pCi/L	---	---	40.0
Plutonium-239 (g)	pCi/L	---	---	30.0
Radium (226+228)	pCi/L	30.0	30.0	30.0
Tritium - accelerator	nCi/L	20.0	20.0	20.0
Tritium - reactor (g)	nCi/L	---	---	3,000
Organics:				
Phenols	µg/L	5	---	---
Total DDT and metabolites	µg/L	---	0.001	---
Total PCBs	µg/L	---	0.014	---
Total Toxic Organics	µg/L	---	---	1,000
Nineteen others	µg/L	h	---	---
Total No. of Regulated Parameters		46	19	23
No. of Parameters for RLWTF		3	0	22

a: Shaded cells indicate RLWTF discharge standards.
b: Groundwater standards (20 NMAC 6.2.3103)
c: Livestock watering standards (20 NMAC 6.4.900K)
d: Wildlife habitata standards (20 NMAC 6.4.900L)
e: NPDES permit dated 12/29/00.
f: Report only.
g: DOE Order 5400.5
h: Ranging from 750 to 0.1 µg/L.



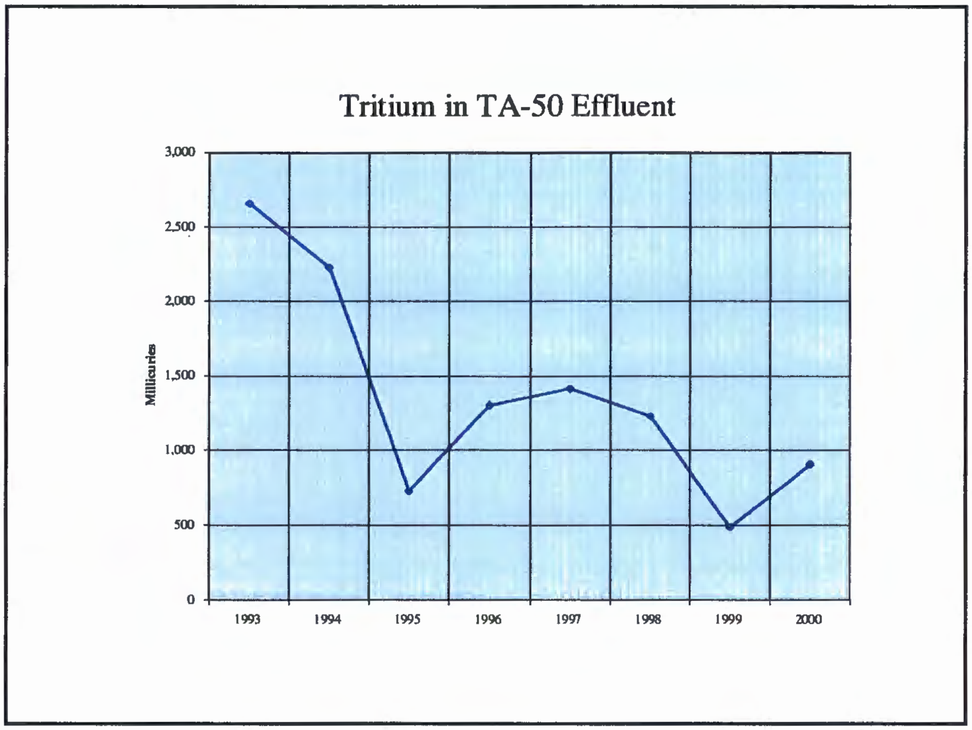
Total Radioactivity in TA-50 Effluent
Millicuries
50
40
30
20
10
0
Radioactivity = Σ(Gross α + Gross β + Gross γ)
1992
1993
1994
1995
1996
1997
1998
1999
2000



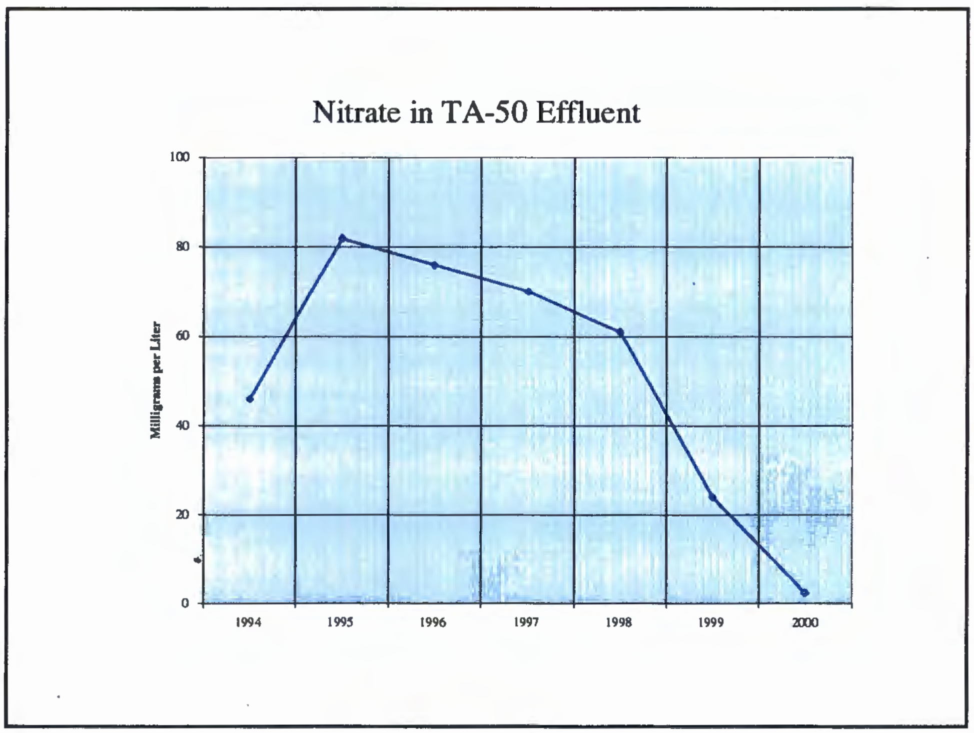
Alpha Radioactivity in TA-50 Effluent
Alpha (pCi/ L)
600
500
400
300
200
100
0
1992
1993
1994
1995
1996
1997
1998
1999
2000

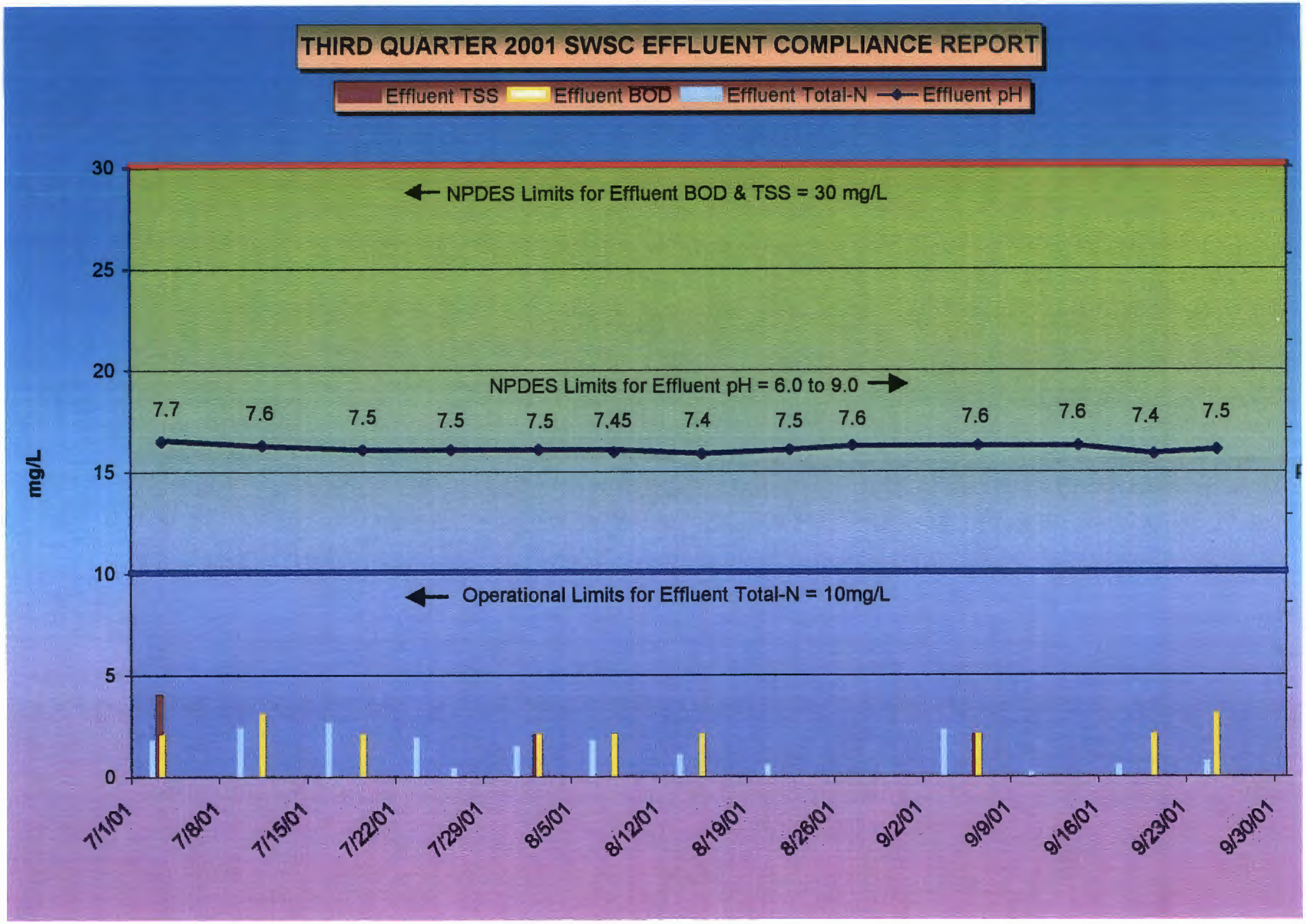
:01576

Tritium in TA-50 Effluent



Nitrate in TA-50 Effluent





THIRD QUARTER 2001 SWSC EFFLUENT COMPLIANCE REPORT
Effluent TSS
Effluent BOD
Effluent Total-N
Effluent pH
mg/L
30
25
20
15
10
5
0
NPDES Limits for Effluent BOD & TSS = 30 mg/L
NPDES Limits for Effluent pH = 6.0 to 9.0
7.7
7.6
7.5
7.5
7.5
7.45
7.4
7.5
7.6
7.6
7.6
7.4
7.5
Operational Limits for Effluent Total-N = 10mg/L
7/1/01
7/8/01
7/15/01
7/22/01
7/29/01
8/5/01
8/12/01
8/19/01
8/26/01
9/2/01
9/9/01
9/16/01
9/23/01
9/30/01

01578

62S[illegible]

RADIOACTIVE LIQUID WASTE
EFFLUENT TANK DISCHARGE ANALYTICAL & APPROVAL FORM

Sample Date: ________________ Sample Time: ________________

Tank: ________________ Sampled By: ________________

Comments ____

____

Analysis	results/units	date	time	analyst	method	comment	Regulatory Limits mon. avg.	Regulatory Limits daily max
pH							N/A	6-9 units (NPDES)
Gross Alpha							N/A	30 pCi/L*
Mercury							0.77µg/l	0.77µg/l
COD							125 mg/l	125 mg/l
TSS							30 mg/l	45 mg/l
TDS							N/A	1,000 mg/l (GWCP)
Tritium							20,000 pCi/l or 20 nCi/l #	20,000 pCi/l or 20 nCi/l #
Nitrate as Nitrogen							N/A	10 mg/l (GWCP)
Zinc							4.37 mg/l	8.75 mg/l

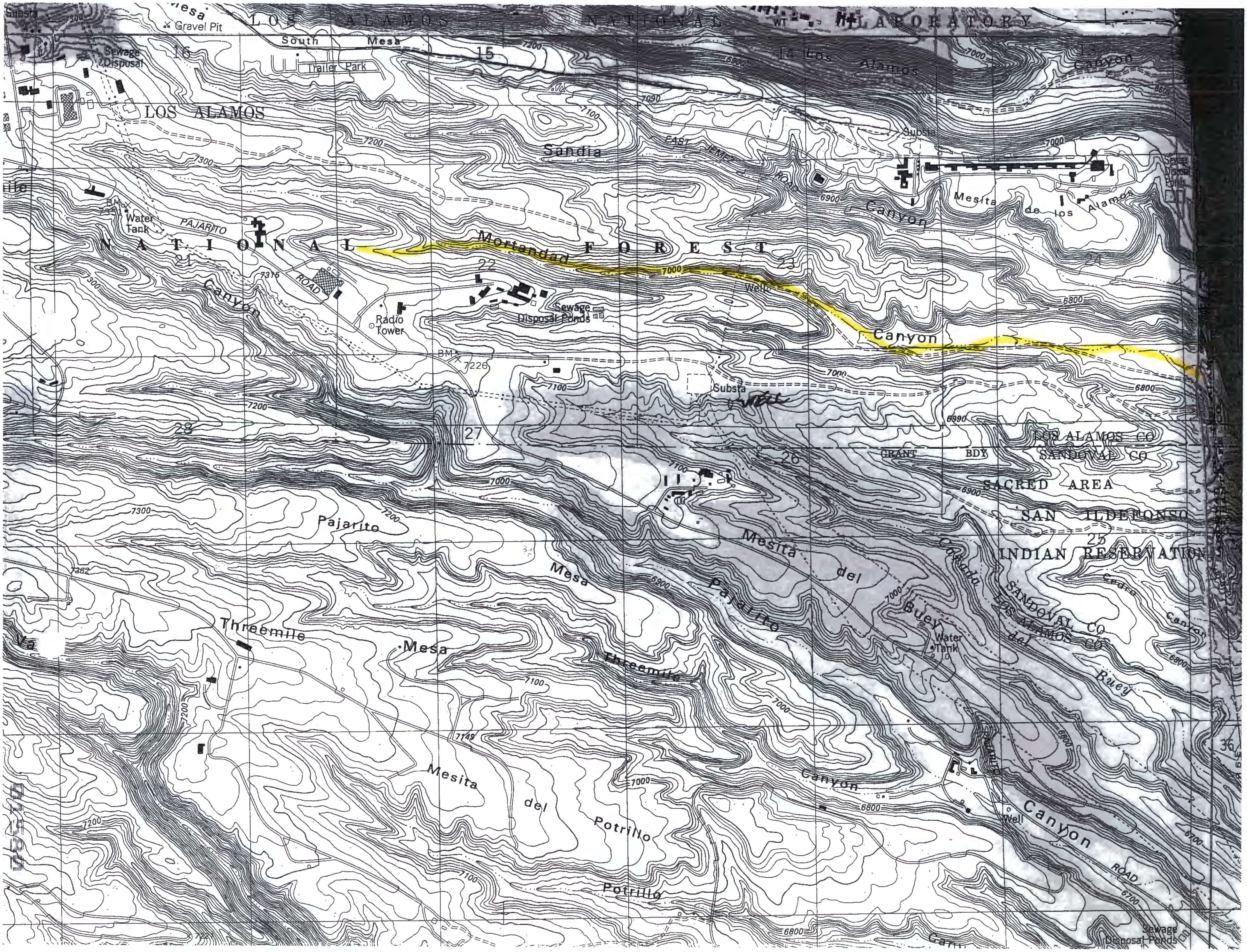
Approval Signatures for Discharge:
(Both signatures required for discharge)

Operations: ________________ Date: ________________
(manager or designee)

FMU: ________________ Date: ________________
(manager or designee)

\# Accelerator produced Tritium
* To meet DCG-Derived Concentration Guidelines (DOE) limits.
GWCP- Ground Water Control Parameter
NPDES – National Pollution Discharge Elimination System

Form Approval *[signature]* Date: 3-27-01


LOS ALAMOS NATIONAL LABORATORY
Gravel Pit
South Mesa
Trailer Park
Sewage Disposal
LOS ALAMOS
Los Alamos Canyon
Sandia Canyon
EAST JEMEZ ROAD
Substa
Mesita de los Alamos
Water Tank
PAJARITO ROAD
NATIONAL FOREST
Mortandad Canyon
Radio Tower
Sewage Disposal Ponds
Well
Substa
LOS ALAMOS CO
SANDOVAL CO
GRANT BDY
SACRED AREA
SAN ILDEFONSO
INDIAN RESERVATION
Pajarito Canyon
Pajarito Mesa
Mesita del Pajarito
Cañada del Buey
Water Tank
Threemile Mesa
Threemile Canyon
Mesita del Potrillo
Potrillo Canyon
Cedro Canyon
Canyon ROAD
Sewage Disposal Ponds

EXTENT OF SATURATION IN MORTANDAD CANYON

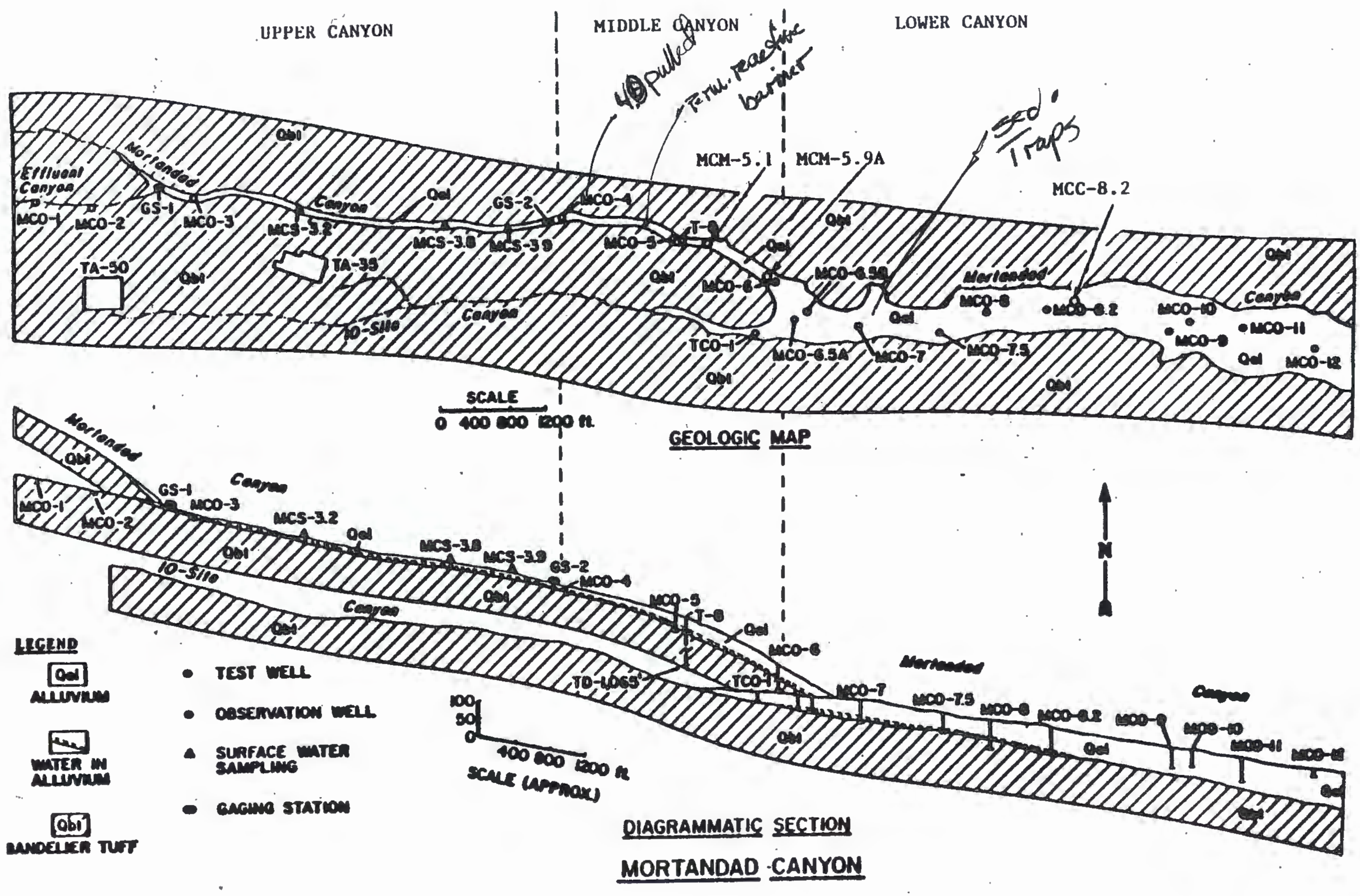
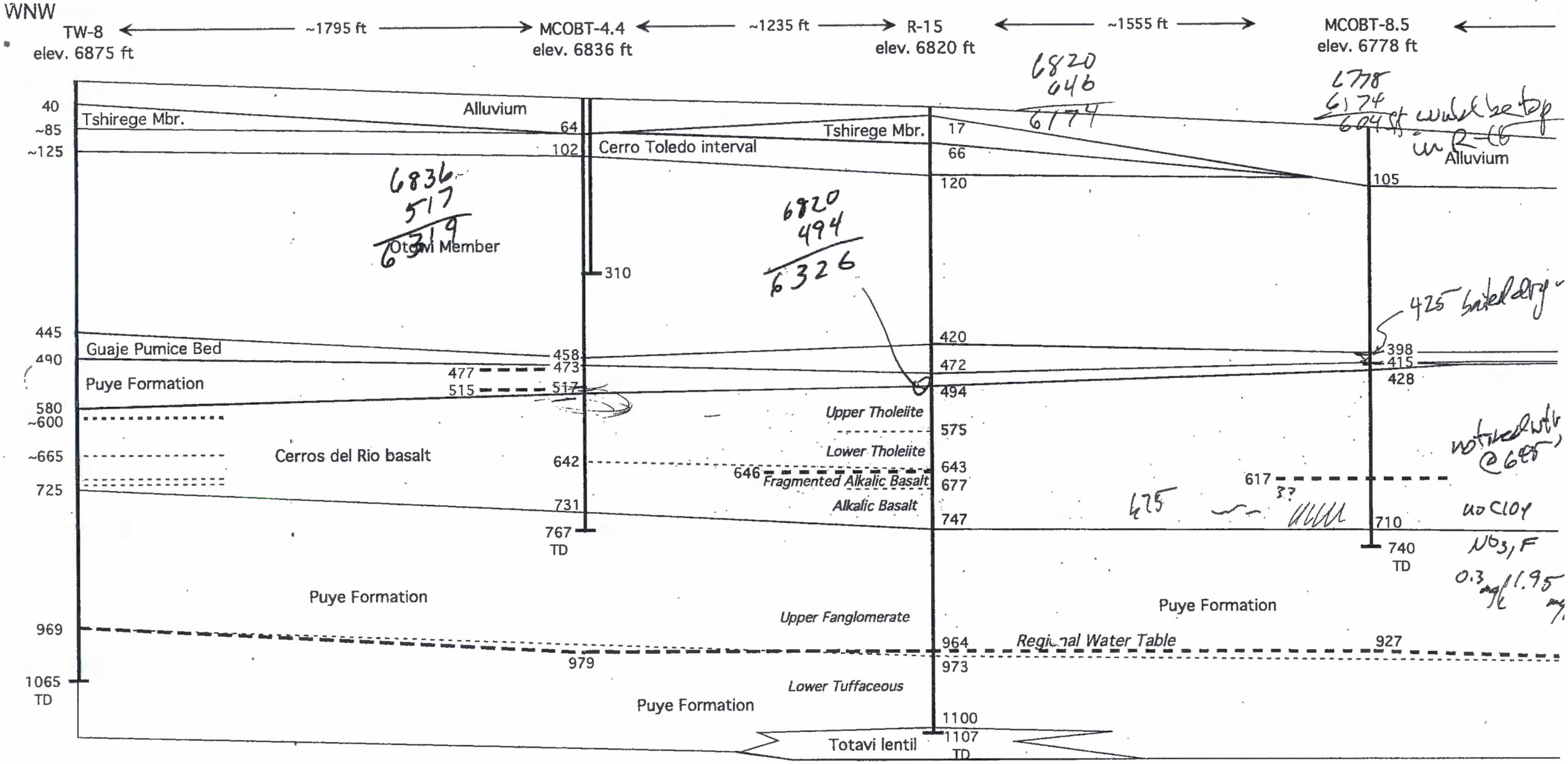


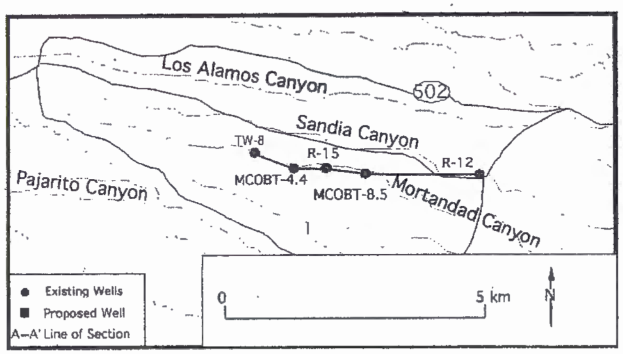
Fig. 3-3

6125181



Vertical Exaggeration = 2X
All footages in feet.

- - - - - - - - - - *Perched Water Table*



01582

:01583

AGENDA

New Mexico Environment Department-Ground Water Quality Bureau Tour

Tuesday, November 13, 2001

Attendees

NMED-GWQB: Phyllis Bustamante (827-0166)
Curt Frischkorn (827-0078)

NM Toxics Coalition: Coila Ash (982-2609)

LANL Tour POC: Bob Beers, ESH-18 (667-7969)

Time	Location	Tour Guide
9:00	Meet at ESH-18 Conference Room (TA-59 Bldg 117)	Bob Beers
9:15	Mortandad Canyon, NPDES Outfall 051	Rick Alexander
9:45	RLWTF, TA-50 Bldg 01 Conference Room	Rick Alexander
11:00	Driving tour of Lower Mortandad Canyon	David Rogers
12:30	Lunch, Otowi Cafeteria	Bob Beers
1:15	NPDES Outfalls 001 and 03A027, Sandia Canyon	Bob Beers
2:00	TA-46 SWS Facility	Ramiro Marquez
3:15	TA-61/53 Sludge Land Application Site	Bob Beers
3:45	Close-Out Meeting, ESH-18 Conference Room	Bob Beers
4:30	End of Tour	

Field Trip Report
Ground Water Pollution Prevention Section

Date: November 13, 2001

Inspector (s)
Curt Frischkorn
Phyllis Bustamante

Facility

Facility Name: LANL-RLWTF (TA-50) Contact: Bob Beers
Location: TA-50
Discharge Plan Number: DP- 1132 UIC Related? Yes (No)
Type of Operation: Radio-Active Liquid Waste Treatment Facility

Inspection Summary

Purpose:
(a.) Evaluation of Proposed Discharge Plan
b. Compliance Inspection (Complete Checklist o Reverse Side)
(c.) Other (Specify): Familiarize myself with facility.

Activities

a. Inspection of Facilities or Construction (specify): Treatment system consists of pretreatment ($KMnO_4$), Clarifier, Sand Filter (recirc.) w/anthracite & garnet, R/O, and Tubular Ultra-Filtration. R/O reject goes to evap. unit, solids landfilled @ TA-54
Flow Measurement: Type: Condition:
↳ Effluent discharged to Mortendad Canyon under an NPDES permit.
b. Effluent Sample (s): (provide sampling location): None

No. of Ponds: N/A No. in Use: N/A Condition of Ponds: N/A
Condition of Pond Liner (s): N/A

c. Ground Water Sample (s) (provide well name and location): None

No. of Monitor Wells: 3 to 5 assoc. w/Mortendad Canyon Well Condition:

d. Other (specify): Divert wastewater to R/O unit if NO_3 > 10mg/l or radio-nuclides > 30 Pci/l (Fl & TDS also) — 7.1 Pci/L avg. Pu238 does not precipitate from solution (heat source)

Observations and Information Obtained

New Ion exchange system goes on-line March 31, 2002.
↳ Perchlorate Removal

Action Required

Respond to issues raised by protestants.
Issue Draft DP approval.

Water Quality Inspection & Sampling Checklist
Reference: Regulation No. HED 86 – 14 (EID)

Entry Conference:

Was facility representative informed of EID's right of entry and authority: (To access records, inspect monitoring equipment or methods and sample effluents under Sections 74-6-9.E of the New Mexico Water Quality Act NMSA 1978)?

Was EID identification presented?

Were other potential or suspected violations which prompted inspections listed?

During the inspection, was the facility representative immediately advised or addition potential violations?

Exit Conference:

Were the preliminary inspection results summarized?

Was the facility representative advised if violations discussed during the entry conference remain under investigation?

Were other potential violations discovered during the inspection discussed?

Was a date provided as to when EID expects to complete consideration of potential violation?

Water Quality Sampling:

Was the facility representative offered a reasonable opportunity to obtain split/replicate samples, perform simultaneous tests, measurements or photographs?

Were copies of EID's results (sampling, testing, photos) requested? If yes, copies must be provided within ten working days after such results are in EID's possession.

Los Alamos National Laboratory

UNIVERSITY OF CALIFORNIA

Environmental Restoration

Environmental Science and Waste Technology (E)
Environmental Restoration, MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

Date: November 26, 2001
Refer to: ER2001-0915

NOV 28 2001

GROUND WATER BUREAU

Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, NM 87505-6303

SUBJECT: NOTIFICATION OF GEOTECHNICAL AND WASTE CHARACTERIZATION SAMPLING AT TECHNICAL AREA 50

Dear Mr. Young:

As discussed during the Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project/New Mexico Environment Department (NMED) monthly meeting on October 24, 2001, geotechnical and waste characterization samples will be collected to determine the feasibility of constructing a new pump house and influent storage tank vault at TA-50. Mobilization is planned for the week of December 10, 2001 with fieldwork to be complete by December 21, 2001. Sample collection is planned to begin on December 15, 2001. Rick Alexander, TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) Operations Team Leader, described the project during the August 20, 2001 NMED/ER Project monthly meeting and a project location map was distributed at that time. The purpose of the project is to replace the existing pump house; increase storage capacity; replace transmission piping with double-contained monitored piping; and provide remote monitoring and control for the pump house and tanks at the TA-50 RLWTF.

The purpose of this sampling effort is to assess the geotechnical parameters necessary for design development and to obtain waste characterization information to evaluate disposal options for soils, which might be excavated during construction of the new pump house and influent storage tank vault. Seven boreholes will be advanced in the proposed footprint of the pump house and tank vault and an eighth borehole will be advanced at the proposed location of a new manhole west of the proposed pump house location. A minimum of three samples will be collected at three depths from each borehole. Samples will be collected from two additional depth intervals from borehole location #2 to be located within the boundary of Potential Release Site (PRS) 50-011(a). The potential impacted area from the proposed construction at TA-50 and proposed borehole locations are illustrated on the figure provided as Enclosure 1. The sampling is summarized in the following table, which indicates the minimum number of samples to be collected:

Plan/Document	Location	Number of Samples	Sample Type	Analyses
1. TA-50 Pump House and Influent Storage Tanks Project Geotechnical Investigation & Waste Characterization Sampling and Analysis Plan	TA-50, PRSs 50-004(c) and 50-011(a)	26	Subsurface soil	VOCs; SVOCs; PCBs/pesticides; TPH; metals; isotopic Am, Pu, and U; Sr-90; and gross alpha, beta and gamma radioactivity

The ER Project will verbally confirm and/or notify NMED Hazardous Waste Bureau staff of any changes to the schedule. If you have any questions or concerns please feel free to give me a call at (505) 667-0819.

Sincerely,

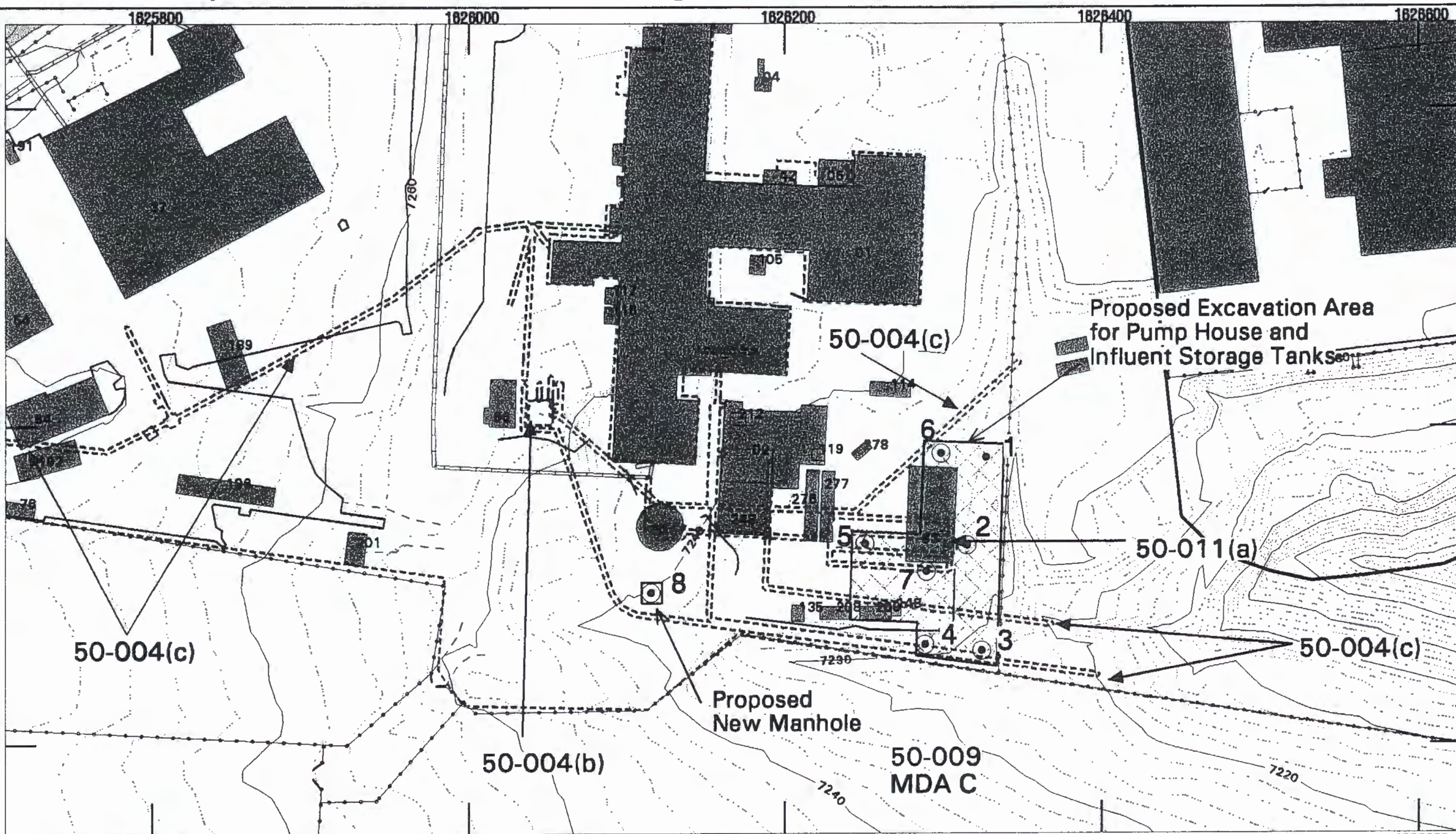
David McInroy
Environmental Restoration Project

DM/PB/ev

Enclosure: Proposed Construction Area and Borehole Locations

Cy: P. Bertino, E/ER, MS M992
J. Canepa, E/ER, MS M992
R. Alexander, FWO-WFM, MS E518
D. McLain, FWO-WFM, MS J593
L. Winn, NMED-HWB
M. Leavitt, NMED-GWQB
D. McInroy, E/ER, MS M992
J. Hopkins, E/ER, MS M992
D. Neleigh, US EPA (2 copies)
J. Pope, E/ER, MS M992
J. Bearzi, NMED-HWB
M. Johansen, LAAO, MS A316
G. Turner, LAAO, MS A316
J. Kieling, NMED-HWB
L. Woodworth, LAAO, MS A316
J. Parker, NMED-DOE OB
S. Yanicak, NMED-DOE OB, MS J993
E/ER File, MS M992
RPF, MS M707

TA-50 Pump House and Influent Storage Tank Project



PRSs 50-001(a), 50-004(b,c), 50-009, 50-011(a)

Fence
PRS Boundary
Road/Trail, Dirt
Road, Paved
TA Boundary
Structure
Proposed Borehole Location

Contour Interval: 2 ft

Scale: 1:1200

0 100 200

FEET

1983 North American Datum
Projection:
New Mexico State Plane Coordinate System, Central Zone (Transverse Mercator)

Notice: Information on this map is provisional and has not been checked for accuracy.

Produced by Marcia Jones

FIMAD G110248 25 Nov 01

06590

ATTACHMENT 7.0

Derived Concentration Guideline (DCG)
Monthly Report

for the

TA-50 Radioactive Liquid Waste Treatment Facility

From:
Los Alamos National Laboratory

To:
U.S. Department of Energy
Los Alamos Area Office

December 7, 2001

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: December 7, 2001
In Reply Refer To: ESH-18/WQ&H:01-404
Mail Stop: K497
Telephone: (505) 665-1859

Mr. Corey Cruz
Acting Area Manager
U.S. Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 87544

Mr. Joseph Vozella
Assistant Area Manager
Office of Environment
U.S. Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 87544

SUBJECT: RADIOACTIVE EFFLUENT QUALITY AT NPDES OUTFALL 051, TA-50, SEPTEMBER 2001

Dear Messrs. Cruz and Vozella:

Enclosed is the monthly monitoring report for NPDES Outfall 051 for radioactive effluent quality data. This report includes the monthly value (monthly average) compared with the DOE Derived Concentration Guideline (DCG) value for each parameter analyzed. The monthly values are equal composites of all discharges that occurred during the month. Please note, this report also includes radioactive influent data for the TA-50 Treatment Facility and percent removal.

There were a total of 19 releases (1,417,700 Liters) to Mortandad Canyon during the monitoring period from the TA-50 Treatment Facility. The monthly composite results were 2.7 pCi/l for Strontium 90 (Sr-90) and 12,000 pCi/l for Tritium. There were no exceedances of DCGs for individual radionuclides during the monitoring period. Additionally, the sum of the fractions for the radionuclides did not exceed the DCG value of 1.

Per your request, we have included the monthly composite results for perchlorate and nitrate with this DCG Report. The monthly composite result for nitrate was 1.5 mg/l. The NM WQCC Regulation 3103 ground water standard for nitrate is 10 mg/l. The monthly composite for perchlorate was 187 ug/l. New Mexico currently does not have a ground water or surface water standard for perchlorate. However, California's drinking water action level for perchlorate is 18 ug/l. Please note, that nitrate and perchlorate results are not radioactive constituents and are being reported separately from the DCG Report.

Please contact me at 665-1859 or Mike Saladen at 665-6085 if additional information would be helpful.

Sincerely,

Steven R. Rae
Group Leader
Water Quality and Hydrology Group

SR:MS/tml

Enclosures: a/s

Cy: J. Parker, NMED/DOE OB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
G. Turner, DOE/LAAO, w/enc., MS A316
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M. Saladen, ESH-18, w/enc., MS K497
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

TA50 -1 EFFLUENT DISCHARGE & REMOVAL for SEPTEMBER, 2001

Issued 4 Dec 2001 6:58:53 a.m.

Species	Guideline as (uCi/ml)	Guideline as (Ci/L)	Effluent (Ci/L)	Eff/Guide Ratio	Exceeded	Influent (Ci/L)	% Removal
Am-241	3.0e-8	30.0e-12	1.7e-12	0.057		3.9e-9	99.956
Cs-137	3.0e-6	3.0e-9	3.6e-11	0.012		7.1e-11	49.296
Pu-238	4.0e-8	40.0e-12	4.0e-12	0.1		2.9e-9	99.862
Pu-239	3.0e-8	30.0e-12	1.1e-12	0.037		820.0e-12	99.866
Sr-89	2.0e-5	20.0e-9	4.8e-12	2.4e-4		9.1e-11	94.725
Sr-90	1.0e-6	1.0e-9	2.7e-12	0.003		5.2e-11	94.808
TRITIUM	0.002	2.0e-6	12.0e-9	0.006			
U-234	5.0e-7	500.0e-12	1.5e-12	0.003		70.0e-12	97.857
U-235	6.0e-7	600.0e-12	5.1e-13	8.5e-4		4.9e-11	98.959
U-238	6.0e-7	600.0e-12	0.73e-12	0.001		36.0e-12	97.972

Sum of Ratios = 0.219

19 discharges in SEPTEMBER, 2001

1,417,700 liters (volume) discharged

NITRATE-N: Influent = 20.2 Mg/L, Effluent = 1.5 Mg/L.

TA 50-1 Radioactive Liquid Wastewater Treatment Facility
Effluent Quality for September 2001

Parameter	Sample Type	Effluent Quality	California Action Level
Perchorate	Monthly Composite	187 ug/l	18 ug/l

Parameter	Sample Type	Effluent Quality	NM WQCC Standard
Nitrate	Monthly Composite	1.5 mg/l	10 mg/l

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REPORT

RLWTF ANNUAL REPORT FOR 2000

AR-RLW-2000 Vol. 2,R.

EffectiveDate: 8/15/2001

MOSS, DAVE
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Volume 2
Chapter
1

Flows, TA-50

TA50 MONTHLY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
JAN-2000											
Total	1,549,413	1,535,564	225.45		1,398,800	0	83,469	0	55,739	0	0
Maximum/Day	95,637	129,360	13.117	194.527	147,243		62,459				
Minimum/Day	20,400	33,147	8.017	61.867	73,621		21,010				
Average/Day	49,981	73,122	10.736	112.834	77,711		41,735				
FEB-2000											
Total	1,904,632	1,927,256	221.183		1,914,150	0	0	0	35,036	0	0
Maximum/Day	142,155	180,399	12.6	238.623	147,243						
Minimum/Day	28,890	47,863	5.967	97.679	73,621						
Average/Day	65,677	87,603	10.054	144.083	87,007						
MAR-2000											
Total	2,276,465	2,410,258	237.717		2,282,258	0	60,188	0	66,356	0	1,793
Maximum/Day	159,056	161,949	13.3	297.701	220,864				31,851		
Minimum/Day	20,710	14,706	3.8	22.625	73,621				3,185		
Average/Day	73,434	100,428	9.905	172.681	103,739				22,119		
APR-2000											
Total	1,792,235	1,934,548	173.2		1,914,153	8,532	44,005	0	20,703	3,647	3,778
Maximum/Day	140,712	150,915	14.05	269.491	147,243						
Minimum/Day	11,688	47,863	-5.383	102.71	73,621						
Average/Day	59,741	96,727	8.66	169.793	100,745						
MAY-2000											
Total	1,254,797	1,278,382	131.983		1,251,559	71,047	0	0	0	0	0
Maximum/Day	109,587	147,243	11.25	357.385	147,243						
Minimum/Day	7,885	14,724	2.917	81.802	73,621						
Average/Day	40,477	71,021	7.332	161.442	83,438						

3.785 L/gal.

TA50 MONTHLY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
JUN-2000											
Total	1,516,494	1,692,251	177.333		1,619,666	177,296	39,746	16,578	42,999	0	0
Maximum/Day	120,595	161,967	10.583	292.359	147,243	73,553					
Minimum/Day	6,836	3,681	4.5	6.681	73,621	7,907					
Average/Day	50,550	80,583	8.444	158.572	89,982	35,459					
JUL-2000											
Total	1,570,310	1,867,290	182.183		1,840,530	88,688	50,000	0	52,023	0	0
Maximum/Day	150,355	150,095	11.75	271.419	220,864	53,984			39,283		
Minimum/Day	18,355	46,348	5.517	128.315	73,621	34,704			12,740		
Average/Day	50,655	93,364	9.109	169.863	96,870	44,344			26,011		
AUG-2000											
Total	1,540,571	1,672,305	151.0		1,619,667	67,490	12,000	0	0	0	0
Maximum/Day	139,684	143,553	10.133	549.14	147,243	61,959					
Minimum/Day	15,213	25,046	1.5	52.07	73,621	15,531					
Average/Day	49,696	79,633	7:19	200.326	95,275	33,745					
SEP-2000											
Total	1,153,587	1,156,318	99.417		1,174,461	0	0	0	0	9	0
Maximum/Day	103,951	96,795	7.667	276.772	147,243						
Minimum/Day	7,688	10,696	3.5	48.616	70,145						
Average/Day	38,453	57,816	4.971	190.673	78,298						
OCT-2000											
Total	1,404,635	1,377,231	112.333		1,454,017	0	11	0	0	0	0
Maximum/Day	92,565	121,039	8.883	306.447	147,243						
Minimum/Day	20,071	25,839	2.967	112.343	73,621						
Average/Day	45,311	68,861	5.617	208.519	85,531						

TA50 MONTHLY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
NOV-2000											
Total	1,111,894	1,200,555	106.867		1,094,156	0	20,155	31,641	0	0	0
Maximum/Day	70,383	111,912	8.1	261.89	147,243						
Minimum/Day	14,507	31,641	4.483	94.17	73,621						
Average/Day	37,063	75,035	6.667	188.055	84,166						
DEC-2000											
Total	782,933	573,358	83.183		1,068,756	0	0	0	27,604	0	0
Maximum/Day	69,160	84,763	8.05	552.08	158,117						
Minimum/Day	5,313	2,585	0.833	9.645	73,621						
Average/Day	25,256	38,224	5.546	137.539	97,160						
SUMMARY											
Total	17,857,966	18,625,316	1901.65		18,632,173	413,053	309,574	48,219	300,460	3,656	5,571
Maximum/Month	2,276,465	2,410,258			2,282,258	177,296	83,469	31,641	66,356	3,647	3,778
Minimum/Month	782,933	573,358			1,068,756	8,532	11	16,578	20,703	9	1,793
Average/Month	1,488,164	1,552,110	158.471	183.238	1,552,681	34,421	25,798	4,018	25,038	305	464

TA50 DAILY FLOWS (liters)

JAN-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-JAN-2000	21,681	0	0.0	0.0	0	0	0	0	0	0	0
02-JAN-2000	20,400	0	0.0	0.0	0	0	0	0	0	0	0
03-JAN-2000	57,998	73,621	10.183	120.493	0	0	0	0	0	0	0
04-JAN-2000	38,206	44,119	9.417	78.087	73,621	0	0	0	0	0	0
05-JAN-2000	78,676	106,689	13.117	135.564	73,621	0	0	0	0	0	0
06-JAN-2000	46,949	77,365	12.033	107.154	147,243	0	0	0	0	0	0
07-JAN-2000	43,106	36,811	9.917	61.867	0	0	0	0	0	0	0
08-JAN-2000	28,252	0	0.0	0.0	0	0	0	0	0	0	0
09-JAN-2000	27,100	0	0.0	0.0	0	0	0	0	0	0	0
10-JAN-2000	64,905	81,019	10.917	123.693	73,621	0	62,459	0	0	0	0
11-JAN-2000	62,192	69,878	12.667	91.945	73,621	0	0	0	0	0	0
12-JAN-2000	55,576	69,967	11.917	97.856	73,621	0	0	0	0	0	0
13-JAN-2000	95,637	129,360	11.083	194.527	73,621	0	0	0	55,739	0	0
14-JAN-2000	70,217	66,313	9.017	122.574	73,621	0	0	0	0	0	0
15-JAN-2000	24,271	0	0.0	0.0	0	0	0	0	0	0	0
16-JAN-2000	54,127	62,569	8.383	124.392	73,621	0	0	0	0	0	0
17-JAN-2000	32,443	0	0.0	0.0	0	0	0	0	0	0	0
18-JAN-2000	61,133	99,380	11.25	147.23	73,621	0	0	0	0	0	0
19-JAN-2000	67,814	88,346	13.017	113.119	73,621	0	0	0	0	0	0
20-JAN-2000	54,248	51,517	11.667	73.596	73,621	0	0	0	0	0	0
21-JAN-2000	31,986	33,147	8.017	68.914	73,621	0	0	0	0	0	0
22-JAN-2000	27,222	0	0.0	0.0	0	0	0	0	0	0	0
23-JAN-2000	26,642	0	0.0	0.0	0	0	0	0	0	0	0
24-JAN-2000	38,041	95,708	11.35	140.54	73,621	0	0	0	0	0	0
25-JAN-2000	71,933	77,365	11.0	117.219	73,621	0	0	0	0	0	0
26-JAN-2000	70,664	62,578	11.667	89.397	73,621	0	21,010	0	0	0	0
27-JAN-2000	65,131	84,674	10.95	128.879	73,621	0	0	0	0	0	0
28-JAN-2000	68,475	55,171	8.3	110.786	73,621	0	0	0	0	0	0
29-JAN-2000	45,440	0	0.0	0.0	0	0	0	0	0	0	0
30-JAN-2000	35,506	0	0.0	0.0	0	0	0	0	0	0	0
31-JAN-2000	65,442	69,967	9.583	121.682	0	0	0	0	0	0	0
JAN-2000											
Total	1,549,413	1,535,564	225.45		1,398,800	0	83,469	0	55,739	0	0
Maximum/Day	95,637	129,360	13.117	194.527	147,243		62,459				
Minimum/Day	20,400	33,147	8.017	61.867	73,621		21,010				
Average/Day	49,981	73,122	10.736	112.834	77,711		41,735				

TA50 DAILY FLOWS (liters)

FEB-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-FEB-2000	75,779	88,328	11.75	125.288	147,243	0	0	0	0	0	0
02-FEB-2000	73,302	103,123	12.25	140.304	73,621	0	0	0	0	0	0
03-FEB-2000	107,482	88,328	11.667	126.183	73,621	0	0	0	0	0	0
04-FEB-2000	51,237	69,967	9.5	122.749	73,621	0	0	0	0	0	0
05-FEB-2000	40,541	0	0.0	0.0	0	0	0	0	0	0	0
06-FEB-2000	47,615	47,863	6.25	127.634	73,621	0	0	0	0	0	0
07-FEB-2000	76,268	64,584	10.0	140.974	73,621	0	0	0	0	0	0
08-FEB-2000	64,588	90,296	9.167	164.175	73,621	0	0	0	35,036	0	0
09-FEB-2000	116,317	88,328	11.283	130.469	73,621	0	0	0	0	0	0
10-FEB-2000	68,268	110,432	11.833	155.538	73,621	0	0	0	0	0	0
11-FEB-2000	63,515	69,958	9.0	129.552	73,621	0	0	0	0	0	0
12-FEB-2000	37,096	0	0.0	0.0	0	0	0	0	0	0	0
13-FEB-2000	36,038	0	0.0	0.0	0	0	0	0	0	0	0
14-FEB-2000	57,985	92,071	10.967	139.926	147,243	0	0	0	0	0	0
15-FEB-2000	102,392	125,228	12.233	170.61	73,621	0	0	0	0	0	0
16-FEB-2000	92,027	106,715	11.15	159.515	147,243	0	0	0	0	0	0
17-FEB-2000	77,805	95,699	11.75	135.743	73,621	0	0	0	0	0	0
18-FEB-2000	65,153	47,863	8.167	97.679	73,621	0	0	0	0	0	0
19-FEB-2000	35,111	0	0.0	0.0	0	0	0	0	0	0	0
20-FEB-2000	43,530	58,915	5.967	164.567	73,621	0	0	0	0	0	0
21-FEB-2000	38,015	0	0.0	0.0	0	0	0	0	0	0	0
22-FEB-2000	142,155	180,399	12.6	238.623	147,243	0	0	0	0	0	0
23-FEB-2000	42,776	55,261	7.05	130.64	73,621	0	0	0	0	0	0
24-FEB-2000	76,670	73,621	8.167	150.248	73,621	0	0	0	0	0	0
25-FEB-2000	66,144	66,224	7.0	157.675	73,621	0	0	0	0	0	0
26-FEB-2000	28,890	0	0.0	0.0	0	0	0	0	0	0	0
27-FEB-2000	35,115	0	0.0	0.0	0	0	0	0	0	0	0
28-FEB-2000	76,682	103,123	11.75	146.274	73,621	0	0	0	0	0	0
29-FEB-2000	66,136	80,930	11.683	115.449	73,621	0	0	0	0	0	0
FEB-2000											
Total	1,904,632	1,927,256	221.183		1,914,150	0	0	0	35,036	0	0
Maximum/Day	142,155	180,399	12.6	238.623	147,243						
Minimum/Day	28,890	47,863	5.967	97.679	73,621						
Average/Day	65,677	87,603	10.054	144.083	87,007						

RLWTF INFORMATION ONLY

TA50 DAILY FLOWS (liters)

MAR-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-MAR-2000	69,184	102,610	11.817	144.724	73,621	0	0	0	3,185	0	0
02-MAR-2000	70,382	116,524	12.3	157.892	147,243	0	0	0	31,851	0	0
03-MAR-2000	136,245	137,242	7.883	290.153	147,243	0	0	0	0	0	0
04-MAR-2000	20,710	0	0.0	0.0	0	0	0	0	0	0	0
05-MAR-2000	38,242	0	0.0	0.0	0	0	0	0	0	0	0
06-MAR-2000	104,012	114,086	11.75	161.825	73,621	0	0	0	0	0	0
07-MAR-2000	123,835	150,897	10.9	230.729	73,621	0	0	0	0	0	0
08-MAR-2000	63,869	73,532	8.417	145.608	73,621	0	0	0	0	0	0
09-MAR-2000	68,451	95,726	11.1	143.732	73,621	0	0	0	0	0	0
10-MAR-2000	159,056	161,949	9.067	297.701	220,864	0	0	0	0	0	0
11-MAR-2000	34,743	0	0.0	0.0	0	0	0	0	0	0	0
12-MAR-2000	35,368	0	0.0	0.0	0	0	0	0	0	0	0
13-MAR-2000	64,944	103,123	10.7	160.628	73,621	0	60,188	0	0	0	0
14-MAR-2000	48,150	14,706	10.833	22.625	73,621	0	0	0	0	0	0
15-MAR-2000	90,806	136,191	12.067	188.109	73,621	0	0	0	0	0	0
16-MAR-2000	60,683	114,086	12.75	149.133	147,243	0	0	0	0	0	0
17-MAR-2000	21,687	81,019	9.617	140.415	73,621	0	0	0	0	0	0
18-MAR-2000	37,647	0	0.0	0.0	0	0	0	0	0	0	0
19-MAR-2000	37,645	0	0.0	0.0	0	0	0	0	0	0	0
20-MAR-2000	93,955	110,432	10.75	171.213	73,621	0	0	0	0	0	0
21-MAR-2000	64,955	88,328	8.717	168.887	73,621	0	0	0	0	0	0
22-MAR-2000	55,022	81,001	8.0	168.753	73,621	0	0	0	0	0	0
23-MAR-2000	139,782	108,097	6.917	260.474	220,864	0	0	0	0	0	0
24-MAR-2000	108,104	114,113	7.7	246.998	73,621	0	0	0	0	0	0
25-MAR-2000	52,442	0	0.0	0.0	0	0	0	0	0	0	0
26-MAR-2000	52,783	29,769	3.8	130.568	0	0	0	0	0	0	0
27-MAR-2000	80,049	103,034	8.683	197.763	73,621	0	0	0	0	0	0
28-MAR-2000	114,722	125,228	13.3	156.927	147,243	0	0	0	0	0	1,793
29-MAR-2000	84,247	103,123	12.65	135.867	147,243	0	0	0	0	0	0
30-MAR-2000	89,315	79,129	10.583	124.613	73,621	0	0	0	31,320	0	0
31-MAR-2000	55,430	66,313	7.417	149.017	0	0	0	0	0	0	0
MAR-2000											
Total	2,276,465	2,410,258	237.717		2,282,258	0	60,188	0	66,356	0	1,793
Maximum/Day	159,056	161,949	13.3	297.701	220,864				31,851		
Minimum/Day	20,710	14,706	3.8	22.625	73,621				3,185		
Average/Day	73,434	100,428	9.905	172.681	103,739				22,119		

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TA50 DAILY FLOWS (liters)

APR-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-APR-2000	89,107	0	0.0	0.0	0	0	0	0	0	0	0
02-APR-2000	47,756	0	0.0	0.0	0	0	0	0	0	0	0
03-APR-2000	114,732	143,544	11.483	208.337	147,243	0	0	0	0	0	0
04-APR-2000	52,657	117,830	11.117	176.656	147,243	0	0	0	0	0	0
05-APR-2000	106,927	95,726	9.117	175.001	73,621	0	0	0	0	0	0
06-APR-2000	118,775	110,423	12.217	150.646	73,621	0	0	0	0	0	3,778
07-APR-2000	57,184	84,674	8.717	161.9	147,243	0	0	0	0	0	0
08-APR-2000	19,348	0	0.0	0.0	0	0	0	0	0	0	0
09-APR-2000	47,020	0	0.0	0.0	0	0	0	0	0	0	0
10-APR-2000	11,688	139,845	14.05	165.89	147,243	0	0	0	0	0	0
11-APR-2000	100,431	106,769	12.65	140.67	73,621	0	0	0	0	0	0
12-APR-2000	44,319	99,469	9.383	176.677	73,621	0	0	0	0	0	0
13-APR-2000	61,361	110,432	13.617	135.168	147,243	0	0	0	0	0	0
14-APR-2000	64,448	47,863	7.767	102.71	73,621	8,532	0	0	0	0	0
15-APR-2000	25,447	0	0.0	0.0	0	0	0	0	0	0	0
16-APR-2000	34,809	0	0.0	0.0	0	0	0	0	0	0	0
17-APR-2000	93,434	150,915	9.333	269.491	147,243	0	0	0	0	0	0
18-APR-2000	46,204	96,599	8.533	188.67	73,621	0	0	0	0	0	0
19-APR-2000	63,856	84,674	7.35	192.003	73,621	0	0	0	0	0	0
20-APR-2000	140,712	134,854	-5.383	0.0	147,243	0	0	0	0	0	0
21-APR-2000	61,922	55,216	5.083	181.036	0	0	0	0	0	0	0
22-APR-2000	33,914	0	0.0	0.0	0	0	0	0	0	0	0
23-APR-2000	33,349	0	0.0	0.0	0	0	0	0	0	0	0
24-APR-2000	49,200	90,643	5.983	252.488	73,621	0	0	0	20,703	0	0
25-APR-2000	45,017	55,261	7.817	117.826	73,621	0	0	0	0	0	0
26-APR-2000	83,049	55,171	8.6	106.921	73,621	0	44,005	0	0	0	0
27-APR-2000	71,275	92,071	8.733	175.709	73,621	0	0	0	0	3,647	0
28-APR-2000	42,445	62,569	7.033	148.268	73,621	0	0	0	0	0	0
29-APR-2000	40,409	0	0.0	0.0	0	0	0	0	0	0	0
30-APR-2000	41,440	0	0.0	0.0	0	0	0	0	0	0	0
APR-2000											
Total	1,792,235	1,934,548	173.2		1,914,153	8,532	44,005	0	20,703	3,647	3,778
Maximum/Day	140,712	150,915	14.05	269.491	147,243						
Minimum/Day	11,688	47,863	-5.383	102.71	73,621						
Average/Day	59,741	96,727	8.66	169.793	100,745						

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TA50 DAILY FLOWS (liters)

MAY-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-MAY-2000	7,885	66,224	7.8	141.503	73,621	0	0	0	0	0	0
02-MAY-2000	92,921	92,027	7.567	202.702	73,621	0	0	0	0	0	0
03-MAY-2000	109,587	55,261	7.25	127.036	73,621	0	0	0	0	0	0
04-MAY-2000	86,987	88,346	10.717	137.396	73,621	0	0	0	0	0	0
05-MAY-2000	56,329	73,621	7.667	160.046	73,621	0	0	0	0	0	0
06-MAY-2000	26,309	0	0.0	0.0	0	0	0	0	0	0	0
07-MAY-2000	25,877	0	0.0	0.0	0	0	0	0	0	0	0
08-MAY-2000	16,150	0	0.0	0.0	0	0	0	0	0	0	0
09-MAY-2000	57,742	0	0.0	0.0	0	0	0	0	0	0	0
10-MAY-2000	31,044	44,208	4.0	184.202	73,621	0	0	0	0	0	0
11-MAY-2000	59,767	0	0.0	0.0	0	0	0	0	0	0	0
12-MAY-2000	25,827	0	0.0	0.0	0	0	0	0	0	0	0
13-MAY-2000	22,608	0	0.0	0.0	0	0	0	0	0	0	0
14-MAY-2000	29,531	55,216	7.25	126.933	0	0	0	0	0	0	0
15-MAY-2000	35,062	70,947	8.25	143.328	147,243	0	0	0	0	0	0
16-MAY-2000	29,614	0	0.0	0.0	0	0	0	0	0	0	0
17-MAY-2000	23,125	62,578	7.8	133.714	0	0	0	0	0	0	0
18-MAY-2000	31,426	58,897	6.167	159.181	73,621	0	0	0	0	0	0
19-MAY-2000	40,639	29,449	2.917	168.277	73,621	0	0	0	0	0	0
20-MAY-2000	26,267	0	0.0	0.0	0	0	0	0	0	0	0
21-MAY-2000	26,787	0	0.0	0.0	0	0	0	0	0	0	0
22-MAY-2000	30,993	0	0.0	0.0	0	0	0	0	0	0	0
23-MAY-2000	50,825	95,708	9.633	165.584	73,621	0	0	0	0	0	0
24-MAY-2000	43,356	103,070	11.25	152.696	73,621	0	0	0	0	0	0
25-MAY-2000	45,445	69,940	8.25	141.294	73,621	0	0	0	0	0	0
26-MAY-2000	43,863	73,621	7.417	165.441	73,621	0	0	0	0	0	0
27-MAY-2000	22,542	0	0.0	0.0	0	0	0	0	0	0	0
28-MAY-2000	43,238	14,724	3.0	81.802	73,621	0	0	0	0	0	0
29-MAY-2000	21,188	0	0.0	0.0	0	0	0	0	0	0	0
30-MAY-2000	31,556	77,302	8.183	157.439	0	0	0	0	0	0	0
31-MAY-2000	60,307	147,243	6.867	357.385	147,243	71,047	0	0	0	0	0
MAY-2000											
Total	1,254,797	1,278,382	131.983		1,251,559	71,047	0	0	0	0	0
Maximum/Day	109,587	147,243	11.25	357.385	147,243						
Minimum/Day	7,885	14,724	2.917	81.802	73,621						
Average/Day	40,477	71,021	7.332	161.442	83,438						

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TA50 DAILY FLOWS (liters)

JUN-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-JUN-2000	63,397	89,130	9.617	154.471	147,243	0	0	0	0	0	0
02-JUN-2000	62,982	38,754	4.5	143.532	73,621	0	0	0	0	0	0
03-JUN-2000	12,633	0	0.0	0.0	0	0	0	0	0	0	0
04-JUN-2000	21,103	0	0.0	0.0	0	0	0	0	0	0	0
05-JUN-2000	118,669	161,967	9.233	292.359	73,621	0	0	0	0	0	0
06-JUN-2000	79,817	98,170	8.733	187.347	73,621	0	39,746	0	42,999	0	0
07-JUN-2000	65,276	58,915	7.683	127.798	0	0	0	0	0	0	0
08-JUN-2000	21,317	92,071	10.267	149.466	73,621	73,553	0	0	0	0	0
09-JUN-2000	42,022	70,145	8.917	131.113	73,621	0	0	0	0	0	0
10-JUN-2000	22,008	0	0.0	0.0	0	0	0	0	0	0	0
11-JUN-2000	20,164	0	0.0	0.0	0	0	0	0	0	0	0
12-JUN-2000	18,145	31,998	7.333	72.722	73,621	0	0	0	0	0	0
13-JUN-2000	18,239	103,070	10.583	162.315	73,621	0	0	0	0	0	0
14-JUN-2000	75,356	58,897	7.917	123.994	73,621	7,907	0	0	0	0	0
15-JUN-2000	104,673	158,295	9.25	285.216	147,243	47,879	0	0	0	0	0
16-JUN-2000	100,059	128,846	7.367	291.508	147,243	0	0	0	0	0	0
17-JUN-2000	21,491	0	0.0	0.0	0	0	0	0	0	0	0
18-JUN-2000	21,838	0	0.0	0.0	0	0	0	0	0	0	0
19-JUN-2000	102,109	95,458	7.75	205.287	73,621	0	0	0	0	0	0
20-JUN-2000	0	0	0.0	0.0	0	0	0	0	0	0	0
21-JUN-2000	0	3,681	9.183	6.681	0	0	0	16,578	0	0	0
22-JUN-2000	63,718	66,259	8.067	136.899	0	0	0	0	0	0	0
23-JUN-2000	105,040	73,621	7.083	173.227	73,621	0	0	0	0	0	0
24-JUN-2000	29,532	0	0.0	0.0	0	0	0	0	0	0	0
25-JUN-2000	15,900	0	0.0	0.0	0	0	0	0	0	0	0
26-JUN-2000	120,595	92,045	9.0	170.453	73,621	18,073	0	0	0	0	0
27-JUN-2000	6,836	40,492	9.167	73.621	73,621	29,884	0	0	0	0	0
28-JUN-2000	76,318	98,881	10.5	156.954	73,621	0	0	0	0	0	0
29-JUN-2000	54,136	81,019	8.3	162.689	147,243	0	0	0	0	0	0
30-JUN-2000	53,119	50,537	6.883	122.365	73,621	0	0	0	0	0	0
JUN-2000											
Total	1,516,494	1,692,251	177.333		1,619,666	177,296	39,746	16,578	42,999	0	0
Maximum/Day	120,595	161,967	10.583	292.359	147,243	73,553					
Minimum/Day	6,836	3,681	4.5	6.681	73,621	7,907					
Average/Day	50,550	80,583	8.444	158.572	89,982	35,459					

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TA50 DAILY FLOWS (liters)

JUL-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-JUL-2000	33,983	0	0.0	0.0	0	0	0	0	0	0	0
02-JUL-2000	29,655	0	0.0	0.0	0	0	0	0	0	0	0
03-JUL-2000	54,023	89,344	8.017	185.746	73,621	0	0	0	0	0	0
04-JUL-2000	28,011	0	0.0	0.0	0	0	0	0	0	0	0
05-JUL-2000	72,040	80,984	8.75	154.254	73,621	0	0	0	0	0	0
06-JUL-2000	101,278	101,341	8.633	195.639	73,621	0	0	0	0	0	0
07-JUL-2000	64,483	75,404	8.967	140.156	73,621	0	0	0	0	0	0
08-JUL-2000	28,450	0	0.0	0.0	0	0	0	0	0	0	0
09-JUL-2000	33,627	0	0.0	0.0	0	0	0	0	0	0	0
10-JUL-2000	59,135	99,389	8.833	187.526	73,621	0	0	0	0	0	0
11-JUL-2000	46,102	77,365	8.067	159.845	73,621	0	0	0	0	0	0
12-JUL-2000	127,599	67,917	8.083	140.035	73,621	0	0	0	0	0	0
13-JUL-2000	124,231	145,567	11.083	218.898	220,864	0	0	0	0	0	0
14-JUL-2000	63,538	73,621	6.983	175.707	0	0	0	0	0	0	0
15-JUL-2000	29,873	0	0.0	0.0	0	0	0	0	0	0	0
16-JUL-2000	28,979	0	0.0	0.0	0	0	0	0	0	0	0
17-JUL-2000	50,210	64,543	8.383	128.315	73,621	0	50,000	0	12,740	0	0
18-JUL-2000	45,990	107,966	10.5	171.375	73,621	0	0	0	39,283	0	0
19-JUL-2000	150,355	150,095	9.217	271.419	147,243	0	0	0	0	0	0
20-JUL-2000	41,694	96,795	10.317	156.373	147,243	0	0	0	0	0	0
21-JUL-2000	0	72,552	8.0	151.15	73,621	0	0	0	0	0	0
22-JUL-2000	27,369	0	0.0	0.0	0	0	0	0	0	0	0
23-JUL-2000	27,978	0	0.0	0.0	0	0	0	0	0	0	0
24-JUL-2000	18,355	97,508	9.217	176.326	73,621	0	0	0	0	0	0
25-JUL-2000	61,395	112,571	11.567	162.206	73,621	53,984	0	0	0	0	0
26-JUL-2000	51,486	108,293	11.75	153.607	147,243	34,704	0	0	0	0	0
27-JUL-2000	24,667	96,617	10.5	153.36	73,621	0	0	0	0	0	0
28-JUL-2000	39,577	46,348	5.517	140.023	73,621	0	0	0	0	0	0
29-JUL-2000	30,265	0	0.0	0.0	0	0	0	0	0	0	0
30-JUL-2000	26,639	0	0.0	0.0	0	0	0	0	0	0	0
31-JUL-2000	49,325	103,070	9.8	175.289	147,243	0	0	0	0	0	0
JUL-2000											
Total	1,570,310	1,867,290	182.183		1,840,530	88,688	50,000	0	52,023	0	0
Maximum/Day	150,355	150,095	11.75	271.419	220,864	53,984			39,283		
Minimum/Day	18,355	46,348	5.517	128.315	73,621	34,704			12,740		
Average/Day	50,655	93,364	9.109	169.863	96,870	44,344			26,011		

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TA50 DAILY FLOWS (liters)

AUG-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-AUG-2000	85,494	137,314	8.333	274.627	73,621	0	0	0	0	0	0
02-AUG-2000	55,651	101,965	8.967	189.526	73,621	0	0	0	0	0	0
03-AUG-2000	71,754	62,569	9.25	112.737	73,621	0	0	0	0	0	0
04-AUG-2000	32,081	40,492	4.0	168.716	73,621	0	0	0	0	0	0
05-AUG-2000	38,275	0	0.0	0.0	0	0	0	0	0	0	0
06-AUG-2000	45,689	0	0.0	0.0	0	0	0	0	0	0	0
07-AUG-2000	88,600	88,346	8.5	173.227	73,621	0	0	0	0	0	0
08-AUG-2000	59,495	103,070	9.0	190.87	147,243	0	0	0	0	0	0
09-AUG-2000	46,175	73,621	7.75	158.326	0	0	0	0	0	0	0
10-AUG-2000	48,966	80,984	5.417	249.18	147,243	0	0	0	0	0	0
11-AUG-2000	42,609	44,173	3.75	196.324	0	0	0	0	0	0	0
12-AUG-2000	31,085	0	0.0	0.0	0	0	0	0	0	0	0
13-AUG-2000	32,757	0	0.0	0.0	0	0	0	0	0	0	0
14-AUG-2000	0	29,805	7.95	62.484	0	0	0	0	0	0	0
15-AUG-2000	101,605	49,423	1.5	549.14	73,621	0	0	0	0	0	0
16-AUG-2000	0	0	0.0	0.0	0	0	0	0	0	0	0
17-AUG-2000	74,956	92,027	6.333	242.176	147,243	0	0	0	0	0	0
18-AUG-2000	24,207	25,046	8.017	52.07	0	0	12,000	0	0	0	0
19-AUG-2000	32,227	0	0.0	0.0	0	0	0	0	0	0	0
20-AUG-2000	28,662	0	0.0	0.0	0	0	0	0	0	0	0
21-AUG-2000	124,191	125,156	8.233	253.353	147,243	0	0	0	0	0	0
22-AUG-2000	15,213	75,832	10.133	124.723	73,621	51,959	0	0	0	0	0
23-AUG-2000	139,684	143,553	8.75	273.434	147,243	15,531	0	0	0	0	0
24-AUG-2000	37,208	83,854	8.45	165.392	73,621	0	0	0	0	0	0
25-AUG-2000	54,362	72,231	5.083	236.823	73,621	0	0	0	0	0	0
26-AUG-2000	25,007	0	0.0	0.0	0	0	0	0	0	0	0
27-AUG-2000	24,882	0	0.0	0.0	0	0	0	0	0	0	0
28-AUG-2000	37,236	84,665	7.417	190.257	73,621	0	0	0	0	0	0
29-AUG-2000	30,537	36,811	4.917	124.782	73,621	0	0	0	0	0	0
30-AUG-2000	29,463	0	0.0	0.0	73,621	0	0	0	0	0	0
31-AUG-2000	82,500	121,368	9.25	218.682	0	0	0	0	0	0	0
AUG-2000											
Total	1,540,571	1,672,305	151.0		1,619,667	67,490	12,000	0	0	0	0
Maximum/Day	139,684	143,553	10.133	549.14	147,243	51,959					
Minimum/Day	15,213	25,046	1.5	52.07	73,621	15,531					
Average/Day	49,696	79,633	7.19	200.326	95,275	33,745					

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TA50 DAILY FLOWS (liters)

SEP-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-SEP-2000	7,688	10,696	3.667	48.616	73,621	0	0	0	0	0	0
02-SEP-2000	25,285	0	0.0	0.0	0	0	0	0	0	0	0
03-SEP-2000	26,722	0	0.0	0.0	0	0	0	0	0	0	0
04-SEP-2000	23,981	0	0.0	0.0	0	0	0	0	0	0	0
05-SEP-2000	70,236	93,408	6.5	239.508	73,621	0	0	0	0	0	0
06-SEP-2000	35,060	61,197	5.583	182.677	70,145	0	0	0	0	0	0
07-SEP-2000	103,951	73,621	4.433	276.772	73,621	0	0	0	0	0	0
08-SEP-2000	34,508	77,810	6.0	216.14	73,621	0	0	0	0	0	0
09-SEP-2000	24,231	0	0.0	0.0	0	0	0	0	0	0	0
10-SEP-2000	26,647	0	0.0	0.0	0	0	0	0	0	0	0
11-SEP-2000	48,960	96,795	7.667	210.424	73,621	0	0	0	0	0	0
12-SEP-2000	24,824	31,534	3.5	150.163	73,621	0	0	0	0	0	0
13-SEP-2000	39,764	38,522	3.7	173.522	0	0	0	0	0	0	0
14-SEP-2000	38,389	73,087	5.083	239.628	73,621	0	0	0	0	0	0
15-SEP-2000	49,424	49,824	3.933	211.117	73,621	0	0	0	0	0	0
16-SEP-2000	28,738	0	0.0	0.0	0	0	0	0	0	0	0
17-SEP-2000	28,173	0	0.0	0.0	0	0	0	0	0	0	0
18-SEP-2000	43,011	40,732	3.75	181.033	73,621	0	0	0	0	9	0
19-SEP-2000	55,150	69,940	4.5	259.038	0	0	0	0	0	0	0
20-SEP-2000	45,162	59,539	4.667	212.639	73,621	0	0	0	0	0	0
21-SEP-2000	51,181	77,302	7.167	179.773	73,621	0	0	0	0	0	0
22-SEP-2000	43,209	40,492	4.0	168.718	73,621	0	0	0	0	0	0
23-SEP-2000	26,589	0	0.0	0.0	0	0	0	0	0	0	0
24-SEP-2000	24,788	0	0.0	0.0	0	0	0	0	0	0	0
25-SEP-2000	54,818	71,268	6.083	195.256	73,621	0	0	0	0	0	0
26-SEP-2000	52,659	67,926	6.333	178.753	0	0	0	0	0	0	0
27-SEP-2000	25,656	36,811	4.75	129.16	0	0	0	0	0	0	0
28-SEP-2000	43,555	58,897	3.85	254.966	147,243	0	0	0	0	0	0
29-SEP-2000	22,419	26,917	4.25	105.558	0	0	0	0	0	0	0
30-SEP-2000	28,809	0	0.0	0.0	0	0	0	0	0	0	0
SEP-2000											
Total	1,153,587	1,156,318	99.417		1,174,461	0	0	0	0	9	0
Maximum/Day	103,951	96,795	7.667	276.772	147,243						
Minimum/Day	7,688	10,696	3.5	48.616	70,145						
Average/Day	38,453	57,816	4.971	190.673	78,298						

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TA50 DAILY FLOWS (liters)

OCT-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-OCT-2000	28,776	0	0.0	0.0	0	0	0	0	0	0	0
02-OCT-2000	34,989	61,411	4.417	231.738	73,621	0	0	0	0	0	0
03-OCT-2000	45,923	55,216	3.7	248.721	128,837	0	0	0	0	0	0
04-OCT-2000	47,483	40,492	4.3	156.945	0	0	0	0	0	0	0
05-OCT-2000	71,977	88,346	5.75	256.074	73,621	0	0	0	0	0	0
06-OCT-2000	0	25,839	3.833	112.343	73,621	0	0	0	0	0	0
07-OCT-2000	20,759	0	0.0	0.0	0	0	0	0	0	0	0
08-OCT-2000	20,071	0	0.0	0.0	0	0	0	0	0	0	0
09-OCT-2000	25,724	0	0.0	0.0	0	0	0	0	0	0	0
10-OCT-2000	92,565	121,039	8.75	230.55	73,621	0	0	0	0	0	0
11-OCT-2000	63,079	73,087	5.667	214.961	73,621	0	0	0	0	0	0
12-OCT-2000	69,313	93,230	7.467	208.103	73,621	0	0	0	0	0	0
13-OCT-2000	53,336	49,200	4.5	182.221	73,621	0	0	0	0	0	0
14-OCT-2000	23,443	0	0.0	0.0	0	0	0	0	0	0	0
15-OCT-2000	24,741	0	0.0	0.0	0	0	0	0	0	0	0
16-OCT-2000	57,558	71,420	7.583	156.967	73,621	0	0	0	0	0	0
17-OCT-2000	51,978	50,055	4.583	182.02	73,621	0	0	0	0	0	0
18-OCT-2000	56,950	46,383	3.0	257.685	73,621	0	0	0	0	0	0
19-OCT-2000	60,243	93,497	7.517	207.311	0	0	0	0	0	0	0
20-OCT-2000	46,098	47,863	4.0	199.428	147,243	0	0	0	0	0	0
21-OCT-2000	27,509	0	0.0	0.0	0	0	0	0	0	0	0
22-OCT-2000	25,563	0	0.0	0.0	0	0	0	0	0	0	0
23-OCT-2000	81,342	66,250	4.05	272.635	0	0	0	0	0	0	0
24-OCT-2000	58,825	82,419	8.883	154.631	73,621	0	11	0	0	0	0
25-OCT-2000	69,281	116,404	8.8	220.462	147,243	0	0	0	0	0	0
26-OCT-2000	48,824	80,244	6.9	193.825	73,621	0	0	0	0	0	0
27-OCT-2000	52,822	54,548	2.967	306.447	73,621	0	0	0	0	0	0
28-OCT-2000	24,583	0	0.0	0.0	0	0	0	0	0	0	0
29-OCT-2000	25,005	0	0.0	0.0	0	0	0	0	0	0	0
30-OCT-2000	58,546	60,288	5.667	177.316	73,621	0	0	0	0	0	0
31-OCT-2000	39,329	0	0.0	0.0	0	0	0	0	0	0	0
OCT-2000											
Total	1,404,635	1,377,231	112.333		1,454,017	0	11	0	0	0	0
Maximum/Day	92,565	121,039	8.883	306.447	147,243						
Minimum/Day	20,071	25,839	2.967	112.343	73,621						
Average/Day	45,311	68,861	5.617	208.519	85,531						

TA50 DAILY FLOWS (liters)

NOV-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-NOV-2000	58,762	100,325	7.833	213.457	73,621	0	0	0	0	0	0
02-NOV-2000	55,720	54,280	4.533	199.559	73,621	0	0	0	0	0	0
03-NOV-2000	41,044	58,113	5.233	185.072	73,621	0	0	0	0	0	0
04-NOV-2000	21,497	0	0.0	0.0	0	0	0	0	0	0	0
05-NOV-2000	19,548	0	0.0	0.0	0	0	0	0	0	0	0
06-NOV-2000	42,030	78,969	8.083	162.823	0	0	0	0	0	0	0
07-NOV-2000	25,992	0	0.0	0.0	137,082	0	0	0	0	0	0
08-NOV-2000	52,575	53,745	6.017	148.879	0	0	0	0	0	0	0
09-NOV-2000	41,698	93,497	7.083	219.994	0	0	20,155	31,641	0	0	0
10-NOV-2000	23,748	0	0.0	0.0	0	0	0	0	0	0	0
11-NOV-2000	23,743	0	0.0	0.0	0	0	0	0	0	0	0
12-NOV-2000	22,603	0	0.0	0.0	0	0	0	0	0	0	0
13-NOV-2000	14,507	31,641	5.6	94.17	73,621	0	0	0	0	0	0
14-NOV-2000	40,963	61,500	6.45	158.914	0	0	0	0	0	0	0
15-NOV-2000	21,221	50,091	7.7	108.422	73,621	0	0	0	0	0	0
16-NOV-2000	65,730	67,650	5.583	201.939	0	0	0	0	0	0	0
17-NOV-2000	56,407	82,267	7.9	173.559	73,621	0	0	0	0	0	0
18-NOV-2000	21,462	0	0.0	0.0	0	0	0	0	0	0	0
19-NOV-2000	21,592	0	0.0	0.0	0	0	0	0	0	0	0
20-NOV-2000	64,200	87,116	7.55	192.308	73,621	0	0	0	0	0	0
21-NOV-2000	70,383	111,912	8.1	230.271	147,243	0	0	0	0	0	0
22-NOV-2000	45,450	70,448	4.483	261.89	73,621	0	0	0	0	0	0
23-NOV-2000	25,877	0	0.0	0.0	0	0	0	0	0	0	0
24-NOV-2000	19,373	0	0.0	0.0	0	0	0	0	0	0	0
25-NOV-2000	22,605	0	0.0	0.0	0	0	0	0	0	0	0
26-NOV-2000	22,699	0	0.0	0.0	0	0	0	0	0	0	0
27-NOV-2000	53,887	99,612	6.983	237.737	73,621	0	0	0	0	0	0
28-NOV-2000	28,260	0	0.0	0.0	73,621	0	0	0	0	0	0
29-NOV-2000	46,699	0	0.0	0.0	0	0	0	0	0	0	0
30-NOV-2000	41,619	99,389	7.533	219.887	73,621	0	0	0	0	0	0
NOV-2000											
Total	1,111,894	1,200,555	106.667		1,094,156	0	20,155	31,641	0	0	0
Maximum/Day	70,383	111,912	8.1	261.89	147,243						
Minimum/Day	14,507	31,641	4.483	94.17	73,621						
Average/Day	37,063	75,035	6.667	188.055	84,166						

TA50 DAILY FLOWS (liters)

DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
01-DEC-2000	0	0	0.0	0.0	79,058	0	0	0	0	0	0
02-DEC-2000	23,470	0	0.0	0.0	0	0	0	0	0	0	0
03-DEC-2000	24,980	0	0.0	0.0	0	0	0	0	0	0	0
04-DEC-2000	0	9,983	5.933	28.041	73,621	0	0	0	0	0	0
05-DEC-2000	0	20,233	5.733	58.815	152,680	0	0	0	0	0	0
06-DEC-2000	32,807	13,904	2.783	83.259	0	0	0	0	0	0	0
07-DEC-2000	15,302	36,811	7.817	78.488	73,621	0	0	0	0	0	0
08-DEC-2000	34,738	33,308	3.867	143.568	79,058	0	0	0	0	0	0
09-DEC-2000	21,592	0	0.0	0.0	0	0	0	0	0	0	0
10-DEC-2000	23,390	0	0.0	0.0	0	0	0	0	0	0	0
11-DEC-2000	48,208	27,604	0.833	552.08	0	0	0	0	27,604	0	0
12-DEC-2000	8,227	29,324	7.233	67.566	0	0	0	0	0	0	0
13-DEC-2000	12,559	66,259	8.05	137.183	0	0	0	0	0	0	0
14-DEC-2000	31,440	31,819	3.617	146.633	147,243	0	0	0	0	0	0
15-DEC-2000	0	21,659	6.633	54.419	79,058	0	0	0	0	0	0
16-DEC-2000	21,727	0	0.0	0.0	0	0	0	0	0	0	0
17-DEC-2000	38,634	0	0.0	0.0	0	0	0	0	0	0	0
18-DEC-2000	66,116	84,763	7.967	177.328	73,621	0	0	0	0	0	0
19-DEC-2000	65,613	84,674	8.0	176.403	0	0	0	0	0	0	0
20-DEC-2000	15,853	2,585	4.467	9.645	158,117	0	0	0	0	0	0
21-DEC-2000	69,160	73,648	6.25	196.395	79,058	0	0	0	0	0	0
22-DEC-2000	25,513	36,784	4.0	153.266	73,621	0	0	0	0	0	0
23-DEC-2000	21,026	0	0.0	0.0	0	0	0	0	0	0	0
24-DEC-2000	20,879	0	0.0	0.0	0	0	0	0	0	0	0
25-DEC-2000	18,710	0	0.0	0.0	0	0	0	0	0	0	0
26-DEC-2000	5,313	0	0.0	0.0	0	0	0	0	0	0	0
27-DEC-2000	22,193	0	0.0	0.0	0	0	0	0	0	0	0
28-DEC-2000	53,787	0	0.0	0.0	0	0	0	0	0	0	0
29-DEC-2000	19,615	0	0.0	0.0	0	0	0	0	0	0	0
30-DEC-2000	19,615	0	0.0	0.0	0	0	0	0	0	0	0
31-DEC-2000	22,466	0	0.0	0.0	0	0	0	0	0	0	0
DEC-2000											
Total	782,933	573,358	83.183		1,068,756	0	0	0	27,604	0	0
Maximum/Day	69,160	84,763	8.05	552.08	158,117						
Minimum/Day	5,313	2,585	0.833	9.645	73,621						
Average/Day	25,256	38,224	5.546	137.539	97,160						

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TA50 DAILY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
SUMMARY											
Total	17,857,966	18,625,316	1901.65		18,632,173	413,053	309,574	48,219	300,460	3,656	5,571
Maximum/Month	2,276,465	2,410,258			2,282,258	177,296	83,469	31,641	66,356	3,647	3,778
Minimum/Month	782,933	573,358			1,068,756	8,532	11	16,578	20,703	9	1,793
Average/Month	1,488,164	1,552,110	158.471	163.238	1,552,681	34,421	25,798	4,018	25,038	305	464

Volume 2
Chapter

Analyses of Composite Radiological Samples, TA-50

TA50 RADIOISOTOPES

JAN-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	19.0e-9	29.176e-3		9.2e-12	12.869e-6
Am-241	3.5e-9	5.374e-3		4.3e-12	6.015e-6
BETA	2.0e-9	3.071e-3		13.0e-12	18.184e-6
Cs-137	LDL*			LDL*	
GAMMA	LDL*			LDL*	
Pu-238	7.8e-9	11.977e-3		4.8e-12	6.714e-6
Pu-239	5.0e-9	7.678e-3		2.8e-12	3.917e-6
Sr-89	7.4e-12	11.363e-6		LDL*	
Sr-90	4.2e-12	6.449e-6		4.1e-12	5.735e-6
TOTAL PLUTONIUM	12.8e-9	19.655e-3		7.6e-12	10.631e-6
TRITIUM**				12.0e-9	16.786e-3
U-234	600.0e-12	921.338e-6		1.7e-12	2.378e-6
U-235	LDL*			LDL*	
Total Alpha		25.951e-3			19.024e-6

Volume of Flow: Influent = 1,549,413.0 liters Final = 1,398,800.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

FEB-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	27.0e-9	52.036e-3		11.0e-12	21.056e-6
Am-241	4.1e-9	7.902e-3		1.5e-12	2.871e-6
BETA	7.7e-9	14.84e-3		49.0e-12	93.793e-6
Cs-137	LDL*			LDL*	
GAMMA	11.0e-9	21.2e-3			
Pu-238	8.8e-9	16.96e-3		4.7e-12	8.997e-6
Pu-239	4.1e-9	7.902e-3		2.3e-12	4.403e-6
Rb-83	6.4e-9	12.334e-3			
Rb-84	6.3e-9	12.142e-3			
Sr-89	LDL*			LDL*	
Sr-90	6.6e-12	12.72e-6		LDL*	
TOTAL PLUTONIUM	12.9e-9	24.862e-3		7.0e-12	13.399e-6
TRITIUM**				5.0e-9	9.571e-3
U-234	170.0e-12	327.634e-6		3.7e-12	7.082e-6
U-235	19.0e-12	36.618e-6		LDL*	
Total Alpha		33.128e-3			23.353e-6

Volume of Flow: Influent = 1,904,632.0 liters Final = 1,914,150.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

MAR-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	18.0e-9	43.385e-3		11.6e-12	26.474e-6
Am-241	3.3e-9	7.954e-3		0.2e-12	456.452e-9
BETA	2.6e-9	6.267e-3		3.8e-12	8.673e-6
Cs-137	LDL*			LDL*	
GAMMA	LDL*				
Pu-238	9.2e-9	22.174e-3		1.0e-12	2.282e-6
Pu-239	3.9e-9	9.4e-3		0.2e-12	456.452e-9
Sr-89	LDL*			LDL*	
Sr-90	10.0e-12	24.103e-6		LDL*	
TOTAL PLUTONIUM	13.1e-9	31.574e-3		1.2e-12	2.739e-6
TRITIUM**				5.0e-9	11.411e-3
Th-232	220.0e-12	530.257e-6			
U-234	LDL*			LDL*	
U-235	LDL*			LDL*	
Total Alpha		39.528e-3			3.195e-6

Volume of Flow: Influent = 2,276,465.0 liters Final = 2,282,258.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

APR-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	41.0e-9	79.316e-3		11.9e-12	22.778e-6
Am-241	3.1e-9	5.997e-3		LDL*	
BETA	1.9e-9	3.676e-3		LDL*	
Cs-137	140.0e-12	270.837e-6		280.0e-12	535.963e-6
Mn-54				15.0e-12	28.712e-6
Pu-238	34.0e-9	65.775e-3		LDL*	
Pu-239	6.2e-9	11.994e-3		LDL*	
Sr-89	LDL*			LDL*	
Sr-90	50.0e-12	96.727e-6		LDL*	
TOTAL PLUTONIUM	40.2e-9	77.769e-3		LDL*	
TRITIUM**				23.0e-9	44.026e-3
Th-232	220.0e-12	425.601e-6			
U-234	LDL*			5.8e-12	11.102e-6
U-235	LDL*			0.1e-12	191.415e-9
U-238	740.0e-12	1.432e-3			
Total Alpha		83.766e-3			11.294e-6

Volume of Flow: Influent = 1,792,235.0 liters Final = 1,914,153.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

MAY-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	21.0e-9	26.846e-3		15.7e-12	19.649e-6
Am-241	4.8e-9	6.136e-3		2.7e-12	3.379e-6
BETA	2.0e-9	2.557e-3		LDL*	
Cs-137	400.0e-12	511.353e-6		370.0e-12	463.077e-6
Pu-238	17.0e-9	21.732e-3		8.9e-12	11.139e-6
Pu-239	3.4e-9	4.346e-3		4.4e-12	5.507e-6
Sr-89	47.0e-12	60.084e-6		LDL*	
Sr-90	450.0e-12	575.272e-6		LDL*	
TOTAL PLUTONIUM	20.4e-9	26.079e-3		13.3e-12	16.646e-6
TRITIUM**				6.3e-9	7.885e-3
U-234	200.0e-12	255.676e-6		12.3e-12	15.394e-6
U-235	LDL*			1.7e-12	2.128e-6
Total Alpha		32.471e-3			37.547e-6

Volume of Flow: Influent = 1,254,797.0 liters Final = 1,251,559.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

JUN-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	10.0e-9	16.923e-3		2.4e-12	3.887e-6
Am-241	1.2e-9	2.031e-3		1.5e-12	2.429e-6
BETA	16.0e-9	27.076e-3		69.0e-12	111.757e-6
Cs-137	350.0e-12	592.288e-6		340.0e-12	550.686e-6
Pu-238	4.5e-9	7.615e-3		3.8e-12	6.155e-6
Pu-239	1.3e-9	2.2e-3		1.7e-12	2.753e-6
Sr-89	43.0e-12	72.767e-6		LDL*	
Sr-90	97.0e-12	164.148e-6		2.8e-12	4.535e-6
TOTAL PLUTONIUM	5.8e-9	9.815e-3		210.0	3.401e8
TRITIUM**				200.0e-9	323.933e-3
U-234	720.0e-12	1.218e-3		2.7e-12	4.373e-6
U-235	82.0e-12	138.765e-6		LDL*	
Total Alpha		13.203e-3			15.711e-6

Volume of Flow: Influent = 1,516,494.0 liters Final = 1,619,666.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

JUL-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	14.0e-9	26.142e-3		5.3e-12	9.755e-6
Am-241	1.4e-9	2.614e-3		LDL*	
BETA	3.1e-9	5.789e-3		65.0e-12	119.634e-6
Cs-137	210.0e-12	392.131e-6		320.0e-12	588.97e-6
Pu-238	7.3e-9	13.631e-3		LDL*	
Pu-239	3.2e-9	5.975e-3		0.1e-12	184.053e-9
Sr-89	5.5e-12	10.27e-6		LDL*	
Sr-90	51.0e-12	95.232e-6		LDL*	
TOTAL PLUTONIUM	10.5e-9	19.607e-3		210.0	3.865e8
TRITIUM**				120.0e-9	220.864e-3
U-234	650.0e-12	1.214e-3		LDL*	
U-235	LDL*			0.6e-12	1.104e-6
Total Alpha		23.434e-3			1.288e-6

Volume of Flow: Influent = 1,570,310.0 liters Final = 1,840,530.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

AUG-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	10.0e-9	16.723e-3		12.0e-12	19.436e-6
Am-241	1.3e-9	2.174e-3		3.5e-12	5.669e-6
BETA	1.9e-9	3.177e-3		150.0e-12	242.95e-6
Cs-137	200.0e-12	334.461e-6		260.0e-12	421.113e-6
Pu-238	8.6e-9	14.382e-3		2.8e-12	4.535e-6
Pu-239	3.2e-9	5.351e-3		1.1e-12	1.782e-6
Sr-89	4.8e-12	8.027e-6		9.8e-12	15.873e-6
Sr-90	23.0e-12	38.463e-6		LDL*	
TOTAL PLUTONIUM	11.8e-9	19.733e-3		3.9e-12	6.317e-6
TRITIUM**	16.0e-9	26.757e-3		130.0e-9	210.557e-3
U-234	LDL*			1.5e-12	2.43e-6
U-235	34.0e-12	56.858e-6		7.4e-12	11.986e-6
Total Alpha		21.964e-3			26.401e-6

Volume of Flow: Influent = 1,540,571.0 liters Final = 1,619,667.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

SEP-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	56.0e-9	64.754e-3		15.0e-12	17.617e-6
Am-241	8.2e-9	9.482e-3		5.4e-12	6.342e-6
BETA	54.0e-9	62.441e-3		780.0e-12	916.08e-6
Cs-137	350.0e-12	404.711e-6		310.0e-12	364.083e-6
Pu-238	40.0e-9	46.253e-3		5.0e-12	5.872e-6
Pu-239	9.2e-9	10.638e-3		1.9e-12	2.231e-6
Sr-89	LDL*			LDL*	
Sr-90	58.0e-12	67.066e-6		LDL*	
TOTAL PLUTONIUM	210.0	2.428e8		24.0	2.819e7
TRITIUM**				35.0e-9	41.106e-3
U-234	LDL*			1.8e-12	2.114e-6
U-235	LDL*			6.9e-12	8.104e-6
Total Alpha		66.373e-3			24.664e-6

Volume of Flow: Influent = 1,153,587.0 liters Final = 1,174,461.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

OCT-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	14.0e-9	19.281e-3		16.0e-12	23.264e-6
Am-241	2.1e-9	2.892e-3		1.3e-12	1.89e-6
BETA	5.8e-9	7.988e-3		190.0e-12	276.263e-6
Cs-137	LDL*			LDL*	
Pu-238	11.0e-9	15.15e-3		4.6e-12	6.688e-6
Pu-239	2.9e-9	3.994e-3		2.6e-12	3.78e-6
Sr-89	50.0e-12	68.862e-6		36.0e-12	52.345e-6
Sr-90	20.0e-12	27.545e-6		4.8e-12	6.979e-6
TOTAL PLUTONIUM	13.9e-9	19.144e-3		7.2e-12	10.469e-6
TRITIUM**				5.2e-9	7.561e-3
U-234	LDL*			LDL*	
U-235	LDL*			LDL*	
Total Alpha		22.036e-3			12.359e-6

Volume of Flow: Influent = 1,404,635.0 liters Final = 1,454,017.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

RLWTF INFORMATION ONLY

TA50 RADIOISOTOPES

NOV-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	24.0e-9	28.813e-3		14.0e-12	15.318e-6
Am-241	1.7e-9	2.041e-3		1.6e-12	1.751e-6
BETA	9.1e-9	10.925e-3		650.0e-12	711.201e-6
Cs-137	LDL*			LDL*	
Pu-238	19.0e-9	22.811e-3		0.4e-12	437.662e-9
Pu-239	4.9e-9	5.883e-3		1.6e-12	1.751e-6
Rb-83	320.0e-12	384.178e-6		270.0e-12	295.422e-6
Sr-89	230.0e-12	276.128e-6		210.0e-12	229.773e-6
Sr-90	130.0e-12	156.072e-6		4.6e-12	5.033e-6
TOTAL PLUTONIUM	23.9e-9	28.693e-3		2.0e-12	2.188e-6
TRITIUM**				5.8e-9	6.346e-3
U-234	1.5e-9	1.801e-3		LDL*	
U-235	LDL*			LDL*	
Total Alpha		32.535e-3			3.939e-6

Volume of Flow: Influent = 1,111,894.0 liters Final = 1,094,156.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

DEC-2000

	RAW Ci/L	RAW Total (Ci)		FINAL Ci/l	FINAL Total (Ci)
ALPHA	9.0e-9	5.16e-3		25.0e-12	26.719e-6
Am-241	2.5e-9	1.433e-3		4.0e-12	4.275e-6
BETA	4.0e-9	2.293e-3		200.0e-12	213.751e-6
Cs-137	4.0e-9	2.293e-3		LDL*	
Mn-54				110.0e-12	117.563e-6
Nb-95				1.5e-9	1.603e-3
Pu-238	9.3e-9	5.332e-3		4.0e-12	4.275e-6
Pu-239	2.2e-9	1.261e-3		4.0e-12	4.275e-6
Sr-89	320.0e-12	183.475e-6		14.0e-12	14.963e-6
Sr-90	3.5e-12	2.007e-6		20.0e-12	21.375e-6
TOTAL PLUTONIUM	11.5e-9	6.594e-3		8.0e-12	8.55e-6
TRITIUM**				7.1e-9	7.588e-3
U-234	71.0e-12	40.708e-6		4.1e-12	4.382e-6
U-235	12.0e-12	6.88e-6		0.25e-12	267.189e-9
U-238				9.4e-12	10.046e-6
Total Alpha		8.075e-3			17.474e-6

Volume of Flow: Influent = 782,933.0 liters Final = 1,068,756.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

Volume 2
Chapter
3

Analyses of Composite Mineral Samples, TA-50

TA50 MINERALS

JAN-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	61.0	93.669		41.0	57.351
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.29	0.445		LDL*	
AMMONIA-N	3.21	4.929		0.45	0.629
ANTIMONY	0.011	0.017		LDL*	
ARSENIC	LDL*			LDL*	
BARIUM	0.018	0.028		LDL*	
BERYLLIUM	LDL*			LDL*	
BORON	0.1	0.154		0.14	0.196
CADMIUM	LDL*			LDL*	
CALCIUM	12.0	18.427		0.34	0.476
CHLORIDE	16.9	25.951		0.45	0.629
COBALT	LDL*			LDL*	
COD	39.0	59.887		21.0	29.375
CONDUCTIVITY*	489.0			78.1	
COPPER	LDL*			LDL*	
CYANIDE	0.03	0.046		0.03	0.042
FLUORIDE	1.36	2.088		LDL*	
HARDNESS*	44.377	68.144		LDL*	
IRON	0.45	0.691		0.069	0.097
LEAD	0.024	0.037		LDL*	
MAGNESIUM	3.5	5.374		LDL*	
MERCURY	LDL*			LDL*	
NICKEL	0.13	0.2		LDL*	
NITRATE-N	6.56	10.073		0.18	0.252
PHOSPHORUS	5.0	7.678		LDL*	
POTASSIUM	4.4	6.756		LDL*	
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	79.0	121.31		2.0	2.798
SILICON	39.0	59.887		1.2	1.679
SILVER	LDL*			LDL*	
SODIUM	73.0	112.096		16.0	22.381
SULFATE	98.32	150.977		1.04	1.455
TDS	538.0	826.133		30.0	41.964
THALLIUM	7.0e-4	0.001		1.0e-4	1.399e-4
TOTAL CATIONS*	4.65			0.82	
TOTAL CHROMIUM	0.016	0.025		LDL*	
TSS	11.0	16.891		LDL*	
URANIUM	0.065	0.1		LDL*	
VANADIUM	LDL*			LDL*	
ZINC	0.27	0.415		LDL*	
pH	7.34			7.18	

Volume of Flow: Influent = 1,549,413.0 liters Final = 1,398,800.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

FEB-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	58.0	111.781		92.0	176.102
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.15	0.289		LDL*	
AMMONIA-N	2.78	5.358		4.55	8.709
ANTIMONY	9.0e-4	0.002		LDL*	
ARSENIC	LDL*			LDL*	
BARIUM	0.025	0.048		LDL*	
BERYLLIUM	0.001	0.002		LDL*	
BORON	0.064	0.123		0.052	0.1
CADMIUM	LDL*			LDL*	
CALCIUM	13.0	25.054		0.13	0.249
CHLORIDE	24.31	46.852		1.25	2.393
COBALT	LDL*			LDL*	
COD	83.0	159.962		LDL*	
CONDUCTIVITY*	289.0			182.0	
COPPER	0.1	0.193		0.004	0.008
CYANIDE	LDL*			LDL*	
FLUORIDE	1.98	3.816		0.08	0.153
HARDNESS*	46.462	89.544		LDL*	
IRON	0.97	1.869		LDL*	
LEAD	0.02	0.039		LDL*	
MAGNESIUM	3.4	6.553		LDL*	
MERCURY	0.003	0.006		LDL*	
NICKEL	0.086	0.166		LDL*	
NITRATE-N	5.25	10.118		0.22	0.421
PHOSPHORUS	3.76	7.246		LDL*	
POTASSIUM	3.7	7.131		0.33	0.632
SELENIUM	0.002	0.004		LDL*	
SILICA DIOXIDE	15.0	28.909		5.0	9.571
SILICON	32.0	61.672		LDL*	
SILVER	0.012	0.023		LDL*	
SODIUM	31.0	59.745		40.0	76.566
SULFATE	12.32	23.744		1.49	2.852
TDS	304.0	585.886		116.0	222.041
THALLIUM	2.4e-4	4.625e-4		LDL*	
TOTAL CATIONS*	2.72			1.84	
TOTAL CHROMIUM	0.02	0.039		LDL*	
TSS	5.0	9.636		LDL*	
URANIUM	0.035	0.067		1.0e-4	1.914e-4
VANADIUM	LDL*			LDL*	
ZINC	0.29	0.559		LDL*	
pH	7.21			7.41	

Volume of Flow: Influent = 1,904,632.0 liters Final = 1,914,150.0 liters

*Alkalinities and hardness as mg CaCO3/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

MAR-2000**

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	62.0	149.436		212.0	483.839
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	LDL*			LDL*	
AMMONIA-N	4.15	10.003		7.28	16.615
ANTIMONY	7.0e-4	0.002		LDL*	
ARSENIC	0.001	0.002		LDL*	
BARIUM	0.032	0.077		0.001	0.002
BERYLLIUM	0.002	0.005		LDL*	
BORON	0.062	0.149		0.074	0.169
CADMIUM	LDL*			LDL*	
CALCIUM	13.0	31.333		5.3	12.096
CHLORIDE	22.6	54.472		3.14	7.166
COBALT	LDL*			LDL*	
COD	107.0	257.898		7.0	15.976
COPPER	0.078	0.188		0.013	0.03
CYANIDE	0.01	0.024		0.01	0.023
FLUORIDE	0.68	1.639		0.09	0.205
HARDNESS*	48.109	115.955		13.811	31.52
IRON	0.63	1.518		0.089	0.203
LEAD	LDL*			LDL*	
MAGNESIUM	3.8	9.159		0.14	0.32
MERCURY	LDL*			0.004	0.009
NICKEL	LDL*			LDL*	
NITRATE-N	4.26	10.268		0.36	0.822
PHOSPHORUS	2.12	5.11		0.05	0.114
POTASSIUM	3.7	8.918		1.1	2.51
SELENIUM	0.001	0.002		0.002	0.005
SILICA DIOXIDE	86.0	207.282		4.0	9.129
SILICON	35.0	84.359		2.6	5.934
SILVER	0.021	0.051		LDL*	
SODIUM	26.0	62.667		120.0	273.871
TDS	244.0	588.103		264.0	602.516
THALLIUM	5.6e-4	0.001		1.0e-4	2.282e-4
TOTAL CHROMIUM	0.018	0.043		LDL*	
TSS	1.0	2.41		LDL*	
URANIUM	0.094	0.227		9.7e-4	0.002
VANADIUM	LDL*			LDL*	
ZINC	0.2	0.482		0.052	0.119
pH	7.02			7.85	

Volume of Flow: Influent = 2,276,465.0 liters   Final = 2,282,258.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

**Prematurely discarded sample. Conductivity, Sulfate, and Total Cations not available.

TA50 MINERALS

APR-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	74.0	143.157		430.0	823.086
ALKALINITY-P*	LDL*			21.0	40.197
ALUMINUM	LDL*			LDL*	
AMMONIA-N	4.35	8.415		2.86	5.474
ANTIMONY	7.0e-4	0.001		LDL*	
ARSENIC	0.001	0.002		LDL*	
BARIUM	0.031	0.06		LDL*	
BERYLLIUM	LDL*			LDL*	
BORON	0.042	0.081		LDL*	
CADMIUM	LDL*			LDL*	
CALCIUM	15.0	29.018		2.3	4.403
CHLORIDE	21.62	41.825		5.45	10.432
COBALT	LDL*			LDL*	
COD	36.0	69.644		6.0	11.485
CONDUCTIVITY*	269.0			667.0	
COPPER	0.081	0.157		0.019	0.036
CYANIDE	0.03	0.058		0.02	0.038
FLUORIDE	0.67	1.296		0.1	0.191
HARDNESS*	52.28	101.138		LDL*	
IRON	1.3	2.515		LDL*	
LEAD	0.022	0.043		LDL*	
MAGNESIUM	3.6	6.964		LDL*	
MERCURY	0.009	0.017		LDL*	
NICKEL	LDL*			LDL*	
NITRATE-N	6.1	11.801		0.49	0.938
PHOSPHORUS	1.8	3.482		0.03	0.057
POTASSIUM	3.9	7.545		LDL*	
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	9.0	17.411		2.0	3.828
SILICON	40.0	77.382		2.2	4.211
SILVER	LDL*			LDL*	
SODIUM	32.0	61.906		180.0	344.548
SULFATE	16.22	31.378		15.0	28.712
TDS	468.0	905.368		428.0	819.257
THALLIUM	2.7e-4	5.223e-4		7.0e-5	1.34e-4
TOTAL CATIONS*	2.79			9.04	
TOTAL CHROMIUM	0.014	0.027		LDL*	
TSS	4.0	7.738		LDL*	
URANIUM	0.026	0.05		LDL*	
VANADIUM	LDL*			LDL*	
ZINC	0.33	0.638		LDL*	
pH	7.97			8.29	

Volume of Flow: Influent = 1,792,235.0 liters   Final = 1,914,153.0 liters

*Alkalinities and hardness as mg CaCO3/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

MAY-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	64.0	81.816		380.0	475.592
ALKALINITY-P*	LDL*			13.0	16.27
ALUMINUM	LDL*			LDL*	
AMMONIA-N	0.57	0.729		0.15	0.188
ANTIMONY	6.0e-4	7.67e-4		LDL*	
ARSENIC	0.001	0.001		LDL*	
BARIUM	0.027	0.035		0.002	0.003
BERYLLIUM	0.003	0.004		LDL*	
BORON	0.056	0.072		0.047	0.059
CADMIUM	LDL*			LDL*	
CALCIUM	14.0	17.897		2.4	3.004
CHLORIDE	15.1	19.304		8.72	10.914
COBALT	LDL*			LDL*	
COD	16.0	20.454		20.0	25.031
CONDUCTIVITY*	102.0			323.0	
COPPER	0.044	0.056		0.012	0.015
CYANIDE	LDL*			LDL*	
FLUORIDE	0.88	1.125		0.16	0.2
HARDNESS*	49.371	63.115		LDL*	
IRON	LDL*			LDL*	
LEAD	LDL*			LDL*	
MAGNESIUM	3.5	4.474		LDL*	
MERCURY	0.002	0.003		1.4e-4	1.752e-4
NICKEL	0.013	0.017		LDL*	
NITRATE-N	2.82	3.605		0.39	0.488
PHOSPHORUS	1.69	2.16		0.03	0.038
POTASSIUM	5.5	7.031		2.5	3.129
SELENIUM	0.002	0.003		LDL*	
SILICA DIOXIDE	79.0	100.992		9.0	11.264
SILICON	41.0	52.414		4.9	6.133
SILVER	0.008	0.01		LDL*	
SODIUM	22.0	28.124		170.0	212.765
SULFATE	19.2	24.545		30.1	37.672
TDS	202.0	258.233		404.0	505.63
THALLIUM	1.2e-4	1.534e-4		LDL*	
TOTAL CATIONS*	2.25			8.54	
TOTAL CHROMIUM	0.015	0.019		LDL*	
TSS	LDL*			LDL*	
URANIUM	0.017	0.022		5.9e-4	7.384e-4
VANADIUM	LDL*			LDL*	
ZINC	0.11	0.141		LDL*	
pH	8.63			8.24	

Volume of Flow: Influent = 1,254,797.0 liters   Final = 1,251,559.0 liters

*Alkalinities and hardness as mg CaC03/l.   *Conductivity as uS/cm.   *Total Cations as meq/l.   Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

JUN-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	31.0	52.46		196.0	317.455
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.52	0.88		LDL*	
AMMONIA-N	2.31	3.909		6.34	10.269
ANTIMONY	0.001	0.002		LDL*	
ARSENIC	LDL*			LDL*	
BARIUM	0.047	0.08		0.001	0.002
BERYLLIUM	0.011	0.019		0.002	0.003
BORON	0.1	0.169		0.06	0.097
CADMIUM	0.005	0.008		LDL*	
CALCIUM	14.0	23.692		4.9	7.936
CHLORIDE	29.1	49.245		5.4	8.746
COBALT	LDL*			LDL*	
COD	54.0	91.382		16.0	25.915
CONDUCTIVITY*	211.0			543.0	
COPPER	0.48	0.812		0.01	0.016
CYANIDE	LDL*			LDL*	
FLUORIDE	1.23	2.081		0.25	0.405
HARDNESS*	49.783	84.245		13.1	21.218
IRON	1.4	2.369		0.1	0.162
LEAD	LDL*			LDL*	
MAGNESIUM	3.6	6.092		0.21	0.34
MERCURY	0.01	0.017		2.0e-5	3.239e-5
NICKEL	0.097	0.164		LDL*	
NITRATE-N	52.1	88.166		4.47	7.24
PHOSPHORUS	2.34	3.96		0.08	0.13
POTASSIUM	6.5	11.0		2.0	3.239
SELENIUM	0.002	0.003		LDL*	
SILICA DIOXIDE	85.0	143.841		13.0	21.056
SILICON	35.0	59.229		5.9	9.556
SILVER	0.013	0.022		LDL*	
SODIUM	37.0	62.613		97.0	157.108
SULFATE	LDL*			46.9	75.962
TDS	304.0	514.444		352.0	570.122
THALLIUM	LDL*			LDL*	
TOTAL CATIONS*	2.8			5.37	
TOTAL CHROMIUM	0.018	0.03		0.003	0.005
TSS	6.0	10.154		LDL*	
URANIUM	0.82	1.388		0.005	0.008
VANADIUM	LDL*			LDL*	
ZINC	0.18	0.305		0.04	0.065
pH	6.95			8.0	

Volume of Flow: Influent = 1,516,494.0 liters Final = 1,619,666.0 liters

*Alkalinities and hardness as mg CaCO3/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

JUL-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	49.0	91.497		326.0	600.013
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.41	0.766		LDL*	
AMMONIA-N	5.49	10.251		0.75	1.38
ANTIMONY	0.001	0.002		LDL*	
ARSENIC	0.001	0.002		LDL*	
BARIUM	0.031	0.058		LDL*	
BERYLLIUM	0.003	0.006		LDL*	
BORON	0.071	0.133		0.067	0.123
CADMIUM	0.002	0.004		LDL*	
CALCIUM	15.0	28.009		0.92	1.693
CHLORIDE	26.2	48.923		4.74	8.724
COBALT	LDL*			LDL*	
COD	LDL*			35.0	64.419
CONDUCTIVITY*	333.0			586.0	
COPPER	0.32	0.598		LDL*	
CYANIDE	LDL*			0.01	0.018
FLUORIDE	7.26	13.557		0.43	0.791
HARDNESS*	51.456	96.083		2.586	4.76
IRON	0.94	1.755		0.071	0.131
LEAD	LDL*			LDL*	
MAGNESIUM	3.4	6.349		0.07	0.129
MERCURY	0.004	0.007		2.0e-5	3.681e-5
NICKEL	0.21	0.392		LDL*	
NITRATE-N	7.19	13.426		3.3	6.074
PHOSPHORUS	14.6	27.262		0.03	0.055
POTASSIUM	5.2	9.71		1.7	3.129
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	81.0	151.25		3.0	5.522
SILICON	39.0	72.824		2.3	4.233
SILVER	0.027	0.05		0.005	0.009
SODIUM	40.0	74.692		160.0	294.485
SULFATE	20.1	37.533		6.85	12.608
TDS	244.0	455.619		368.0	677.315
THALLIUM	1.2e-4	2.241e-4		5.0e-5	9.203e-5
TOTAL CATIONS*	3.04			7.03	
TOTAL CHROMIUM	0.014	0.026		0.004	0.007
TSS	2.0	3.735		LDL*	
URANIUM	0.237	0.443		0.014	0.026
VANADIUM	LDL*			LDL*	
ZINC	0.16	0.299		LDL*	
pH	9.21			8.4	

Volume of Flow: Influent = 1,570,310.0 liters Final = 1,840,530.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

AUG-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	49.0	81.943		296.0	479.421
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.29	0.485		LDL*	
AMMONIA-N	4.97	8.311		7.16	11.597
ANTIMONY	0.002	0.003		0.001	0.002
ARSENIC	0.001	0.002		LDL*	
BARIUM	0.028	0.047		LDL*	
BERYLLIUM	0.001	0.002		LDL*	
BORON	LDL*			LDL*	
CADMIUM	0.002	0.003		LDL*	
CALCIUM	13.0	21.74		3.7	5.993
CHLORIDE	22.7	37.961		10.3	16.683
COBALT	LDL*			LDL*	
COD	55.0	91.977		15.0	24.295
CONDUCTIVITY*	218.0			648.0	
COPPER	0.27	0.452		0.011	0.018
CYANIDE	LDL*			0.01	0.016
FLUORIDE	0.54	0.903		0.24	0.389
HARDNESS*	47.286	79.077		9.857	15.965
IRON	0.65	1.087		0.079	0.128
LEAD	LDL*			LDL*	
MAGNESIUM	3.6	6.02		0.15	0.243
MERCURY	2.8e-4	4.682e-4		8.0e-5	1.296e-4
NICKEL	LDL*			0.012	0.019
NITRATE-N	5.4	9.03		2.47	4.001
PHOSPHORUS	1.18	1.973		0.23	0.373
POTASSIUM	3.7	6.188		1.7	2.753
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	82.0	137.129		11.0	17.816
SILICON	38.0	63.548		4.7	7.612
SILVER	0.006	0.01		LDL*	
SODIUM	25.0	41.808		140.0	226.753
SULFATE	13.8	23.078		27.1	43.893
TDS	244.0	408.042		296.0	479.421
THALLIUM	8.0e-4	0.001		7.0e-4	0.001
TOTAL CATIONS*	2.8			6.92	
TOTAL CHROMIUM	0.011	0.018		LDL*	
TSS	3.0	5.017		LDL*	
URANIUM	0.074	0.124		0.022	0.036
VANADIUM	LDL*			LDL*	
ZINC	0.35	0.585		0.031	0.05
pH	7.4			7.92	

Volume of Flow: Influent = 1,540,571.0 liters Final = 1,619,667.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

SEP-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	46.0	53.191		166.0	194.961
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.26	0.301		LDL*	
AMMONIA-N	4.36	5.042		4.38	5.144
ANTIMONY	8.0e-4	9.251e-4		9.0e-4	0.001
ARSENIC	0.001	0.001		LDL*	
BARIUM	0.029	0.034		0.002	0.002
BERYLLIUM	0.003	0.003		LDL*	
BORON	0.046	0.053		0.051	0.06
CADMIUM	0.003	0.003		LDL*	
CALCIUM	12.0	13.876		33.0	38.757
CHLORIDE	23.3	26.942		16.5	19.379
COBALT	LDL*			LDL*	
COD	42.0	48.565		20.0	23.489
CONDUCTIVITY*	315.0			623.0	
COPPER	0.22	0.254		0.044	0.052
CYANIDE	LDL*			LDL*	
FLUORIDE	0.8	0.925		0.71	0.834
HARDNESS*	44.789	51.79		84.131	98.809
IRON	0.96	1.11		0.055	0.065
LEAD	0.069	0.08		LDL*	
MAGNESIUM	3.6	4.163		0.42	0.493
MERCURY	0.004	0.005		4.0e-5	4.698e-5
NICKEL	0.59	0.682		0.046	0.054
NITRATE-N	5.03	5.816		4.18	4.909
PHOSPHORUS	6.91	7.99		0.14	0.164
POTASSIUM	3.8	4.394		5.0	5.872
SELENIUM	0.003	0.003		0.002	0.002
SILICA DIOXIDE	79.0	91.349		46.0	54.025
SILICON	38.0	43.94		22.0	25.838
SILVER	0.019	0.022		LDL*	
SODIUM	25.0	28.908		110.0	129.191
SULFATE	15.8	18.27		108.0	126.842
TDS	234.0	270.578		332.0	389.921
THALLIUM	3.6e-4	4.163e-4		LDL*	
TOTAL CATIONS*	2.8			6.4	
TOTAL CHROMIUM	0.026	0.03		LDL*	
TSS	15.0	17.345		3.0	3.523
URANIUM	0.109	0.126		0.019	0.022
VANADIUM	0.006	0.007		0.005	0.006
ZINC	0.12	0.139		LDL*	
pH	7.36			8.02	

Volume of Flow: Influent = 1,153,587.0 liters   Final = 1,174,461.0 liters

*Alkalinities and hardness as mg CaC03/l.   *Conductivity as uS/cm.   *Total Cations as meq/l.   Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

OCT-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	46.0	63.353		176.0	255.907
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	4.7	6.473		LDL*	
AMMONIA-N	3.72	5.123		3.12	4.537
ANTIMONY	0.047	0.065		0.02	0.029
ARSENIC	0.001	0.001		LDL*	
BARIUM	0.036	0.05		0.002	0.003
BERYLLIUM	0.003	0.004		LDL*	
BORON	0.043	0.059		0.053	0.077
CADMIUM	0.007	0.01		0.003	0.004
CALCIUM	13.0	17.904		63.0	91.603
CHLORIDE	16.3	22.449		25.2	36.641
COBALT	LDL*			LDL*	
COD	44.0	60.598		29.0	42.166
CONDUCTIVITY*	524.0			882.0	
COPPER	0.57	0.785		0.037	0.054
CYANIDE	LDL*			LDL*	
FLUORIDE	0.63	0.868		0.7	1.018
HARDNESS*	48.109	66.257		157.682	229.272
IRON	2.1	2.892		0.03	0.044
LEAD	0.16	0.22		LDL*	
MAGNESIUM	3.8	5.233		0.09	0.131
MERCURY	0.003	0.004		6.0e-5	8.724e-5
NICKEL	0.14	0.193		0.04	0.058
NITRATE-N	5.02	6.914		7.45	10.832
PHOSPHORUS	1.75	2.41		0.35	0.509
POTASSIUM	4.6	6.335		6.0	8.724
SELENIUM	0.002	0.003		0.002	0.003
SILICA DIOXIDE	76.0	104.67		49.0	71.247
SILICON	39.0	53.712		23.0	33.442
SILVER	0.01	0.014		0.005	0.007
SODIUM	76.0	104.67		130.0	189.022
SULFATE	125.0	172.154		188.0	273.355
TDS	426.0	586.7		578.0	840.422
THALLIUM	1.6e-4	2.204e-4		8.0e-5	1.163e-4
TOTAL CATIONS*	4.43			8.2	
TOTAL CHROMIUM	0.045	0.062		LDL*	
TSS	34.0	46.826		8.0	11.632
URANIUM	0.11	0.151		4.0e-4	5.816e-4
VANADIUM	LDL*			LDL*	
ZINC	0.16	0.22		LDL*	
pH	7.06			7.95	

Volume of Flow: Influent = 1,404,635.0 liters Final = 1,454,017.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

NOV-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	52.0	62.429		226.0	247.279
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	LDL*			LDL*	
AMMONIA-N	2.43	2.917		3.71	4.059
ANTIMONY	0.002	0.002		0.005	0.005
ARSENIC	0.001	0.001		LDL*	
BARIUM	0.032	0.038		0.002	0.002
BERYLLIUM	0.001	0.001		LDL*	
BORON	0.041	0.049		0.042	0.046
CADMIUM	LDL*			LDL*	
CALCIUM	12.9	15.487		58.8	64.336
CHLORIDE	12.8	15.367		20.5	22.43
COBALT	LDL*			LDL*	
COD	48.0	57.627		32.0	35.013
CONDUCTIVITY*	220.0			737.0	
COPPER	0.172	0.206		0.031	0.034
CYANIDE	LDL*			LDL*	
FLUORIDE	0.61	0.732		0.49	0.536
HARDNESS*	46.871	56.271		147.771	161.685
IRON	1.18	1.417		0.03	0.033
LEAD	0.08	0.096		LDL*	
MAGNESIUM	3.56	4.274		0.23	0.252
MERCURY	0.002	0.002		8.0e-5	8.753e-5
NICKEL	0.04	0.048		LDL*	
NITRATE-N	4.18	5.018		5.29	5.788
PHOSPHORUS	1.62	1.945		0.13	0.142
POTASSIUM	4.6	5.523		5.1	5.58
SELENIUM	0.002	0.002		0.002	0.002
SILICA DIOXIDE	79.0	94.844		41.0	44.86
SILICON	39.2	47.062		19.0	20.789
SILVER	0.01	0.012		LDL*	
SODIUM	23.8	28.573		112.0	122.545
SULFATE	13.4	16.087		105.0	114.886
TDS	260.0	312.144		498.0	544.89
THALLIUM	1.9e-4	2.281e-4		9.0e-5	9.847e-5
TOTAL CATIONS*	2.8			7.62	
TOTAL CHROMIUM	0.027	0.032		0.003	0.003
TSS	11.0	13.206		2.0	2.188
URANIUM	0.055	0.066		0.003	0.003
VANADIUM	LDL*			LDL*	
ZINC	0.15	0.18		LDL*	
pH	7.34			8.18	

Volume of Flow: Influent = 1,111,894.0 liters Final = 1,094,156.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

DEC-2000

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	68.0	38.988		188.0	200.926
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.6	0.344		LDL*	
AMMONIA-N	4.23	2.425		3.35	3.58
ANTIMONY	0.004	0.002		0.003	0.003
ARSENIC	0.001	5.734e-4		LDL*	
BARIUM	0.029	0.017		0.008	0.009
BERYLLIUM	0.003	0.002		0.001	0.001
BORON	0.044	0.025		0.045	0.048
CADMIUM	0.028	0.016		LDL*	
CALCIUM	11.7	6.708		43.0	45.957
CHLORIDE	104.0	59.629		32.2	34.414
COBALT	LDL*			LDL*	
COD	69.0	39.562		15.0	16.031
CONDUCTIVITY*	615.0			779.0	
COPPER	1.18	0.677		0.064	0.068
CYANIDE	LDL*			LDL*	
FLUORIDE	1.08	0.619		0.52	0.556
HARDNESS*	43.01	24.66		108.4	115.853
IRON	4.04	2.316		0.33	0.353
LEAD	0.1	0.057		LDL*	
MAGNESIUM	3.35	1.921		0.25	0.267
MERCURY	0.007	0.004		7.6e-4	8.123e-4
NICKEL	0.25	0.143		LDL*	
NITRATE-N	4.97	2.85		4.56	4.874
PHOSPHORUS	5.79	3.32		0.03	0.032
POTASSIUM	3.7	2.121		4.4	4.703
SELENIUM	0.002	0.001		LDL*	
SILICA DIOXIDE	78.0	44.722		35.0	37.406
SILICON	30.8	17.659		16.9	18.062
SILVER	0.003	0.002		LDL*	
SODIUM	93.8	53.781		119.0	127.182
SULFATE	19.2	11.008		103.0	110.082
TDS	354.0	202.969		1.0	1.069
THALLIUM	2.0e-4	1.147e-4		3.0e-4	3.206e-4
TOTAL CATIONS*	5.36			7.33	
TOTAL CHROMIUM	0.123	0.071		0.009	0.01
TSS	17.0	9.747		LDL*	
URANIUM	0.131	0.075		0.027	0.029
VANADIUM	LDL*			LDL*	
ZINC	0.25	0.143		LDL*	
pH	7.42			7.98	

Volume of Flow: Influent = 782,933.0 liters Final = 1,068,756.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

Volume 2
Chapter
4

VOC, SVOC Results, TA-50: By Sample

LEGEND

For VOC/SVOC Results Tables

Sample Number Format	Sample Site
Pmmyy.dd	TA-50 Plant Raw Feed
50Smmyy.dd	TA-50 Vacuum Filter Sludge
DP257mmyy.dd	TA21-257 Raw Feed

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

VOC results by sample for TA50 Plant Feed

01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2000	P0100.04	1,1,1-TRICHLOROETHANE		0.008	0.005
04-JAN-2000	P0100.04	ACETONE		0.17	0.02
04-JAN-2000	P0100.04	CHLOROFORM	<	0.005	0.005
04-JAN-2000	P0100.04	METHYLENE CHLORIDE	<	0.005	0.005
11-JAN-2000	P0100.11	1,1,1-TRICHLOROETHANE	<	0.005	0.005
11-JAN-2000	P0100.11	2-BUTANONE	<	0.02	0.02
11-JAN-2000	P0100.11	ACETONE		0.12	0.02
11-JAN-2000	P0100.11	CHLOROFORM	<	0.005	0.005
11-JAN-2000	P0100.11	METHYLENE CHLORIDE	<	0.005	0.005
18-JAN-2000	P0100.18	1,1,1-TRICHLOROETHANE		0.002	1.5e-4
18-JAN-2000	P0100.18	CHLOROFORM		0.001	1.4e-4
18-JAN-2000	P0100.18	METHYLENE CHLORIDE		0.003	3.1e-4
25-JAN-2000	P0100.25	1,1,1-TRICHLOROETHANE		0.005	5.0e-4
25-JAN-2000	P0100.25	2-BUTANONE		0.013	0.001
25-JAN-2000	P0100.25	CHLOROFORM		0.001	1.2e-4
31-JAN-2000	P0100.31	1,1,1-TRICHLOROETHANE		0.002	2.2e-4
31-JAN-2000	P0100.31	2-BUTANONE		0.01	0.001
31-JAN-2000	P0100.31	CHLOROFORM		0.001	1.2e-4
31-JAN-2000	P0100.31	METHYLENE CHLORIDE		0.004	4.1e-4
08-FEB-2000	P0200.08	1,1,1-TRICHLOROETHANE		0.001	1.3e-4
08-FEB-2000	P0200.08	ACETONE		0.21	0.021
08-FEB-2000	P0200.08	CHLOROFORM		9.3e-4	9.3e-5
16-FEB-2000	P0200.16	1,1,1-TRICHLOROETHANE		0.003	3.1e-4
16-FEB-2000	P0200.16	1,1-DICHLOROETHANE		4.4e-4	4.4e-5
16-FEB-2000	P0200.16	CHLOROFORM		0.001	1.4e-4
22-FEB-2000	P0200.22	1,1-DICHLOROETHANE		6.9e-4	6.9e-5
22-FEB-2000	P0200.22	2-BUTANONE		0.007	7.2e-4
22-FEB-2000	P0200.22	CHLOROFORM		9.0e-4	9.0e-5
22-FEB-2000	P0200.22	NAPHTHALENE		9.7e-4	9.7e-5
29-FEB-2000	P0200.29	1,1,1-TRICHLOROETHANE		0.001	1.2e-4
29-FEB-2000	P0200.29	CHLOROFORM		5.3e-4	5.3e-5
07-MAR-2000	P0300.07	1,1,1-TRICHLOROETHANE		0.002	1.8e-4
07-MAR-2000	P0300.07	CHLOROFORM		0.002	2.4e-4
14-MAR-2000	P0300.14	1,1-DICHLOROETHANE		0.001	1.1e-4
14-MAR-2000	P0300.14	2-BUTANONE		0.007	7.3e-4
20-MAR-2000	P0300.20	1,1,1-TRICHLOROETHANE		7.5e-4	7.5e-5
20-MAR-2000	P0300.20	2-BUTANONE		0.009	9.4e-4
20-MAR-2000	P0300.20	CHLOROFORM		3.5e-4	3.5e-5
28-MAR-2000	P0300.28	1,1,1-TRICHLOROETHANE		0.004	3.7e-4
28-MAR-2000	P0300.28	CHLOROFORM		7.3e-4	7.3e-5
28-MAR-2000	P0300.28	METHYLENE CHLORIDE		0.005	4.7e-4
03-APR-2000	P0400.03	1,1,1-TRICHLOROETHANE		0.002	1.9e-4
03-APR-2000	P0400.03	METHYLENE CHLORIDE		0.005	5.0e-4
11-APR-2000	P0400.11	1,1,1-TRICHLOROETHANE		0.003	2.7e-4
11-APR-2000	P0400.11	CHLOROFORM		8.0e-4	8.0e-5
11-APR-2000	P0400.11	NAPHTHALENE		5.8e-4	5.8e-5
17-APR-2000	P0400.17	1,2,4-TRIMETHYLBENZENE		0.002	1.5e-4
17-APR-2000	P0400.17	2-BUTANONE		0.008	7.9e-4
17-APR-2000	P0400.17	ACETONE		1.4	0.14
17-APR-2000	[illegible].17	CHLOROFORM		5.6e-4	5.6e-5

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

VOC results by sample for TA50 Plant Feed

01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
17-APR-2000	P0400.17	METHYLENE CHLORIDE		0.002	1.8e-4
17-APR-2000	P0400.17	NAPHTHALENE		0.003	2.9e-4
17-APR-2000	P0400.17	TOLUENE		0.001	1.1e-4
25-APR-2000	P0400.25	1,1,1-TRICHLOROETHANE		0.001	1.2e-4
25-APR-2000	P0400.25	1,2,4-TRIMETHYLBENZENE		0.29	0.029
25-APR-2000	P0400.25	1,3,5-TRIMETHYLBENZENE		9.3e-4	9.3e-5
25-APR-2000	P0400.25	2-BUTANONE		0.007	6.5e-4
25-APR-2000	P0400.25	ACETONE		1.1	0.11
25-APR-2000	P0400.25	CHLOROFORM		4.7e-4	4.7e-5
25-APR-2000	P0400.25	CHLOROMETHANE		6.4e-4	6.4e-5
25-APR-2000	P0400.25	METHYLENE CHLORIDE		0.004	4.3e-4
01-MAY-2000	P0500.01	1,2,4-TRIMETHYLBENZENE		7.8e-4	7.8e-5
01-MAY-2000	P0500.01	NAPHTHALENE		0.002	1.6e-4
23-MAY-2000	P0500.23	1,2,4-TRIMETHYLBENZENE		7.8e-4	7.8e-5
23-MAY-2000	P0500.23	ACETONE		0.019	0.002
23-MAY-2000	P0500.23	CHLOROFORM		2.6e-4	2.6e-5
23-MAY-2000	P0500.23	NAPHTHALENE		0.001	1.1e-4
30-MAY-2000	P0500.30	CHLOROFORM		3.0e-4	3.0e-5
06-JUN-2000	P0600.06	1,2,4-TRIMETHYLBENZENE		0.002	1.5e-4
06-JUN-2000	P0600.06	METHYLENE CHLORIDE		0.002	2.2e-4
12-JUN-2000	P0600.12	CHLOROFORM		6.9e-4	6.9e-5
12-JUN-2000	P0600.12	METHYLENE CHLORIDE		0.002	1.6e-4
12-JUN-2000	P0600.12	NAPHTHALENE		5.2e-4	5.2e-5
20-JUN-2000	P0600.20	1,2,4-TRIMETHYLBENZENE		0.003	3.3e-4
20-JUN-2000	P0600.20	1,2-DICHLOROETHANE		6.5e-4	6.5e-5
20-JUN-2000	P0600.20	BROMODICHLOROMETHANE		0.002	2.4e-4
20-JUN-2000	P0600.20	BROMOFORM		0.001	1.4e-4
20-JUN-2000	P0600.20	CHLOROFORM		0.003	3.0e-4
20-JUN-2000	P0600.20	DIBROMOCHLOROMETHANE		0.002	2.1e-4
20-JUN-2000	P0600.20	METHYLENE CHLORIDE		0.002	2.2e-4
20-JUN-2000	P0600.20	NAPHTHALENE		9.6e-4	9.6e-5
20-JUN-2000	P0600.20	TOLUENE		7.8e-4	7.8e-5
20-JUN-2000	P0600.20	TRICHLOROTRIFLUOROETHANE		0.002	1.5e-4
28-JUN-2000	P0600.28	1,2,4-TRIMETHYLBENZENE		0.001	1.0e-4
28-JUN-2000	P0600.28	CHLOROFORM		0.002	1.7e-4
28-JUN-2000	P0600.28	DIBROMOMETHANE		6.2e-4	6.2e-5
28-JUN-2000	P0600.28	METHYLENE CHLORIDE		0.003	2.6e-4
28-JUN-2000	P0600.28	TOLUENE		0.002	1.5e-4
06-JUL-2000	P0700.06	CHLOROFORM		6.7e-4	6.7e-5
06-JUL-2000	P0700.06	METHYLENE CHLORIDE		0.008	8.1e-4
06-JUL-2000	P0700.06	NAPHTHALENE		8.9e-4	8.9e-5
10-JUL-2000	P0700.10	CHLOROFORM		8.0e-4	8.0e-5
10-JUL-2000	P0700.10	METHYLENE CHLORIDE		0.008	7.8e-4
10-JUL-2000	P0700.10	TOLUENE		6.7e-4	6.7e-5
18-JUL-2000	P0700.18	CHLOROFORM		3.5e-4	3.5e-5
18-JUL-2000	P0700.18	METHYLENE CHLORIDE		0.022	0.002
18-JUL-2000	P0700.18	NAPHTHALENE		0.001	1.4e-4
18-JUL-2000	P0700.18	TOLUENE		0.001	1.1e-4
26-JUL-2000	P0700.26	ACETONE		0.012	0.001
26-JUL-2000	P0700.26	CHLOROFORM		5.2e-4	5.2e-5

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by sample for TA50 Plant Feed
01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species	Concentration (mg/l)	Uncertainty (mg/l)
01-AUG-2000	P0800.01	ACETONE	0.014	0.001
01-AUG-2000	P0800.01	CHLOROFORM	4.5e-4	4.5e-5
01-AUG-2000	P0800.01	METHYLENE CHLORIDE	0.002	1.6e-4
01-AUG-2000	P0800.01	NAPHTHALENE	5.9e-4	5.9e-5
01-AUG-2000	P0800.01	UNKNOWN1	0.032	0.003
08-AUG-2000	P0800.08	CHLOROFORM	7.6e-4	7.6e-5
14-AUG-2000	P0800.14	CHLOROFORM	5.6e-4	5.6e-5
14-AUG-2000	P0800.14	NAPHTHALENE	5.2e-4	5.2e-5
22-AUG-2000	P0800.22	CHLOROFORM	7.2e-4	7.2e-5
22-AUG-2000	P0800.22	METHYLENE CHLORIDE	0.007	7.4e-4
22-AUG-2000	P0800.22	TOLUENE	9.0e-4	9.0e-5
29-AUG-2000	P0800.29	2-BUTANONE	0.011	0.001
29-AUG-2000	P0800.29	CHLOROFORM	8.1e-4	8.1e-5
29-AUG-2000	P0800.29	METHYLENE CHLORIDE	0.008	8.0e-4
05-SEP-2000	P0900.05	CHLOROFORM	3.1e-4	3.1e-5
05-SEP-2000	P0900.05	METHYLENE CHLORIDE	0.002	2.5e-4
05-SEP-2000	P0900.05	UNKNOWN1	0.005	5.23e-4
11-SEP-2000	P0900.11	CHLOROFORM	4.4e-4	4.4e-5
19-SEP-2000	P0900.19	CHLOROFORM	0.001	1.1e-4
19-SEP-2000	P0900.19	UNKNOWN1	0.01	0.001
02-OCT-2000	P1000.02	ACETONITRILE	0.011	0.001
02-OCT-2000	P1000.02	METHYLENE CHLORIDE	0.002	2.2e-4
02-OCT-2000	P1000.02	UNKNOWN1	0.047	0.005
10-OCT-2000	P1000.10	METHYLENE CHLORIDE	0.003	2.6e-4
10-OCT-2000	P1000.10	NAPHTHALENE	8.8e-4	8.8e-5
10-OCT-2000	P1000.10	TOLUENE	6.1e-4	6.1e-5
16-OCT-2000	P1000.16	2-BUTANONE	0.005	5.2e-4
16-OCT-2000	P1000.16	METHYLENE CHLORIDE	0.006	6.0e-4
23-OCT-2000	P1000.23	ACETONE	0.013	0.001
23-OCT-2000	P1000.23	METHYLENE CHLORIDE	0.002	2.0e-4
01-NOV-2000	P1100.01	ACETONE	0.86	0.086
01-NOV-2000	P1100.01	ACETONITRILE	0.005	5.4e-4
01-NOV-2000	P1100.01	CHLOROMETHANE	7.3e-4	7.3e-5
01-NOV-2000	P1100.01	METHYLENE CHLORIDE	0.006	6.1e-4
01-NOV-2000	P1100.01	OXYGENATED HYDROCARBON1	0.006	6.0e-4
06-NOV-2000	P1100.06	1,2-DICHLOROETHANE	8.4e-4	8.4e-5
06-NOV-2000	P1100.06	2-BUTANONE	0.011	0.001
06-NOV-2000	P1100.06	ACETONE	1.3	0.13
06-NOV-2000	P1100.06	METHYLENE CHLORIDE	0.002	2.1e-4
06-NOV-2000	P1100.06	OXYGENATED HYDROCARBON1	0.009	9.1e-4
13-NOV-2000	P1100.13	1,2-DICHLOROETHANE	7.5e-4	7.5e-5
13-NOV-2000	P1100.13	METHYLENE CHLORIDE	0.008	7.5e-4
20-NOV-2000	P1100.20	ACETONE	0.058	0.006
30-NOV-2000	P1100.30	2-BUTANONE	0.009	8.7e-4
30-NOV-2000	P1100.30	BROMODICHLOROMETHANE	0.002	2.3e-4
30-NOV-2000	P1100.30	BROMOFORM	0.002	1.5e-4
30-NOV-2000	P1100.30	CHLOROFORM	0.002	1.9e-4
30-NOV-2000	P1100.30	DIBROMOCHLOROMETHANE	0.002	2.4e-4
30-NOV-2000	P1100.30	METHYLENE CHLORIDE	0.002	1.8e-4
04-DEC-2000	P1200.04	1,2,4-TRIMETHYLBENZENE	0.001	1.1e-4

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by sample for TA50 Plant Sludge
01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2000	50S0100.04	METHYLENE CHLORIDE		0.024	0.002
04-JAN-2000	50S0100.04	TOLUENE		0.004	3.5e-4
04-JAN-2000	50S0100.04	TRICHLOROFLUOROMETHANE		0.01	9.5e-4
08-FEB-2000	50S0200.08	1,2,4-TRIMETHYLBENZENE		8.1e-4	8.1e-5
08-FEB-2000	50S0200.08	METHYLENE CHLORIDE		0.003	2.8e-4
08-FEB-2000	50S0200.08	NAPHTHALENE		0.001	1.3e-4
08-FEB-2000	50S0200.08	STYRENE		0.002	1.5e-4
08-FEB-2000	50S0200.08	TOLUENE		0.002	1.5e-4
06-MAR-2000	50S0300.08	METHYLENE CHLORIDE		0.042	0.004
06-MAR-2000	50S0300.08	TOLUENE		0.004	3.8e-4
04-APR-2000	50S0400.04	METHYLENE CHLORIDE		0.032	0.003
04-APR-2000	50S0400.04	TOLUENE		0.003	3.4e-4
14-JUN-2000	50S0600.14	METHYLENE CHLORIDE		0.035	0.004
05-OCT-2000	50S1000.05	2-BUTANONE		0.033	0.003
05-OCT-2000	50S1000.05	METHYLENE CHLORIDE		0.027	0.003
21-DEC-2000	50S1200.21	METHYLENE CHLORIDE		0.008	7.8e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by sample for TA50 Plant Feed
01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-DEC-2000	P1200.04	2-BUTANONE		0.006	5.6e-4
04-DEC-2000	P1200.04	4-METHYL-2-PENTANONE		0.005	4.5e-4
04-DEC-2000	P1200.04	BROMODICHLOROMETHANE		9.7e-4	9.7e-5
04-DEC-2000	P1200.04	BROMOFORM		0.005	4.9e-4
04-DEC-2000	P1200.04	CHLOROFORM		0.001	1.3e-4
04-DEC-2000	P1200.04	DIBROMOCHLOROMETHANE		0.002	2.1e-4
12-DEC-2000	P1200.12	2-BUTANONE		0.007	7.1e-4
12-DEC-2000	P1200.12	CHLOROFORM		0.001	1.2e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by sample for TA50 Plant Feed
01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2000	P0100.04	2,4-DIMETHYLPHENOL		0.011	0.01
04-JAN-2000	P0100.04	BIS(2-ETHYLHEXYL)PHTHALATE	<	0.01	0.01
04-JAN-2000	P0100.04	PYRIDINE	<	0.01	0.01
11-JAN-2000	P0100.11	BIS(2-ETHYLHEXYL)PHTHALATE	<	0.01	0.01
18-JAN-2000	P0100.18	2,4-DIMETHYLPHENOL		0.007	6.9e-4
18-JAN-2000	P0100.18	2,6-DINITROTOLUENE		9.5e-4	9.5e-5
18-JAN-2000	P0100.18	2-CHLOROPHENOL		0.002	2.0e-4
18-JAN-2000	P0100.18	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	7.2e-4
25-JAN-2000	P0100.25	BENZOIC ACID		0.008	8.5e-4
25-JAN-2000	P0100.25	DI-N-BUTYL PHTHALATE		0.002	2.0e-4
25-JAN-2000	P0100.25	DIETHYL PHTHALATE		0.001	1.3e-4
25-JAN-2000	P0100.25	PHENOL		0.007	6.9e-4
31-JAN-2000	P0100.31	2,4,6-TRICHLOROPHENOL		0.004	3.7e-4
31-JAN-2000	P0100.31	2-CHLOROPHENOL		0.003	3.2e-4
31-JAN-2000	P0100.31	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.5e-4
31-JAN-2000	P0100.31	PHENOL		0.006	5.8e-4
08-FEB-2000	P0200.08	2,4-DIMETHYLPHENOL		0.007	7.3e-4
08-FEB-2000	P0200.08	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.0e-4
16-FEB-2000	P0200.16	2,4,6-TRICHLOROPHENOL		0.002	1.6e-4
16-FEB-2000	P0200.16	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.3e-4
22-FEB-2000	P0200.22	2,4-DIMETHYLPHENOL		0.013	0.001
22-FEB-2000	P0200.22	BENZOIC ACID		0.006	5.5e-4
22-FEB-2000	P0200.22	PHENOL		0.002	2.1e-4
29-FEB-2000	P0200.29	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.6e-4
07-MAR-2000	P0300.07	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	2.9e-4
07-MAR-2000	P0300.07	PHENOL		0.002	2.0e-4
14-MAR-2000	P0300.14	2,4-DIMETHYLPHENOL		0.016	0.002
14-MAR-2000	P0300.14	BENZOIC ACID		0.005	4.8e-4
14-MAR-2000	P0300.14	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	5.8e-4
14-MAR-2000	P0300.14	BUTYLBENZYLPHTHALATE		0.002	1.8e-4
20-MAR-2000	P0300.20	BENZOIC ACID		0.008	8.0e-4
20-MAR-2000	P0300.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	6.6e-4
20-MAR-2000	P0300.20	BUTYLBENZYLPHTHALATE		0.001	1.3e-4
20-MAR-2000	P0300.20	PYRIDINE		0.002	2.4e-4
28-MAR-2000	P0300.28	BIS(2-ETHYLHEXYL)PHTHALATE		0.029	0.003
03-APR-2000	P0400.03	BIS(2-ETHYLHEXYL)PHTHALATE		0.012	0.001
11-APR-2000	P0400.11	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	7.3e-4
11-APR-2000	P0400.11	PHENOL		0.005	5.1e-4
17-APR-2000	P0400.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.002	2.3e-4
25-APR-2000	P0400.25	BENZOIC ACID		0.035	0.004
25-APR-2000	P0400.25	BUTYLGLYCOLATE1		4.6	0.46
25-APR-2000	P0400.25	PHENOL		0.005	5.1e-4
01-MAY-2000	P0500.01	BIS(2-ETHYLHEXYL)PHTHALATE		0.004	4.2e-4
23-MAY-2000	P0500.23	DI-N-OCTYL PHTHALATE		0.001	1.2e-4
30-MAY-2000	P0500.30	4-NITROPHENOL		0.003	3.1e-4
30-MAY-2000	P0500.30	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	3.2e-4
12-JUN-2000	P0600.12	2,4,6-TRICHLOROPHENOL		0.005	4.7e-4
12-JUN-2000	P0600.12	2-NITROPHENOL		0.004	3.9e-4
12-JUN-2000	P0600.12	PYRIDINE		0.009	8.8e-4
20-JUN-2000	P0600.20	BENZOIC ACID		0.01	9.5e-4

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

SVOC results by sample for TA50 Plant Feed

01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species	Concentration (mg/l)	Uncertainty (mg/l)
20-JUN-2000	P0600.20	BIS(2-ETHYLHEXYL)PHTHALATE	0.003	2.9e-4
20-JUN-2000	P0600.20	PYRIDINE	0.003	2.9e-4
28-JUN-2000	P0600.28	2-NITROPHENOL	0.002	1.8e-4
28-JUN-2000	P0600.28	NAPHTHALENE	0.001	1.2e-4
28-JUN-2000	P0600.28	PHENOL	0.002	2.2e-4
06-JUL-2000	P0700.06	2,4,6-TRICHLOROPHENOL	0.002	2.4e-4
06-JUL-2000	P0700.06	2,4-DICHLOROPHENOL	0.004	4.1e-4
06-JUL-2000	P0700.06	BIS(2-ETHYLHEXYL)PHTHALATE	0.006	6.3e-4
06-JUL-2000	P0700.06	PYRIDINE	0.002	2.1e-4
10-JUL-2000	P0700.10	BENZOIC ACID	0.02	0.002
10-JUL-2000	P0700.10	BENZYL ALCOHOL	0.006	5.6e-4
10-JUL-2000	P0700.10	BIS(2-ETHYLHEXYL)PHTHALATE	0.017	0.002
10-JUL-2000	P0700.10	NAPHTHALENE	0.001	1.4e-4
10-JUL-2000	P0700.10	PHENOL	0.01	9.5e-4
18-JUL-2000	P0700.18	BIS(2-ETHYLHEXYL)PHTHALATE	0.009	8.6e-4
18-JUL-2000	P0700.18	BUTYLBENZYLPHTHALATE	9.3e-4	9.3e-5
18-JUL-2000	P0700.18	DI-N-BUTYL PHTHALATE	0.004	4.3e-4
26-JUL-2000	P0700.26	BIS(2-ETHYLHEXYL)PHTHALATE	0.005	4.7e-4
01-AUG-2000	P0800.01	BIS(2-ETHYLHEXYL)PHTHALATE	0.002	1.7e-4
08-AUG-2000	P0800.08	BIS(2-ETHYLHEXYL)PHTHALATE	0.004	4.2e-4
14-AUG-2000	P0800.14	BIS(2-ETHYLHEXYL)PHTHALATE	0.002	2.2e-4
22-AUG-2000	P0800.22	BIS(2-ETHYLHEXYL)PHTHALATE	0.005	5.1e-4
22-AUG-2000	P0800.22	NAPHTHALENE	0.002	2.4e-4
29-AUG-2000	P0800.29	2-NITROPHENOL	0.006	6.0e-4
29-AUG-2000	P0800.29	4-NITROPHENOL	0.007	7.0e-4
29-AUG-2000	P0800.29	BIS(2-ETHYLHEXYL)PHTHALATE	0.004	3.8e-4
29-AUG-2000	P0800.29	PYRIDINE	0.009	8.9e-4
11-SEP-2000	P0900.11	BIS(2-ETHYLHEXYL)PHTHALATE	0.003	3.0e-4
19-SEP-2000	P0900.19	BIS(2-ETHYLHEXYL)PHTHALATE	0.006	8.1e-4
25-SEP-2000	P0900.25	BIS(2-ETHYLHEXYL)PHTHALATE	0.006	5.9e-4
25-SEP-2000	P0900.25	PYRIDINE	0.009	8.6e-4
02-OCT-2000	P1000.02	BIS(2-ETHYLHEXYL)PHTHALATE	0.006	8.3e-4
10-OCT-2000	P1000.10	2-NITROPHENOL	0.002	1.8e-4
10-OCT-2000	P1000.10	4-NITROPHENOL	0.002	2.2e-4
10-OCT-2000	P1000.10	BIS(2-ETHYLHEXYL)PHTHALATE	0.003	3.3e-4
01-NOV-2000	P1100.01	BIS(2-ETHYLHEXYL)PHTHALATE	0.008	7.5e-4
13-NOV-2000	P1100.13	BIS(2-ETHYLHEXYL)PHTHALATE	0.005	4.9e-4
13-NOV-2000	P1100.13	PYRIDINE	0.006	8.1e-4
20-NOV-2000	P1100.20	BIS(2-ETHYLHEXYL)PHTHALATE	0.004	4.1e-4
30-NOV-2000	P1100.30	BENZOIC ACID	0.038	0.004
30-NOV-2000	P1100.30	BENZYL ALCOHOL	0.002	2.1e-4
30-NOV-2000	P1100.30	PYRIDINE	0.009	9.3e-4
04-DEC-2000	P1200.04	2-CHLOROPHENOL	0.002	2.2e-4
04-DEC-2000	P1200.04	BIS(2-ETHYLHEXYL)PHTHALATE	0.003	2.8e-4
18-DEC-2000	P1200.18	BENZOIC ACID	0.028	0.003
18-DEC-2000	P1200.18	BIS(2-ETHYLHEXYL)PHTHALATE	0.005	5.0e-4
18-DEC-2000	P1200.18	PYRIDINE	0.009	9.1e-4

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by sample for TA50 Plant Sludge
01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2000	50S0100.04	DI-N-OCTYL PHTHALATE		0.58	0.058
06-MAR-2000	50S0300.06	DI-N-OCTYL PHTHALATE		1.3	0.13
04-APR-2000	50S0400.04	DI-N-OCTYL PHTHALATE		1.2	0.12
14-JUN-2000	50S0600.14	DI-N-OCTYL PHTHALATE		1.0	0.1
05-OCT-2000	50S1000.05	DI-N-OCTYL PHTHALATE		0.68	0.068
21-DEC-2000	50S1200.21	PHENOL		0.88	0.088

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Volume 2
Chapter
5

VOC, SVOC Results, TA-50: By Species

LEGEND

For VOC/SVOC Results Tables

Sample Number Format	Sample Site
Pmmyy.dd	TA-50 Plant Raw Feed
50Smmyy.dd	TA-50 Vacuum Filter Sludge
DP257mmyy.dd	TA21-257 Raw Feed

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

VOC results by species for TA50 Plant Feed

01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2000	P0100.04	1,1,1-TRICHLOROETHANE		0.006	0.005
11-JAN-2000	P0100.11	1,1,1-TRICHLOROETHANE	<	0.005	0.005
18-JAN-2000	P0100.18	1,1,1-TRICHLOROETHANE		0.002	1.5e-4
25-JAN-2000	P0100.25	1,1,1-TRICHLOROETHANE		0.005	5.0e-4
31-JAN-2000	P0100.31	1,1,1-TRICHLOROETHANE		0.002	2.2e-4
08-FEB-2000	P0200.08	1,1,1-TRICHLOROETHANE		0.001	1.3e-4
16-FEB-2000	P0200.16	1,1,1-TRICHLOROETHANE		0.003	3.1e-4
29-FEB-2000	P0200.29	1,1,1-TRICHLOROETHANE		0.001	1.2e-4
07-MAR-2000	P0300.07	1,1,1-TRICHLOROETHANE		0.002	1.8e-4
20-MAR-2000	P0300.20	1,1,1-TRICHLOROETHANE		7.5e-4	7.5e-5
28-MAR-2000	P0300.28	1,1,1-TRICHLOROETHANE		0.004	3.7e-4
03-APR-2000	P0400.03	1,1,1-TRICHLOROETHANE		0.002	1.9e-4
11-APR-2000	P0400.11	1,1,1-TRICHLOROETHANE		0.003	2.7e-4
25-APR-2000	P0400.25	1,1,1-TRICHLOROETHANE		0.001	1.2e-4
16-FEB-2000	P0200.16	1,1-DICHLOROETHANE		4.4e-4	4.4e-5
22-FEB-2000	P0200.22	1,1-DICHLOROETHANE		6.9e-4	6.9e-5
14-MAR-2000	P0300.14	1,1-DICHLOROETHANE		0.001	1.1e-4
17-APR-2000	P0400.17	1,2,4-TRIMETHYLBENZENE		0.002	1.5e-4
25-APR-2000	P0400.25	1,2,4-TRIMETHYLBENZENE		0.29	0.029
01-MAY-2000	P0500.01	1,2,4-TRIMETHYLBENZENE		7.8e-4	7.8e-5
23-MAY-2000	P0500.23	1,2,4-TRIMETHYLBENZENE		7.8e-4	7.8e-5
06-JUN-2000	P0600.06	1,2,4-TRIMETHYLBENZENE		0.002	1.5e-4
20-JUN-2000	P0600.20	1,2,4-TRIMETHYLBENZENE		0.003	3.3e-4
28-JUN-2000	P0600.28	1,2,4-TRIMETHYLBENZENE		0.001	1.0e-4
04-DEC-2000	P1200.04	1,2,4-TRIMETHYLBENZENE		0.001	1.1e-4
20-JUN-2000	P0600.20	1,2-DICHLOROETHANE		6.5e-4	6.5e-5
06-NOV-2000	P1100.06	1,2-DICHLOROETHANE		8.4e-4	8.4e-5
13-NOV-2000	P1100.13	1,2-DICHLOROETHANE		7.5e-4	7.5e-5
25-APR-2000	P0400.25	1,3,5-TRIMETHYLBENZENE		9.3e-4	9.3e-5
11-JAN-2000	P0100.11	2-BUTANONE	<	0.02	0.02
25-JAN-2000	P0100.25	2-BUTANONE		0.013	0.001
31-JAN-2000	P0100.31	2-BUTANONE		0.01	0.001
22-FEB-2000	P0200.22	2-BUTANONE		0.007	7.2e-4
14-MAR-2000	P0300.14	2-BUTANONE		0.007	7.3e-4
20-MAR-2000	P0300.20	2-BUTANONE		0.009	9.4e-4
17-APR-2000	P0400.17	2-BUTANONE		0.008	7.9e-4
25-APR-2000	P0400.25	2-BUTANONE		0.007	8.5e-4
29-AUG-2000	P0800.29	2-BUTANONE		0.011	0.001
16-OCT-2000	P1000.16	2-BUTANONE		0.005	5.2e-4
06-NOV-2000	P1100.06	2-BUTANONE		0.011	0.001
30-NOV-2000	P1100.30	2-BUTANONE		0.009	8.7e-4
04-DEC-2000	P1200.04	2-BUTANONE		0.006	5.6e-4
12-DEC-2000	P1200.12	2-BUTANONE		0.007	7.1e-4
04-DEC-2000	P1200.04	4-METHYL-2-PENTANONE		0.005	4.5e-4
04-JAN-2000	P0100.04	ACETONE		0.17	0.02
11-JAN-2000	P0100.11	ACETONE		0.12	0.02
08-FEB-2000	P0200.08	ACETONE		0.21	0.021
17-APR-2000	P0400.17	ACETONE		1.4	0.14
25-APR-2000	P0400.25	ACETONE		1.1	0.11
23-MAY-2000	P0500.23	ACETONE		0.019	0.002

RADIOACTIVE LIQUID WASTE
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VOC results by species for TA50 Plant Feed
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
26-JUL-2000	P0700.26	ACETONE		0.012	0.001
01-AUG-2000	P0800.01	ACETONE		0.014	0.001
23-OCT-2000	P1000.23	ACETONE		0.013	0.001
01-NOV-2000	P1100.01	ACETONE		0.86	0.086
06-NOV-2000	P1100.06	ACETONE		1.3	0.13
20-NOV-2000	P1100.20	ACETONE		0.058	0.006
02-OCT-2000	P1000.02	ACETONITRILE		0.011	0.001
01-NOV-2000	P1100.01	ACETONITRILE		0.005	5.4e-4
20-JUN-2000	P0600.20	BROMODICHLOROMETHANE		0.002	2.4e-4
30-NOV-2000	P1100.30	BROMODICHLOROMETHANE		0.002	2.3e-4
04-DEC-2000	P1200.04	BROMODICHLOROMETHANE		9.7e-4	9.7e-5
20-JUN-2000	P0600.20	BROMOFORM		0.001	1.4e-4
30-NOV-2000	P1100.30	BROMOFORM		0.002	1.5e-4
04-DEC-2000	P1200.04	BROMOFORM		0.005	4.9e-4
04-JAN-2000	P0100.04	CHLOROFORM	<	0.005	0.005
11-JAN-2000	P0100.11	CHLOROFORM	<	0.005	0.005
18-JAN-2000	P0100.18	CHLOROFORM		0.001	1.4e-4
25-JAN-2000	P0100.25	CHLOROFORM		0.001	1.2e-4
31-JAN-2000	P0100.31	CHLOROFORM		0.001	1.2e-4
08-FEB-2000	P0200.08	CHLOROFORM		9.3e-4	9.3e-5
16-FEB-2000	P0200.16	CHLOROFORM		0.001	1.4e-4
22-FEB-2000	P0200.22	CHLOROFORM		9.0e-4	9.0e-5
29-FEB-2000	P0200.29	CHLOROFORM		5.3e-4	5.3e-5
07-MAR-2000	P0300.07	CHLOROFORM		0.002	2.4e-4
20-MAR-2000	P0300.20	CHLOROFORM		3.5e-4	3.5e-5
28-MAR-2000	P0300.28	CHLOROFORM		7.3e-4	7.3e-5
11-APR-2000	P0400.11	CHLOROFORM		8.0e-4	8.0e-5
17-APR-2000	P0400.17	CHLOROFORM		5.6e-4	5.6e-5
25-APR-2000	P0400.25	CHLOROFORM		4.7e-4	4.7e-5
23-MAY-2000	P0500.23	CHLOROFORM		2.6e-4	2.6e-5
30-MAY-2000	P0500.30	CHLOROFORM		3.0e-4	3.0e-5
12-JUN-2000	P0600.12	CHLOROFORM		6.9e-4	6.9e-5
20-JUN-2000	P0600.20	CHLOROFORM		0.003	3.0e-4
28-JUN-2000	P0600.28	CHLOROFORM		0.002	1.7e-4
06-JUL-2000	P0700.06	CHLOROFORM		6.7e-4	6.7e-5
10-JUL-2000	P0700.10	CHLOROFORM		8.0e-4	8.0e-5
18-JUL-2000	P0700.18	CHLOROFORM		3.5e-4	3.5e-5
26-JUL-2000	P0700.26	CHLOROFORM		5.2e-4	5.2e-5
01-AUG-2000	P0800.01	CHLOROFORM		4.5e-4	4.5e-5
08-AUG-2000	P0800.08	CHLOROFORM		7.6e-4	7.6e-5
14-AUG-2000	P0800.14	CHLOROFORM		5.6e-4	5.6e-5
22-AUG-2000	P0800.22	CHLOROFORM		7.2e-4	7.2e-5
29-AUG-2000	P0800.29	CHLOROFORM		8.1e-4	8.1e-5
05-SEP-2000	P0900.05	CHLOROFORM		3.1e-4	3.1e-5
11-SEP-2000	P0900.11	CHLOROFORM		4.4e-4	4.4e-5
19-SEP-2000	P0900.19	CHLOROFORM		0.001	1.1e-4
30-NOV-2000	P1100.30	CHLOROFORM		0.002	1.9e-4
04-DEC-2000	P1200.04	CHLOROFORM		0.001	1.3e-4
12-DEC-2000	P1200.12	CHLOROFORM		0.001	1.2e-4
25-APR-2000	P0400.25	CHLOROMETHANE		6.4e-4	6.4e-5

RADIOACTIVE LIQUID WASTE
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VOC results by species for TA50 Plant Feed
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
01-NOV-2000	P1100.01	CHLOROMETHANE		7.3e-4	7.3e-5
20-JUN-2000	P0600.20	DIBROMOCHLOROMETHANE		0.002	2.1e-4
30-NOV-2000	P1100.30	DIBROMOCHLOROMETHANE		0.002	2.4e-4
04-DEC-2000	P1200.04	DIBROMOCHLOROMETHANE		0.002	2.1e-4
28-JUN-2000	P0600.28	DIBROMOMETHANE		6.2e-4	6.2e-5
04-JAN-2000	P0100.04	METHYLENE CHLORIDE	<	0.005	0.005
11-JAN-2000	P0100.11	METHYLENE CHLORIDE	<	0.005	0.005
18-JAN-2000	P0100.18	METHYLENE CHLORIDE		0.003	3.1e-4
31-JAN-2000	P0100.31	METHYLENE CHLORIDE		0.004	4.1e-4
28-MAR-2000	P0300.28	METHYLENE CHLORIDE		0.005	4.7e-4
03-APR-2000	P0400.03	METHYLENE CHLORIDE		0.005	5.0e-4
17-APR-2000	P0400.17	METHYLENE CHLORIDE		0.002	1.8e-4
25-APR-2000	P0400.25	METHYLENE CHLORIDE		0.004	4.3e-4
06-JUN-2000	P0600.06	METHYLENE CHLORIDE		0.002	2.2e-4
12-JUN-2000	P0600.12	METHYLENE CHLORIDE		0.002	1.6e-4
20-JUN-2000	P0600.20	METHYLENE CHLORIDE		0.002	2.2e-4
28-JUN-2000	P0600.28	METHYLENE CHLORIDE		0.003	2.6e-4
06-JUL-2000	P0700.06	METHYLENE CHLORIDE		0.008	8.1e-4
10-JUL-2000	P0700.10	METHYLENE CHLORIDE		0.008	7.6e-4
18-JUL-2000	P0700.18	METHYLENE CHLORIDE		0.022	0.002
01-AUG-2000	P0800.01	METHYLENE CHLORIDE		0.002	1.6e-4
22-AUG-2000	P0800.22	METHYLENE CHLORIDE		0.007	7.4e-4
29-AUG-2000	P0800.29	METHYLENE CHLORIDE		0.008	8.0e-4
05-SEP-2000	P0900.05	METHYLENE CHLORIDE		0.002	2.5e-4
02-OCT-2000	P1000.02	METHYLENE CHLORIDE		0.002	2.2e-4
10-OCT-2000	P1000.10	METHYLENE CHLORIDE		0.003	2.6e-4
16-OCT-2000	P1000.16	METHYLENE CHLORIDE		0.006	6.0e-4
23-OCT-2000	P1000.23	METHYLENE CHLORIDE		0.002	2.0e-4
01-NOV-2000	P1100.01	METHYLENE CHLORIDE		0.006	6.1e-4
06-NOV-2000	P1100.06	METHYLENE CHLORIDE		0.002	2.1e-4
13-NOV-2000	P1100.13	METHYLENE CHLORIDE		0.008	7.5e-4
30-NOV-2000	P1100.30	METHYLENE CHLORIDE		0.002	1.8e-4
22-FEB-2000	P0200.22	NAPHTHALENE		9.7e-4	9.7e-5
11-APR-2000	P0400.11	NAPHTHALENE		5.8e-4	5.8e-5
17-APR-2000	P0400.17	NAPHTHALENE		0.003	2.9e-4
01-MAY-2000	P0500.01	NAPHTHALENE		0.002	1.6e-4
23-MAY-2000	P0500.23	NAPHTHALENE		0.001	1.1e-4
12-JUN-2000	P0600.12	NAPHTHALENE		5.2e-4	5.2e-5
20-JUN-2000	P0600.20	NAPHTHALENE		9.6e-4	9.6e-5
06-JUL-2000	P0700.06	NAPHTHALENE		8.9e-4	8.9e-5
18-JUL-2000	P0700.18	NAPHTHALENE		0.001	1.4e-4
01-AUG-2000	P0800.01	NAPHTHALENE		5.9e-4	5.9e-5
14-AUG-2000	P0800.14	NAPHTHALENE		5.2e-4	5.2e-5
10-OCT-2000	P1000.10	NAPHTHALENE		8.8e-4	8.8e-5
01-NOV-2000	P1100.01	OXYGENATED HYDROCARBON1		0.006	6.0e-4
06-NOV-2000	P1100.06	OXYGENATED HYDROCARBON1		0.009	9.1e-4
17-APR-2000	P0400.17	TOLUENE		0.001	1.1e-4
20-JUN-2000	P0600.20	TOLUENE		7.8e-4	7.8e-5
28-JUN-2000	P0600.28	TOLUENE		0.002	1.5e-4
10-JUL-2000	P0700.10	TOLUENE		6.7e-4	6.7e-5

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by species for TA50 Plant Feed
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
18-JUL-2000	P0700.18	TOLUENE		0.001	1.1e-4
22-AUG-2000	P0800.22	TOLUENE		9.0e-4	9.0e-5
10-OCT-2000	P1000.10	TOLUENE		6.1e-4	6.1e-5
20-JUN-2000	P0600.20	TRICHLOROTRIFLUOROETHANE		0.002	1.5e-4
01-AUG-2000	P0600.01	UNKNOWN1		0.032	0.003
05-SEP-2000	P0900.05	UNKNOWN1		0.005	5.23e-4
19-SEP-2000	P0900.19	UNKNOWN1		0.01	0.001
02-OCT-2000	P1000.02	UNKNOWN1		0.047	0.005

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by species for TA50 Plant Sludge
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
08-FEB-2000	50S0200.08	1,2,4-TRIMETHYLBENZENE		8.1e-4	8.1e-5
05-OCT-2000	50S1000.05	2-BUTANONE		0.033	0.003
04-JAN-2000	50S0100.04	METHYLENE CHLORIDE		0.024	0.002
08-FEB-2000	50S0200.08	METHYLENE CHLORIDE		0.003	2.8e-4
06-MAR-2000	50S0300.06	METHYLENE CHLORIDE		0.042	0.004
04-APR-2000	50S0400.04	METHYLENE CHLORIDE		0.032	0.003
14-JUN-2000	50S0600.14	METHYLENE CHLORIDE		0.035	0.004
05-OCT-2000	50S1000.05	METHYLENE CHLORIDE		0.027	0.003
21-DEC-2000	50S1200.21	METHYLENE CHLORIDE		0.008	7.8e-4
08-FEB-2000	50S0200.08	NAPHTHALENE		0.001	1.3e-4
08-FEB-2000	50S0200.08	STYRENE		0.002	1.5e-4
04-JAN-2000	50S0100.04	TOLUENE		0.004	3.5e-4
08-FEB-2000	50S0200.08	TOLUENE		0.002	1.5e-4
06-MAR-2000	50S0300.06	TOLUENE		0.004	3.8e-4
04-APR-2000	50S0400.04	TOLUENE		0.003	3.4e-4
04-JAN-2000	50S0100.04	TRICHLOROFLUOROMETHANE		0.01	9.5e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by species for TA50 Plant Feed
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
31-JAN-2000	P0100.31	2,4,6-TRICHLOROPHENOL		0.004	3.7e-4
16-FEB-2000	P0200.16	2,4,6-TRICHLOROPHENOL		0.002	1.6e-4
12-JUN-2000	P0600.12	2,4,6-TRICHLOROPHENOL		0.005	4.7e-4
06-JUL-2000	P0700.06	2,4,6-TRICHLOROPHENOL		0.002	2.4e-4
06-JUL-2000	P0700.06	2,4-DICHLOROPHENOL		0.004	4.1e-4
04-JAN-2000	P0100.04	2,4-DIMETHYLPHENOL		0.011	0.01
18-JAN-2000	P0100.18	2,4-DIMETHYLPHENOL		0.007	6.9e-4
08-FEB-2000	P0200.08	2,4-DIMETHYLPHENOL		0.007	7.3e-4
22-FEB-2000	P0200.22	2,4-DIMETHYLPHENOL		0.013	0.001
14-MAR-2000	P0300.14	2,4-DIMETHYLPHENOL		0.016	0.002
18-JAN-2000	P0100.18	2,6-DINITROTOLUENE		9.5e-4	9.5e-5
18-JAN-2000	P0100.18	2-CHLOROPHENOL		0.002	2.0e-4
31-JAN-2000	P0100.31	2-CHLOROPHENOL		0.003	3.2e-4
04-DEC-2000	P1200.04	2-CHLOROPHENOL		0.002	2.2e-4
12-JUN-2000	P0600.12	2-NITROPHENOL		0.004	3.9e-4
28-JUN-2000	P0600.28	2-NITROPHENOL		0.002	1.8e-4
29-AUG-2000	P0800.29	2-NITROPHENOL		0.006	6.0e-4
10-OCT-2000	P1000.10	2-NITROPHENOL		0.002	1.8e-4
30-MAY-2000	P0500.30	4-NITROPHENOL		0.003	3.1e-4
29-AUG-2000	P0800.29	4-NITROPHENOL		0.007	7.0e-4
10-OCT-2000	P1000.10	4-NITROPHENOL		0.002	2.2e-4
25-JAN-2000	P0100.25	BENZOIC ACID		0.008	8.5e-4
22-FEB-2000	P0200.22	BENZOIC ACID		0.006	5.5e-4
14-MAR-2000	P0300.14	BENZOIC ACID		0.005	4.8e-4
20-MAR-2000	P0300.20	BENZOIC ACID		0.008	8.0e-4
25-APR-2000	P0400.25	BENZOIC ACID		0.035	0.004
20-JUN-2000	P0600.20	BENZOIC ACID		0.01	9.5e-4
10-JUL-2000	P0700.10	BENZOIC ACID		0.02	0.002
30-NOV-2000	P1100.30	BENZOIC ACID		0.036	0.004
18-DEC-2000	P1200.18	BENZOIC ACID		0.028	0.003
10-JUL-2000	P0700.10	BENZYL ALCOHOL		0.006	5.6e-4
30-NOV-2000	P1100.30	BENZYL ALCOHOL		0.002	2.1e-4
04-JAN-2000	P0100.04	BIS(2-ETHYLHEXYL)PHTHALATE	<	0.01	0.01
11-JAN-2000	P0100.11	BIS(2-ETHYLHEXYL)PHTHALATE	<	0.01	0.01
18-JAN-2000	P0100.18	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	7.2e-4
31-JAN-2000	P0100.31	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.5e-4
08-FEB-2000	P0200.08	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.0e-4
16-FEB-2000	P0200.16	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.3e-4
29-FEB-2000	P0200.29	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.6e-4
07-MAR-2000	P0300.07	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	2.9e-4
14-MAR-2000	P0300.14	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	5.8e-4
20-MAR-2000	P0300.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	6.8e-4
28-MAR-2000	P0300.28	BIS(2-ETHYLHEXYL)PHTHALATE		0.029	0.003
03-APR-2000	P0400.03	BIS(2-ETHYLHEXYL)PHTHALATE		0.012	0.001
11-APR-2000	P0400.11	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	7.3e-4
17-APR-2000	P0400.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.002	2.3e-4
01-MAY-2000	P0500.01	BIS(2-ETHYLHEXYL)PHTHALATE		0.004	4.2e-4
30-MAY-2000	P0500.30	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	3.2e-4
20-JUN-2000	P0600.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	2.9e-4
06-JUL-2000	P0700.06	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.3e-4

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by species for TA50 Plant Feed
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
10-JUL-2000	P0700.10	BIS(2-ETHYLHEXYL)PHTHALATE		0.017	0.002
18-JUL-2000	P0700.18	BIS(2-ETHYLHEXYL)PHTHALATE		0.009	8.6e-4
26-JUL-2000	P0700.26	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.7e-4
01-AUG-2000	P0800.01	BIS(2-ETHYLHEXYL)PHTHALATE		0.002	1.7e-4
08-AUG-2000	P0800.08	BIS(2-ETHYLHEXYL)PHTHALATE		0.004	4.2e-4
14-AUG-2000	P0800.14	BIS(2-ETHYLHEXYL)PHTHALATE		0.002	2.2e-4
22-AUG-2000	P0800.22	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.1e-4
29-AUG-2000	P0800.29	BIS(2-ETHYLHEXYL)PHTHALATE		0.004	3.8e-4
11-SEP-2000	P0900.11	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	3.0e-4
19-SEP-2000	P0900.19	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.1e-4
25-SEP-2000	P0900.25	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	5.9e-4
02-OCT-2000	P1000.02	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.3e-4
10-OCT-2000	P1000.10	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	3.3e-4
01-NOV-2000	P1100.01	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.5e-4
13-NOV-2000	P1100.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.9e-4
20-NOV-2000	P1100.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.004	4.1e-4
04-DEC-2000	P1200.04	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	2.8e-4
18-DEC-2000	P1200.18	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.0e-4
14-MAR-2000	P0300.14	BUTYLBENZYLPHTHALATE		0.002	1.8e-4
20-MAR-2000	P0300.20	BUTYLBENZYLPHTHALATE		0.001	1.3e-4
18-JUL-2000	P0700.18	BUTYLBENZYLPHTHALATE		9.3e-4	9.3e-5
25-APR-2000	P0400.25	BUTYLGLYCOLATE1		4.6	0.46
25-JAN-2000	P0100.25	DI-N-BUTYL PHTHALATE		0.002	2.0e-4
18-JUL-2000	P0700.18	DI-N-BUTYL PHTHALATE		0.004	4.3e-4
23-MAY-2000	P0500.23	DI-N-OCTYL PHTHALATE		0.001	1.2e-4
25-JAN-2000	P0100.25	DIETHYL PHTHALATE		0.001	1.3e-4
28-JUN-2000	P0600.28	NAPHTHALENE		0.001	1.2e-4
10-JUL-2000	P0700.10	NAPHTHALENE		0.001	1.4e-4
22-AUG-2000	P0800.22	NAPHTHALENE		0.002	2.4e-4
25-JAN-2000	P0100.25	PHENOL		0.007	6.9e-4
31-JAN-2000	P0100.31	PHENOL		0.006	5.8e-4
22-FEB-2000	P0200.22	PHENOL		0.002	2.1e-4
07-MAR-2000	P0300.07	PHENOL		0.002	2.0e-4
11-APR-2000	P0400.11	PHENOL		0.005	5.1e-4
25-APR-2000	P0400.25	PHENOL		0.005	5.1e-4
28-JUN-2000	P0600.28	PHENOL		0.002	2.2e-4
10-JUL-2000	P0700.10	PHENOL		0.01	9.5e-4
04-JAN-2000	P0100.04	PYRIDINE	<	0.01	0.01
20-MAR-2000	P0300.20	PYRIDINE		0.002	2.4e-4
12-JUN-2000	P0600.12	PYRIDINE		0.009	8.8e-4
20-JUN-2000	P0600.20	PYRIDINE		0.003	2.9e-4
06-JUL-2000	P0700.06	PYRIDINE		0.002	2.1e-4
29-AUG-2000	P0800.29	PYRIDINE		0.009	8.9e-4
25-SEP-2000	P0900.25	PYRIDINE		0.009	8.6e-4
13-NOV-2000	P1100.13	PYRIDINE		0.008	8.1e-4
30-NOV-2000	P1100.30	PYRIDINE		0.009	9.3e-4
18-DEC-2000	P1200.18	PYRIDINE		0.009	9.1e-4

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by species for TA50 Plant Sludge
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2000	50S0100.04	DI-N-OCTYL PHTHALATE		0.58	0.058
06-MAR-2000	50S0300.06	DI-N-OCTYL PHTHALATE		1.3	0.13
04-APR-2000	50S0400.04	DI-N-OCTYL PHTHALATE		1.2	0.12
14-JUN-2000	50S0600.14	DI-N-OCTYL PHTHALATE		1.0	0.1
05-OCT-2000	50S1000.05	DI-N-OCTYL PHTHALATE		0.68	0.068
21-DEC-2000	50S1200.21	PHENOL		0.88	0.088

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Flows, TA-21

TA21 MONTHLY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
JAN-2000									
Total	12824	0	0.0		0.0		0	0	0
Maximum/Day	7207								
Minimum/Day	5617								
Average/Day	414			0.0		0.0			
FEB-2000									
Total	14095	0	0.0		0.0		0	0	0
Maximum/Day	10068								
Minimum/Day	4027								
Average/Day	486			0.0		0.0			
MAR-2000									
Total	21872	5022	0.417		0.417		0	0	0
Maximum/Day	9473								
Minimum/Day	3709								
Average/Day	706			200.866		48.992			
APR-2000									
Total	58960	46147	2.833		2.667		8532	0	0
Maximum/Day	36033	39567	2.0	329.726	1.833	87.732			
Minimum/Day	3285	6580	0.833	131.602	0.833	32.098			
Average/Day	1965	23074	1.417	230.664	1.333	59.915			
MAY-2000									
Total	10093	0	0.0		0.0		71047	0	0
Maximum/Day									
Minimum/Day									
Average/Day				0.0		0.0			

TA21 MONTHLY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
JUN-2000									
Total	152530	215800	11.783		8.95		177296	0	0
Maximum/Day	34338	78441	4.75	707.972	3.5	376.748	73553		
Minimum/Day	2014	33983	0.8	229.639	0.367	74.413	7907		
Average/Day	5084	53950	2.946	406.651	2.237	160.796	35459		
JUL-2000									
Total	104174	148831	12.017		8.75		110997	0	0
Maximum/Day	41332	74675	6.933	243.134	4.5	70.929	53984		
Minimum/Day	106	74156	5.083	179.508	4.25	67.457	22309		
Average/Day	3360	74416	6.008	211.321	4.375	69.193	36999		
AUG-2000									
Total	11371	81558	5.917		4.5		67490	0	0
Maximum/Day							51959		
Minimum/Day							15531		
Average/Day				229.742		73.675	33745		
SEP-2000									
Total	77790	0	0.0		0.0		0	0	0
Maximum/Day	64648								
Minimum/Day	13142								
Average/Day	2593			0.0		0.0			
OCT-2000									
Total	18122	0	0.0		0.0		0	0	0
Maximum/Day	14943								
Minimum/Day	3179								
Average/Day	585			0.0		0.0			

TA21 MONTHLY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
NOV-2000									
Total	5618	39870	5.583		4.25		0	0	0
Maximum/Day	2332								
Minimum/Day	954								
Average/Day	187			119.015		38.135			
DEC-2000									
Total	16109	0	0.0		0.0		0	0	0
Maximum/Day	8584								
Minimum/Day	106								
Average/Day	520			0.0		0.0			
SUMMARY									
Total	503558	537228	38.55		29.533		435362	0	0
Maximum/Month	152530	215800					177296	0	0
Minimum/Month	5618	5022					8532		
Average/Month	41963	44769	3.212	232.265	2.461	73.945	36280	0	0

TA21 DAILY FLOWS (liters)

JAN-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-JAN-2000	5,617	0	0.0	0.0	0.0	0.0	0	0	0
08-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-JAN-2000	7,207	0	0.0	0.0	0.0	0.0	0	0	0
20-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
31-JAN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
JAN-2000									
Total	12824	0	0.0		0.0		0	0	0
Maximum/Day	7207								
Minimum/Day	5617								
Average/Day	414			0.0		0.0			

TA21 DAILY FLOWS (liters)

FEB-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-FEB-2000	10,068	0	0.0	0.0	0.0	0.0	0	0	0
07-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-FEB-2000	4,027	0	0.0	0.0	0.0	0.0	0	0	0
29-FEB-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
FEB-2000									
Total	14095	0	0.0		0.0		0	0	0
Maximum/Day	10068								
Minimum/Day	4027								
Average/Day	486			0.0		0.0			

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TA21 DAILY FLOWS (liters)

MAR-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-MAR-2000	8,690	0	0.0	0.0	0.0	0.0	0	0	0
07-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-MAR-2000	3,709	0	0.0	0.0	0.0	0.0	0	0	0
24-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-MAR-2000	9,473	5,022	0.417	200.866	0.417	48.995	0	0	0
28-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
31-MAR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
MAR-2000									
Total	21872	5022	0.417		0.417		0	0	0
Maximum/Day	9473								
Minimum/Day	3709								
Average/Day	706			200.866		48.992			

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TA21 DAILY FLOWS (liters)

APR-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-APR-2000	3,285	0	0.0	0.0	0.0	0.0	0	0	0
07-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-APR-2000	0	6,580	0.833	131.602	0.833	32.098	0	0	0
11-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-APR-2000	11,058	39,567	2.0	329.726	1.833	87.732	0	0	0
14-APR-2000	8,584	0	0.0	0.0	0.0	0.0	8,532	0	0
15-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-APR-2000	36,033	0	0.0	0.0	0.0	0.0	0	0	0
26-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-APR-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
APR-2000									
Total	58960	46147	2.833		2.667		8532	0	0
Maximum/Day	36033	39567	2.0	329.726	1.833	87.732			
Minimum/Day	3285	6580	0.833	131.602	0.833	32.098			
Average/Day	1965	23074	1.417	230.664	1.333	59.915			

TA21 DAILY FLOWS (liters)

MAY-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-MAY-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
31-MAY-2000	10,093	0	0.0	0.0	0.0	0.0	71,047	0	0
MAY-2000									
Total	10093	0	0.0		0.0		71047	0	0
Maximum/Day									
Minimum/Day									
Average/Day				0.0		0.0			

RLWTF INFORMATION ONLY

TA21 DAILY FLOWS (liters)

JUN-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-JUN-2000	20,443	39,307	1.583	413.761	1.583	100.917	0	0	0
02-JUN-2000	11,197	33,983	0.8	707.972	0.367	376.752	0	0	0
03-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-JUN-2000	9,326	0	0.0	0.0	0.0	0.0	0	0	0
06-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-JUN-2000	4,981	0	0.0	0.0	0.0	0.0	73,553	0	0
09-JUN-2000	15,424	64,069	4.65	229.639	3.5	74.412	0	0	0
10-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-JUN-2000	2,014	0	0.0	0.0	0.0	0.0	7,907	0	0
15-JUN-2000	20,030	0	0.0	0.0	0.0	0.0	47,879	0	0
16-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-JUN-2000	12,628	78,441	4.75	275.233	3.5	91.105	0	0	0
21-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-JUN-2000	0	0	0.0	0.0	0.0	0.0	18,073	0	0
27-JUN-2000	13,671	0	0.0	0.0	0.0	0.0	29,884	0	0
28-JUN-2000	8,478	0	0.0	0.0	0.0	0.0	0	0	0
29-JUN-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-JUN-2000	34,338	0	0.0	0.0	0.0	0.0	0	0	0
JUN-2000									
Total	152530	215800	11.783		8.95		177296	0	0
Maximum/Day	34338	78441	4.75	707.972	3.5	376.748	73553		
Minimum/Day	2014	33983	0.8	229.639	0.367	74.413	7907		
Average/Day	5084	53950	2.946	406.651	2.237	160.796	35459		

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TA21 DAILY FLOWS (liters)

JUL-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-JUL-2000	0	74,156	5.083	243.134	4.25	70.929	0	0	0
07-JUL-2000	41,332	0	0.0	0.0	0.0	0.0	0	0	0
08-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-JUL-2000	106	0	0.0	0.0	0.0	0.0	22,309	0	0
13-JUL-2000	26,041	74,675	6.933	179.508	4.5	67.457	0	0	0
14-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-JUL-2000	4,027	0	0.0	0.0	0.0	0.0	53,984	0	0
26-JUL-2000	30,972	0	0.0	0.0	0.0	0.0	34,704	0	0
27-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-JUL-2000	1,696	0	0.0	0.0	0.0	0.0	0	0	0
29-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
31-JUL-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
JUL-2000									
Total	104174	148831	12.017		8.75		110997	0	0
Maximum/Day	41332	74675	6.933	243.134	4.5	70.929	53984		
Minimum/Day	106	74156	5.083	179.508	4.25	67.457	22309		
Average/Day	3360	74416	6.008	211.321	4.375	69.193	36999		

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TA21 DAILY FLOWS (liters)

AUG-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-AUG-2000	11,371	0	0.0	0.0	0.0	0.0	0	0	0
16-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-AUG-2000	0	81,558	5.917	229.742	4.5	73.675	0	0	0
18-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-AUG-2000	0	0	0.0	0.0	0.0	0.0	51,959	0	0
23-AUG-2000	0	0	0.0	0.0	0.0	0.0	15,531	0	0
24-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
31-AUG-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
AUG-2000									
Total	11371	81558	5.917		4.5		67490	0	0
Maximum/Day							51959		
Minimum/Day							15531		
Average/Day				229.742		73.675	33745		

TA21 DAILY FLOWS (liters)

SEP-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-SEP-2000	64,648	0	0.0	0.0	0.0	0.0	0	0	0
12-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-SEP-2000	13,142	0	0.0	0.0	0.0	0.0	0	0	0
20-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-SEP-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
SEP-2000									
Total	77790	0	0.0		0.0		0	0	0
Maximum/Day	64648								
Minimum/Day	13142								
Average/Day	2593			0.0		0.0			

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TA21 DAILY FLOWS (liters)

OCT-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-OCT-2000	3,179	0	0.0	0.0	0.0	0.0	0	0	0
18-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-OCT-2000	14,943	0	0.0	0.0	0.0	0.0	0	0	0
21-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
31-OCT-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
OCT-2000									
Total	18122	0	0.0		0.0		0	0	0
Maximum/Day	14943								
Minimum/Day	3179								
Average/Day	585			0.0		0.0			

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TA21 DAILY FLOWS (liters)

NOV-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
05-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
13-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
14-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-NOV-2000	954	0	0.0	0.0	0.0	0.0	0	0	0
18-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
19-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
20-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-NOV-2000	2,332	0	0.0	0.0	0.0	0.0	0	0	0
23-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-NOV-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-NOV-2000	0	39,870	5.583	119.015	4.25	38.135	0	0	0
30-NOV-2000	2,332	0	0.0	0.0	0.0	0.0	0	0	0
NOV-2000									
Total	5618	39870	5.583		4.25		0	0	0
Maximum/Day	2332								
Minimum/Day	954								
Average/Day	187			119.015		38.135			

TA21 DAILY FLOWS (liters)

DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
01-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
02-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
03-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
04-DEC-2000	3,815	0	0.0	0.0	0.0	0.0	0	0	0
05-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
06-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
07-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
08-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
09-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
10-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
11-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
12-DEC-2000	1,908	0	0.0	0.0	0.0	0.0	0	0	0
13-DEC-2000	106	0	0.0	0.0	0.0	0.0	0	0	0
14-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
15-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
16-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
17-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
18-DEC-2000	1,696	0	0.0	0.0	0.0	0.0	0	0	0
19-DEC-2000	8,584	0	0.0	0.0	0.0	0.0	0	0	0
20-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
21-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
22-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
23-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
24-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
25-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
26-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
27-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
28-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
29-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
30-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
31-DEC-2000	0	0	0.0	0.0	0.0	0.0	0	0	0
DEC-2000									
Total	16109	0	0.0		0.0		0	0	0
Maximum/Day	8584								
Minimum/Day	106								
Average/Day	520			0.0		0.0			

TA21 DAILY FLOWS (liters)

JAN-2000 through DEC-2000

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
SUMMARY									
Total	503558	537228	38.55		29.533		435362	0	0
Maximum/Month	152530	215800					177296	0	0
Minimum/Month	5618	5022					8532		
Average/Month	41963	44769	3.212	232.265	2.461	73.945	36280	0	0

Volume 2
Chapter
7

Analyses of Composite Radiological Samples, TA-21

No liquid was treated at TA-21-257 for the months of January, February, May, September, October, and December, 2000. Therefore, no analysis results are reported for these months.

TA21 RADIOISOTOPES

MAR-2000***

	RAW Ci/L	RAW Total (Ci)
ALPHA	23.0e-9	503.056e-6
Am-241	LDL*	
BETA	470.0e-12	10.28e-6
Cs-137	LDL*	
Pu-238	1.2e-9	26.246e-6
Pu-239	17.0e-9	371.824e-6
Sr-89	16.0e-12	349.952e-9
Sr-90	49.0e-12	1.072e-6
TOTAL PLUTONIUM	18.2e-9	398.07e-6
TRITIUM**	1.9e-6	41.557e-3
Total Alpha		398.07e-6

Volume of Flow: Influent = 21,872.0 liters Transfered = 0.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

***Prematurely discarded sample. U-234 and U-235 not available.

TA21 RADIOISOTOPES

APR-2000

	RAW Ci/L	RAW Total (Ci)
ALPHA	14.0e-9	825.44e-6
Am-241	1.5e-9	88.44e-6
BETA	8.9e-9	524.744e-6
Cs-137	300.0e-12	17.688e-6
Mn-54	62.0e-12	3.656e-6
Pu-238	380.0e-12	22.405e-6
Pu-239	14.0e-9	825.44e-6
Sr-89	LDL*	
Sr-90	120.0e-12	7.075e-6
TOTAL PLUTONIUM	14.38e-9	847.845e-6
TRITIUM**	1.9e-6	112.024e-3
Th-232	240.0e-12	14.15e-6
U-234	LDL*	
U-235	LDL*	
Total Alpha		936.285e-6

Volume of Flow: Influent = 58,960.0 liters Transfered = 8,532.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA21 RADIOISOTOPES

JUN-2000

	RAW Ci/L	RAW Total (Ci)
ALPHA	6.2e-9	945.5e-6
Am-241	270.0e-12	41.175e-6
BETA	500.0e-9	76.25e-3
Cs-137	430.0e-12	65.575e-6
Pu-238	570.0e-12	86.925e-6
Pu-239	2.7e-9	411.75e-6
Sr-89	6.3e-12	960.75e-9
Sr-90	65.0e-12	9.912e-6
TOTAL PLUTONIUM	3.27e-9	498.675e-6
TRITIUM**	860.0e-9	131.15e-3
U-234	1.6e-9	244.0e-6
U-235	28.0e-12	4.27e-6
Total Alpha		788.12e-6

Volume of Flow: Influent = 152,530.0 liters Transfered = 177,296.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA21 RADIOISOTOPES

JUL-2000

	RAW Ci/L	RAW Total (Ci)
ALPHA	6.7e-9	698.14e-6
Am-241	250.0e-12	26.05e-6
BETA	4.1e-9	427.22e-6
Cs-137	350.0e-12	36.47e-6
Pu-238	2.4e-9	250.08e-6
Pu-239	3.4e-9	354.28e-6
Sr-89	1.0e-12	104.2e-9
Sr-90	17.0e-12	1.771e-6
TOTAL PLUTONIUM	5.8e-9	604.36e-6
TRITIUM**	560.0e-9	58.352e-3
U-234	520.0e-12	54.184e-6
U-235	LDL*	
Total Alpha		684.594e-6

Volume of Flow: Influent = 104,174.0 liters Transfered = 110,997.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA21 RADIOISOTOPES

AUG-2000

	RAW Ci/L	RAW * Total (Ci)
ALPHA	2.4e-9	27.29e-6
Am-241	680.0e-12	7.732e-6
BETA	5.2e-9	59.129e-6
Cs-137	440.0e-12	5.003e-6
Pu-238	520.0e-12	5.913e-6
Pu-239	1.3e-9	14.782e-6
Sr-89	7.1e-12	80.734e-9
Sr-90	34.0e-12	386.614e-9
TOTAL PLUTONIUM	1.82e-9	20.695e-6
TRITIUM**	890.0e-9	10.12e-3
U-234	12.0e-12	136.452e-9
U-235	160.0e-12	1.819e-6
Total Alpha		30.383e-6

Volume of Flow: Influent = 11,371.0 liters Transfered = 67,490.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA21 RADIOISOTOPES

NOV-2000

	RAW Ci/L	RAW Total (Ci)
ALPHA	1.9e-9	10.674e-6
Am-241	560.0e-12	3.146e-6
BETA	1.9e-9	10.674e-6
Cs-137	LDL*	
Pu-238	1.3e-9	7.303e-6
Pu-239	860.0e-12	4.831e-6
Sr-89	LDL*	
Sr-90	37.0e-12	207.866e-9
TOTAL PLUTONIUM	2.16e-9	12.135e-6
TRITIUM**	280.0e-9	1.573e-3
U-234	110.0e-12	617.98e-9
U-235	LDL*	
Total Alpha		15.899e-6

Volume of Flow: Influent = 5,618.0 liters   Transfered = 0.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

Volume 2
Chapter

Analyses of Composite Mineral Samples, TA-21

The plant at TA-21-257 was not operated during the months of January, February, May, September, October, and December, 2000. Therefore, no analysis results are reported for these months.

TA21 MINERALS

MAR-2000**

	RAW Concentration	Total (KG)
ALKALINITY-MO	175.0	3.828
ALKALINITY-P	LDL*	
ALUMINUM	0.35	0.008
AMMONIA-N	2.03	0.044
ANTIMONY	0.002	4.374e-5
ARSENIC	0.019	4.156e-4
BARIUM	0.1	0.002
BERYLLIUM	0.002	4.374e-5
BORON	0.1	0.002
CADMIUM	0.005	1.094e-4
CALCIUM	41.0	0.897
CHLORIDE	43.5	0.951
COBALT	LDL*	
COD	112.0	2.45
COPPER	0.27	0.006
CYANIDE	0.03	6.562e-4
FLUORIDE	1.58	0.035
HARDNESS	142.322	3.113
IRON	16.0	0.35
LEAD	0.061	0.001
MAGNESIUM	9.7	0.212
MERCURY	LDL*	
NICKEL	0.042	9.186e-4
NITRATE-N	4.95	0.108
PHOSPHORUS	1.64	0.036
POTASSIUM	28.0	0.612
SELENIUM	0.001	2.187e-5
SILICA DIOXIDE	74.0	1.619
SILICON	23.0	0.503
SILVER	0.052	0.001
SODIUM	88.0	1.925
TDS	618.0	13.517
THALLIUM	4.1e-4	8.968e-6
TOTAL CHROMIUM	0.004	8.749e-5
TSS	43.0	0.94
URANIUM	0.039	8.53e-4
VANADIUM	0.021	4.593e-4
ZINC	0.37	0.008
pH	8.08	

Volume of Flow: Influent = 21,872.0 liters   Transfered = 0.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

**Prematurely discarded sample. Conductivity, Sulfate, and Total Cations not available.

TA21 MINERALS

APR-2000

	RAW Concentration	Total (KG)
ALKALINITY-MO	170.0	10.023
ALKALINITY-P	LDL*	
ALUMINUM	LDL*	
AMMONIA-N	2.39	0.141
ANTIMONY	0.001	5.896e-5
ARSENIC	0.013	7.665e-4
BARIUM	0.11	0.006
BERYLLIUM	LDL*	
BORON	0.045	0.003
CADMIUM	LDL*	
CALCIUM	39.0	2.299
CHLORIDE	34.2	2.016
COBALT	LDL*	
COD	91.0	5.365
CONDUCTIVITY	589.0	
COPPER	0.21	0.012
CYANIDE	0.05	0.003
FLUORIDE	1.56	0.092
HARDNESS	130.739	7.708
IRON	14.0	0.825
LEAD	0.033	0.002
MAGNESIUM	8.1	0.478
MERCURY	0.006	3.538e-4
NICKEL	LDL*	
NITRATE-N	0.08	0.005
PHOSPHORUS	2.8	0.165
POTASSIUM	26.0	1.533
SELENIUM	LDL*	
SILICA DIOXIDE	61.0	3.597
SILICON	34.0	2.005
SILVER	0.04	0.002
SODIUM	75.0	4.422
SULFATE	83.1	4.9
TDS	198.0	11.674
THALLIUM	2.1e-4	1.238e-5
TOTAL CATIONS	6.4	
TOTAL CHROMIUM	0.039	0.002
TSS	32.0	1.887
URANIUM	0.014	8.254e-4
VANADIUM	LDL*	
ZINC	0.35	0.021
pH	7.47	

Volume of Flow: Influent = 58,960.0 liters Transfered = 8,532.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA21 MINERALS

JUN-2000

	RAW Concentration	Total (KG)
ALKALINITY-MO	155.0	23.637
ALKALINITY-P	115.0	17.537
ALUMINUM	LDL*	
AMMONIA-N	0.87	0.133
ANTIMONY	7.0e-4	1.067e-4
ARSENIC	LDL*	
BARIUM	0.047	0.007
BERYLLIUM	0.002	3.05e-4
BORON	0.067	0.01
CADMIUM	LDL*	
CALCIUM	64.0	9.76
CHLORIDE	0.52	0.079
COBALT	LDL*	
COD	54.0	8.235
CONDUCTIVITY	1015.0	
COPPER	0.046	0.007
CYANIDE	LDL*	
FLUORIDE	1.12	0.171
HARDNESS	174.633	26.632
IRON	4.8	0.732
LEAD	LDL*	
MAGNESIUM	3.6	0.549
MERCURY	5.0e-4	7.625e-5
NICKEL	LDL*	
NITRATE-N	0.15	0.023
PHOSPHORUS	1.63	0.249
POTASSIUM	26.0	3.965
SELENIUM	LDL*	
SILICA DIOXIDE	64.0	9.76
SILICON	32.0	4.88
SILVER	0.007	0.001
SODIUM	67.0	10.217
SULFATE	LDL*	
TDS	466.0	71.065
THALLIUM	2.0e-4	3.05e-5
TOTAL CATIONS	5.7	
TOTAL CHROMIUM	0.019	0.003
TSS	19.0	2.898
URANIUM	0.008	0.001
VANADIUM	0.022	0.003
ZINC	0.07	0.011
pH	10.9	

Volume of Flow: Influent = 152,530.0 liters Transfered = 177,296.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

 *LDL: Less than Detection Limit.

TA21 MINERALS

JUL-2000

	RAW Concentration	Total (KG)
ALKALINITY-MO	305.0	31.781
ALKALINITY-P	255.0	26.571
ALUMINUM	0.27	0.028
AMMONIA-N	0.51	0.053
ANTIMONY	9.0e-4	9.378e-5
ARSENIC	0.007	7.294e-4
BARIUM	0.045	0.005
BERYLLIUM	0.001	1.042e-4
BORON	0.057	0.006
CADMIUM	LDL*	
CALCIUM	140.0	14.588
CHLORIDE	15.3	1.594
COBALT	LDL*	
COD	52.0	5.418
CONDUCTIVITY	895.0	
COPPER	LDL*	
CYANIDE	0.01	0.001
FLUORIDE	0.74	0.077
HARDNESS	378.818	39.473
IRON	5.2	0.542
LEAD	LDL*	
MAGNESIUM	7.1	0.74
MERCURY	8.0e-4	8.336e-5
NICKEL	0.011	0.001
NITRATE-N	0.37	0.039
PHOSPHORUS	15.8	1.646
POTASSIUM	27.0	2.813
SELENIUM	LDL*	
SILICA DIOXIDE	48.0	5.002
SILICON	45.0	4.689
SILVER	0.01	0.001
SODIUM	54.0	5.627
SULFATE	62.1	6.471
TDS	682.0	71.064
THALLIUM	2.7e-4	2.813e-5
TOTAL CATIONS	6.79	
TOTAL CHROMIUM	0.023	0.002
TSS	147.0	15.317
URANIUM	0.009	9.378e-4
VANADIUM	0.03	0.003
ZINC	0.11	0.011
pH	11.61	

Volume of Flow: Influent = 104,174.0 liters Transfered = 110,997.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA21 MINERALS

AUG-2000

	RAW Concentration	Total (KG)
ALKALINITY-MO	188.0	2.138
ALKALINITY-P	152.0	1.728
ALUMINUM	LDL*	
AMMONIA-N	2.02	0.023
ANTIMONY	0.002	2.274e-5
ARSENIC	0.006	6.823e-5
BARIUM	0.036	4.094e-4
BERYLLIUM	0.001	1.137e-5
BORON	LDL*	
CADMIUM	LDL*	
CALCIUM	56.0	0.637
CHLORIDE	21.5	0.244
COBALT	LDL*	
COD	59.0	0.671
CONDUCTIVITY	644.0	
COPPER	0.024	2.729e-4
CYANIDE	0.02	2.274e-4
FLUORIDE	0.98	0.011
HARDNESS	155.069	1.763
IRON	6.5	0.074
LEAD	LDL*	
MAGNESIUM	3.7	0.042
MERCURY	0.002	2.274e-5
NICKEL	0.013	1.478e-4
NITRATE-N	0.22	0.003
PHOSPHORUS	2.25	0.026
POTASSIUM	24.0	0.273
SELENIUM	LDL*	
SILICA DIOXIDE	57.0	0.648
SILICON	30.0	0.341
SILVER	LDL*	
SODIUM	63.0	0.716
SULFATE	72.3	0.822
TDS	352.0	4.003
THALLIUM	0.001	1.137e-5
TOTAL CATIONS	6.02	
TOTAL CHROMIUM	0.015	1.706e-4
TSS	88.0	1.001
URANIUM	0.012	1.365e-4
VANADIUM	0.022	2.502e-4
ZINC	0.072	8.187e-4
pH	10.7	

Volume of Flow: Influent = 11,371.0 liters Transfered = 67,490.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA21 MINERALS

NOV-2000

	RAW Concentration	Total (KG)
ALKALINITY-MO	242.0	1.36
ALKALINITY-P	LDL*	
ALUMINUM	LDL*	
AMMONIA-N	0.37	0.002
ANTIMONY	9.0e-4	5.056e-6
ARSENIC	0.004	2.247e-5
BARIUM	0.069	3.876e-4
BERYLLIUM	LDL*	
BORON	0.08	4.494e-4
CADMIUM	LDL*	
CALCIUM	82.5	0.463
CHLORIDE	34.4	0.193
COBALT	LDL*	
COD	56.0	0.315
CONDUCTIVITY	745.0	
COPPER	0.017	9.551e-5
CYANIDE	LDL*	
FLUORIDE	0.79	0.004
HARDNESS	25.478	0.143
IRON	4.38	0.025
LEAD	LDL*	
MAGNESIUM	10.0	0.056
MERCURY	6.0e-5	3.371e-7
NICKEL	LDL*	
NITRATE-N	0.18	0.001
PHOSPHORUS	13.5	0.076
POTASSIUM	47.9	0.269
SELENIUM	LDL*	
SILICA DIOXIDE	88.0	0.494
SILICON	47.1	0.265
SILVER	0.004	2.247e-5
SODIUM	86.0	0.483
SULFATE	121.0	0.68
TDS	740.0	4.157
THALLIUM	9.0e-5	5.056e-7
TOTAL CATIONS	8.88	
TOTAL CHROMIUM	0.026	1.461e-4
TSS	6.0	0.034
URANIUM	0.007	3.933e-5
VANADIUM	0.03	1.685e-4
ZINC	0.09	5.056e-4

Volume of Flow: Influent = 5,618.0 liters Transfered = 0.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

Volume 2
Chapter
9

VOC, SVOC Results, TA-21: By Sample

LEGEND

For VOC/SVOC Results Tables

Sample Number Format	Sample Site
Pmmyy.dd	TA-50 Plant Raw Feed
50Smmyy.dd	TA-50 Vacuum Filter Sludge
DP257mmyy.dd	TA21-257 Raw Feed

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

VOC results by sample for TA21

01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
06-MAR-2000	DP0300.06	CHLOROFORM		0.001	1.1e-4
06-MAR-2000	DP0300.06	DIBROMOMETHANE		0.001	1.1e-4
06-MAR-2000	DP0300.06	ETHYLBENZENE		7.0e-4	7.0e-5
06-MAR-2000	DP0300.06	M+P-XYLENE		0.002	2.4e-4
06-MAR-2000	DP0300.06	O-XYLENE		0.001	1.3e-4
27-APR-2000	DP0400.27	CARBON DISULFIDE		7.0e-4	7.0e-5
27-APR-2000	DP0400.27	CHLOROFORM		0.001	1.1e-4
27-APR-2000	DP0400.27	DIBROMOMETHANE		0.002	2.5e-4
27-APR-2000	DP0400.27	NAPHTHALENE		6.4e-4	6.4e-5
02-JUN-2000	DP0600.02	BROMOFORM		0.002	2.2e-4
02-JUN-2000	DP0600.02	CHLOROFORM		5.6e-4	5.6e-5
02-JUN-2000	DP0600.02	DIBROMOMETHANE		0.002	2.4e-4
02-JUN-2000	DP0600.02	METHYLENE CHLORIDE		0.002	2.0e-4
02-JUN-2000	DP0600.02	NAPHTHALENE		6.5e-4	6.5e-5
09-JUN-2000	DP0600.09	BROMOFORM		0.004	3.9e-4
09-JUN-2000	DP0600.09	CARBON DISULFIDE		0.002	1.8e-4
09-JUN-2000	DP0600.09	CHLOROFORM		6.3e-4	6.3e-5
09-JUN-2000	DP0600.09	DIBROMOMETHANE		0.002	2.4e-4
09-JUN-2000	DP0600.09	NAPHTHALENE		5.6e-4	5.6e-5
20-JUN-2000	DP0600.20	BROMOFORM		0.001	1.1e-4
20-JUN-2000	DP0600.20	CARBON DISULFIDE		9.0e-4	9.0e-5
20-JUN-2000	DP0600.20	CHLOROFORM		4.0e-4	4.0e-5
20-JUN-2000	DP0600.20	DIBROMOMETHANE		0.001	1.3e-4
20-JUN-2000	DP0600.20	METHYLENE CHLORIDE		0.002	1.6e-4
20-JUN-2000	DP0600.20	TRICHLOROTRIFLUOROETHANE		0.002	1.5e-4
06-JUL-2000	DP0700.06	METHYLENE CHLORIDE		0.005	5.1e-4
06-JUL-2000	DP0700.06	NAPHTHALENE		6.3e-4	6.3e-5
13-JUL-2000	DP0700.13	CARBON DISULFIDE		0.001	1.2e-4
13-JUL-2000	DP0700.13	CHLOROFORM		5.3e-4	5.3e-5
13-JUL-2000	DP0700.13	METHYLENE CHLORIDE		0.005	4.7e-4
17-AUG-2000	DP0600.17	BROMOFORM		0.004	3.8e-4
17-AUG-2000	DP0800.17	CHLOROFORM		1.4e-4	1.4e-5
17-AUG-2000	DP0800.17	NAPHTHALENE		5.5e-4	5.5e-5
30-NOV-2000	DP1100.30	2-BUTANONE		0.005	5.2e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by sample for TA21
01-JAN-2000 - 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
06-MAR-2000	DP0300.06	BIS(2-ETHYLHEXYL)PHTHALATE		0.026	0.003
27-APR-2000	DP0400.27	BIS(2-ETHYLHEXYL)PHTHALATE		0.01	0.001
27-APR-2000	DP0400.27	PHENOL		0.002	1.9e-4
02-JUN-2000	DP0600.02	BENZO(A)ANTHRACENE		9.0e-4	9.0e-5
02-JUN-2000	DP0600.02	CHRYSENE		8.5e-4	8.5e-5
02-JUN-2000	DP0600.02	FLUORANTHENE		0.002	1.8e-4
02-JUN-2000	DP0600.02	PYRENE		0.002	1.8e-4
09-JUN-2000	DP0600.09	BENZO(A)ANTHRACENE		7.6e-4	7.6e-5
09-JUN-2000	DP0600.09	PHENOL		0.004	4.1e-4
09-JUN-2000	DP0600.09	PYRENE		0.002	1.5e-4
20-JUN-2000	DP0600.20	BENZOIC ACID		0.028	0.003
06-JUL-2000	DP0700.06	BENZO(A)ANTHRACENE		6.8e-4	6.8e-5
06-JUL-2000	DP0700.06	BENZOIC ACID		0.005	4.8e-4
06-JUL-2000	DP0700.06	BIS(2-ETHYLHEXYL)PHTHALATE		0.051	0.005
13-JUL-2000	DP0700.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.018	0.002
17-AUG-2000	DP0800.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.002	2.3e-4

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Volume 2
Chapter
10

VOC, SVOC Results, TA-21: By Species

LEGEND

For VOC/SVOC Results Tables

Sample Number Format	Sample Site
Pmmyy.dd	TA-50 Plant Raw Feed
50Smmyy.dd	TA-50 Vacuum Filter Sludge
DP257mmyy.dd	TA21-257 Raw Feed

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by species for TA21
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
30-NOV-2000	DP1100.30	2-BUTANONE		0.005	5.2e-4
02-JUN-2000	DP0600.02	BROMOFORM		0.002	2.2e-4
09-JUN-2000	DP0600.09	BROMOFORM		0.004	3.9e-4
20-JUN-2000	DP0600.20	BROMOFORM		0.001	1.1e-4
17-AUG-2000	DP0800.17	BROMOFORM		0.004	3.8e-4
27-APR-2000	DP0400.27	CARBON DISULFIDE		7.0e-4	7.0e-5
09-JUN-2000	DP0600.09	CARBON DISULFIDE		0.002	1.8e-4
20-JUN-2000	DP0600.20	CARBON DISULFIDE		9.0e-4	9.0e-5
13-JUL-2000	DP0700.13	CARBON DISULFIDE		0.001	1.2e-4
06-MAR-2000	DP0300.06	CHLOROFORM		0.001	1.1e-4
27-APR-2000	DP0400.27	CHLOROFORM		0.001	1.1e-4
02-JUN-2000	DP0600.02	CHLOROFORM		5.6e-4	5.6e-5
09-JUN-2000	DP0600.09	CHLOROFORM		6.3e-4	6.3e-5
20-JUN-2000	DP0600.20	CHLOROFORM		4.0e-4	4.0e-5
13-JUL-2000	DP0700.13	CHLOROFORM		5.3e-4	5.3e-5
17-AUG-2000	DP0800.17	CHLOROFORM		1.4e-4	1.4e-5
06-MAR-2000	DP0300.06	DIBROMOMETHANE		0.001	1.1e-4
27-APR-2000	DP0400.27	DIBROMOMETHANE		0.002	2.5e-4
02-JUN-2000	DP0600.02	DIBROMOMETHANE		0.002	2.4e-4
09-JUN-2000	DP0600.09	DIBROMOMETHANE		0.002	2.4e-4
20-JUN-2000	DP0600.20	DIBROMOMETHANE		0.001	1.3e-4
06-MAR-2000	DP0300.06	ETHYLBENZENE		7.0e-4	7.0e-5
06-MAR-2000	DP0300.06	M+P-XYLENE		0.002	2.4e-4
02-JUN-2000	DP0600.02	METHYLENE CHLORIDE		0.002	2.0e-4
20-JUN-2000	DP0600.20	METHYLENE CHLORIDE		0.002	1.6e-4
06-JUL-2000	DP0700.06	METHYLENE CHLORIDE		0.005	5.1e-4
13-JUL-2000	DP0700.13	METHYLENE CHLORIDE		0.005	4.7e-4
27-APR-2000	DP0400.27	NAPHTHALENE		6.4e-4	6.4e-5
02-JUN-2000	DP0600.02	NAPHTHALENE		6.5e-4	6.5e-5
09-JUN-2000	DP0600.09	NAPHTHALENE		5.6e-4	5.6e-5
06-JUL-2000	DP0700.06	NAPHTHALENE		6.3e-4	6.3e-5
17-AUG-2000	DP0800.17	NAPHTHALENE		5.5e-4	5.5e-5
06-MAR-2000	DP0300.06	O-XYLENE		0.001	1.3e-4
20-JUN-2000	DP0600.20	TRICHLOROTRIFLUOROETHANE		0.002	1.5e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by species for TA21
01-JAN-2000 through 31-DEC-2000

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
02-JUN-2000	DP0600.02	BENZO(A)ANTHRACENE		9.0e-4	9.0e-5
09-JUN-2000	DP0600.09	BENZO(A)ANTHRACENE		7.6e-4	7.6e-5
06-JUL-2000	DP0700.06	BENZO(A)ANTHRACENE		6.8e-4	6.8e-5
20-JUN-2000	DP0600.20	BENZOIC ACID		0.028	0.003
06-JUL-2000	DP0700.06	BENZOIC ACID		0.005	4.8e-4
06-MAR-2000	DP0300.06	BIS(2-ETHYLHEXYL)PHTHALATE		0.026	0.003
27-APR-2000	DP0400.27	BIS(2-ETHYLHEXYL)PHTHALATE		0.01	0.001
06-JUL-2000	DP0700.06	BIS(2-ETHYLHEXYL)PHTHALATE		0.051	0.005
13-JUL-2000	DP0700.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.018	0.002
17-AUG-2000	DP0800.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.002	2.3e-4
02-JUN-2000	DP0600.02	CHRYSENE		8.5e-4	8.5e-5
02-JUN-2000	DP0600.02	FLUORANTHENE		0.002	1.8e-4
27-APR-2000	DP0400.27	PHENOL		0.002	1.9e-4
09-JUN-2000	DP0600.09	PHENOL		0.004	4.1e-4
02-JUN-2000	DP0600.02	PYRENE		0.002	1.8e-4
09-JUN-2000	DP0600.09	PYRENE		0.002	1.5e-4

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ATTACHMENT 2.0

Los Alamos National Laboratory

TA-50 Radioactive Liquid Waste Treatment Facility

Weekly Composite Effluent Sample Results

CY2001

NO3/NO2-N, NH-3, TKN, F, TDS

Table 1.0. TA-50 RLWTF Effluent Holding Tank Results, Weekly Composite Samples, CY2001.

Sample Date	NO3/NO2-N (mg/L)	NH3-N (mg/L)	TKN (mg/L)	Total N (mg/L)[1]	F (mg/L)	TDS (mg/L)
January	3.70	3.60	NA		1.24	770
	6.90	1.70	NA		0.97	536
	9.00	2.50	NA		0.91	532
	5.90	3.20	NA		0.87	504
February	5.20	2.80	NA		1.11	520
	5.40	3.30	NA		1.02	600
	5.40	4.60	NA		0.50	294
	6.20	16.00	NA		0.54	370
March	3.54	2.00	NA		0.45	358
	2.13	2.50	NA		0.35	296
	3.90	1.40	NA		0.49	352
	1.38	1.6	NA		0.34	308
April	4.80	2.64	NA		0.81	476
	4.80	2.22	NA		0.64	452
	2.30	1.82	NA		0.49	254
	3.60	3.80	NA		0.73	454
	3.30	3.20	NA		0.38	256
May	4.26	2.08	NA		0.57	314
	5.61	1.09	NA		0.99	418
	4.34	1.27	NA		1.19	390
	2.69	2.23	NA		0.74	374
June	3.96	3.31	NA		0.86	492
	7.53	1.43	NA		0.26	426
	7.47	2.37	NA		0.76	468
	5.60	3.06	NA		1.12	526

<u>Notes:</u>
[1]Total N means total nitrogen (as N), the sum of NO3/NO2-N and TKN.
J means the reported result is an estimated quantity.

Table 1.0. TA-50 RLWTF Effluent Holding Tank Results, Weekly Composite Samples, CY2001.

Sample Date	NO3/NO2-N (mg/L)	NH3-N (mg/L)	TKN (mg/L)	Total N (mg/L)	F (mg/L)	TDS (mg/L)
July	3.90	2.39	NA		1.06	404
	5.20	3.19	NA		0.98	426
	3.70	3.06	NA		0.65	384
	5.10	4.40	NA		0.67	350
	5.60	5.60	NA		1.25	476
August	6.12	5.83	NA		0.87	498
	6.33	3.82	NA		0.63	290
	7.49	4.56	NA		0.78	384
	6.70	4.32	NA		NA	481
	4.84	3.89	NA		0.85	328
	4.44	3.63	4.65	9.09	0.729	356
September	3.27	3.63	4.11	7.38	0.712	486
	6.60	6.15	7.10	13.70	1.46	880
	6.50	2.58	3.69	10.19	0.957	531
	0.91	0.24	0.57	1.48	0.344	214
October	2.64	1.68	0.66	3.30	0.69	421
	1.30	2.09	3.10	4.40	0.746	633
	2.28	2.32	3.85	6.13	1.48	503
	3.63	6.80	5.5J	9.13J	2.65J	510J
	2.28	7.8J	8.45J	10.73J	2.24J	477
November	0.74	6.80	7.45	8.19	1.26	257
	1.96	8.40	8.75	10.71	0.28	287
	2.66	1.84	2.59	5.25	0.014	188
	3.06	2.96	4.00	7.06	0.573	411
December	2.38	4.35	5.55	7.93	0.828	398
	4.65	8.50	9.75	14.40	1.24	665
	6.00	8.70	9.65	15.65	1.49	688
Annual Averages	**4.44**	**3.72**	**5.03**	**8.32**	**0.79**	**434**

<u>**Notes:**</u>

[1]Total N means total nitrogen (as N), the sum of NO3/NO2-N and TKN.

J means the reported result is an estimated quantity.

:01707

New Mexico Envir[onm]ent Department
Ground Water Quality Bureau

Field Trip Report

Field Trip Report
Ground Water Pollution Prevention Section

Date: January 10, 2002

Inspector (s)
Curt Frischkorn
Phyllis Bustamante
Jeff (?)

Facility

Facility Name: TA-55, Plutonium Processing Plant
Contact: Bob Beers → @ TA55: Don Mullins 996-1782 (pager)
Location: LANL - TA-55 (discharges to RLWTF (DP-1132))
Discharge Plan Number: DP- 1132
UIC Related? Yes (No)
Type of Operation: Plutonium processing / radio-active liquid waste treatment

Inspection Summary

Purpose:

(a.) Evaluation of Proposed Discharge Plan
b. Compliance Inspection (Complete Checklist o Reverse Side)
(c.) Other (Specify): Become familiar with sources of wastewater @ RLWTF (DP-1132)

Activities

a. Inspection of Facilities or Construction (specify): (NARS) Nitric Acid Removal System. Plutonium metals & salts dissolved in a 12-15 Molar Nitric Acid (Influent) Running for 1 year —
Flow Measurement: Type: Totalizing Flowmeters Condition:

b. Effluent Sample (s): (provide sampling location): None

No. of Ponds: N/A No. in Use: N/A Condition of Ponds: N/A
Condition of Pond Liner (s): N/A

c. Ground Water Sample (s) (provide well name and location): None - Effluent goes to TA-50 (RLWTF).

No. of Monitor Wells: 4-6 Mortendad Canyon Well Condition: ?

d. Other (specify): NARS system consists of distillation for recovery of nitric acid, and ion exchange. Backflush from ion exchange resin goes to evaporator unit. At point of precipitation evap. bottoms go to cement stabilization or vitrification then to area G for disposal. Liquid effluent goes to distillation tower for sep. of H_2O and nitric acid. Some HNO_3 recovered. Waste Acid

Observations and Information Obtained

and H_2O/condensate go to TA-50 (RLWTF) for treatment. Influent/Effluent volumes reduced by ½. NO_3 salts end up in cement. Distillation Tower runs 2-3 days/wk.

Action Required

Request list of sources of wastewater generated at TA-55 that are not treated in the NARS unit)

: 01708

Water Quality Inspection & Sampling Checklist

Reference: Regulation No. HED 86 – 14 (EID)

Entry Conference:

Was facility representative informed of EID's right of entry and authority: (To access records, inspect monitoring equipment or methods and sample effluents under Sections 74-6-9.E of the New Mexico Water Quality Act NMSA 1978)?

Was EID identification presented?

Were other potential or suspected violations which prompted inspections listed?

During the inspection, was the facility representative immediately advised or addition potential violations?

Exit Conference:

Were the preliminary inspection results summarized?

Was the facility representative advised if violations discussed during the entry conference remain under investigation?

Were other potential violations discovered during the inspection discussed?

Was a date provided as to when EID expects to complete consideration of potential violation?

Water Quality Sampling:

Was the facility representative offered a reasonable opportunity to obtain split/replicate samples, perform simultaneous tests, measurements or photographs?

Were copies of EID's results (sampling, testing, photos) requested? If yes, copies must be provided within ten working days after such results are in EID's possession.

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

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Water Quality & 1
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P.O. Box 1663, M

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

January 16, 2002

Bob Beers
Water Quality and Hydrology Group
Los Alamos National Laboratory
P.O. Box 1663, MS K497
Los Alamos, New Mexico 87545

RE: Request for Additional Information, DP-1132, Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility (TA-50)

Dear Mr. Beers:

The New Mexico Environment Department (NMED), Ground Water Quality Bureau (GWQB) is in the process of reviewing the discharge plan application for the Radioactive Liquid Waste Treatment Facility (RLWTF) at the Los Alamos National Laboratory (LANL). Additional information is necessary for the GWQB to proceed with the review of your discharge plan application. Please submit the following information to the NMED GWQB within 30 days of receipt of this letter:

1. The most recent influent and effluent quality data for the RLWTF. Analytical data should include nitrate as nitrogen (NO_3-N), total Kjeldahl nitrogen (TKN), radiochemistry, general chemistry, metals, and organics.

2. Analytical results from the most recent ground water samples collected from the alluvial aquifer in Mortendad Canyon. Analytical data should include NO_3-N, TKN, radiochemistry, general chemistry, metals, and organics.

3. Analytical results and disposal plan for the sediment that has been excavated from the sediment traps in Mortendad Canyon.

4. Analytical results and well construction diagram for monitoring well R-14, located at the confluence of Ten Site Canyon and Mortendad Canyon. Analytical data should include NO_3-N, TKN, radiochemistry, general chemistry, metals, and organics.

5. The most recent description of the stratigraphy of Mortendad Canyon.

6. A description of the sources of wastewater generated at TA-55 that are not currently being treated in the nitric acid reduction system (NARS).

In addition to submitting the information requested above, please commit to the following addition to the current monitoring requirements, or propose an alternative for NMED approval:

1. LANL shall collect weekly flow-proportioned composite samples from the effluent holding tank at the RLWTF, and quarterly ground water samples from monitoring wells MCO-3, MCO-4B, MCO-6, and MCO-7. Samples shall be analyzed for perchlorate (ClO_4). Analytical results shall be submitted with the RLWTF quarterly reports.

Thank you for your cooperation. If you have any questions, please contact me at 827-0078.

Sincerely,

Curt Frischkorn
Ground Water Quality Bureau
Pollution Prevention Section

xc: Courte Voorhees, District Manager, NMED District II

:01713

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: January 25, 2002
In Reply Refer To: ESH-18/WQ&H:02-021
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, FOURTH QUARTER, 2001

Dear Ms. Bustamente:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period October 1 through December 31, 2001. 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.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells on November 16, 2001. All of the analytical results from MCO-3 and MCO-6 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS). No samples were collected from alluvial wells MCO-4B and MCO-7; there was not sufficient water in MCO-4B to prepare a sample (i.e., the well was dry) and the bladder pump at MCO-7 was malfunctioning.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the fourth quarter were below NM WQCC Regulation 3103 standards for nitrate (NO3-N), fluoride (F), and total dissolved solids (TDS) with the exception of two fluoride results (2.65 mg/L, 2.24 mg/L) in October 2001. The quarterly average for fluoride in the RLWTF's effluent was 1.06 mg/L, well below the NM WQCC Regulation 3103 standard of 1.6 mg/L. The quarterly average for nitrate/nitrite (NO3/NO2-N) in the RLWTF's effluent was 2.65 mg/L. General Engineering Laboratories, Charleston, SC, preformed all analyses.

In addition to weekly composite sampling, the RLWTF also conducts operational screening for nitrates (NO3-N) in each batch of effluent. Prior to November 5, 2001, operational screening was conducted using a HACH™ test kit. Post November 5, 2001, ion chromatography (IC) has been used for nitrate (NO3-N) determination. This analytical method has a lower detection limit and places the results into the RLWTF's QA/QC program. Operational screening of effluent samples collected during the fourth quarter 2001 produced the following maximum, minimum, and average

01714

results for nitrate (NO3-N), respectively: 6.5 mg/L, 0.1 mg/L, and 2.13 mg/L. The low concentrations of nitrate (NO3-N) in the RLWTF's effluent during this quarter can be attributed to the frequent use of the reverse osmosis (RO) treatment unit which produces a low nitrate (NO3-N) permeate.

Please contact me at 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/am

Enclosures: a/s

Cy: S. Wilson, USEPA, Region 6, Dallas, Texas, w/enc.
E. Spencer, USEPA, Region 6, Dallas, Texas, w/enc.
J. Bearzi, NMED/HRMB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/enc.
R. Ford-Schmid, DOE/OB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/OLASO, w/enc., MS A316
G. Turner, DOE/OLASO, w/enc., MS A316
J. Holt, ADO, w/enc., MS A104
T. Stanford, FWO-DO, w/enc., MS K492
B. Ramsey, FWO-DO, w/enc., MS K492
D. McLain, FWO-WFM, w/enc., MS J593
R. Alexander, FWO-WFM, w/enc., MS E518
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S. Rae, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Wells Analytical Results (mg/L), 4th Quarter, 2001.

	Sample Date: November 16, 2001				
Sampling Location	**NO3/NO2-N**	**TKN**	**NH3-N**	**TDS**	**F**
MCO-3	3.87	0.620	<0.024	405	0.585
MCO-4B	NS	NS	NS	NS	NS
MCO-6	2.91	0.490	<0.024	329	1.24
MCO-7	OS	OS	OS	OS	OS
NM WQCC Ground Water Standards	*10*			*1000*	*1.6*

Notes:
NS means that no sample was collected at this well because there was not sufficient water in the well.
OS means that no sample was collected at this well because the well was out-of-service.
All units: mg/L

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 4th Quarter, 2001.

Monitoring Period	Sample Date	RLWTF Weekly Effluent Monitoring Analytical Results (mg/L)		
		NO3/NO2 (as-N)	Fluoride	TDS
SEPTEMBER	9/26/01	0.91	0.344	214
OCTOBER	10/3/01	2.64	0.69	421
	10/10/01	1.30	0.746	633
	10/17/01	2.28	1.48	503
	10/23/01	3.63	2.65	510
	10/30/01	2.28	2.24	477
NOVEMBER	11/7/01	0.74	1.26	257
	11/14/01	1.96	0.28	287
	11/20/01	2.66	0.014	188
	11/27/01	3.06	0.573	411
DECEMBER	12/5/01	2.38	0.828	398
	12/11/01	4.65	1.24	665
	12/18/01	6.00	1.49	688
4th Quarter Averages (mg/L)		**2.65**	**1.06**	**435**
NM WQCC 3103 Ground Water Standards (mg/L)		*10.00*	*1.6*	*1000*

Notes:

All analyses by the General Engineering Laboratory, Charleston, South Carolina.

:01718

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: January 31, 2002
In Reply Refer To: ESH-18/WQ&H:02-025
Mail Stop: K497
Telephone: (505) 665-1859

FEB 2002 RECEIVED

Mr. Samual Coleman, P. E., Director
Compliance Assurance and Enforcement Division (6-EN)
U. S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

SUBJECT: NOTICE OF PLANNED CHANGE AT NPDES OUTFALL 051, NPDES PERMIT NO. NM0028355

Dear Mr. Coleman:

The National Pollutant Discharge Elimination System (NPDES) Permit No. NM0028355 for Los Alamos National Laboratory requires the permittee to notify the U. S. Environmental Protection Agency (EPA) regarding any physical alterations or additions to the permitted facility that could significantly change the nature or increase the quantity of pollutants discharged. In accordance with Section III.D.1.a. of the NPDES Permit issued to the Laboratory on February 1, 2001, we are providing this notification regarding the installation of the perchlorate treatment upgrade at the Technical Area 50, Radioactive Liquid Wastewater Treatment Facility (TA-50 RLWTF).

Pilot testing of ion exchange resins at the TA-50 RLWTF has demonstrated that perchlorate can be removed from effluent to below 4 parts per billion (ppb) on a bench-scale. The use of a full-scale ion exchange treatment process should substantially reduce perchlorate concentrations in the plant effluent.

A strong base anion exchange resin, Sybron Inc. SR-7, is proposed for use. This resin has proven capability to remove the perchlorate in the effluent for more than 15,000 bed volumes. Installation of a perchlorate removal process using 54 cubic feet of SR-7 ion exchange resin will remove perchlorate from 23 million liters of effluent. This is approximately equal to one year of radioactive liquid waste effluent from the facility. All tubular ultra-filter effluent will be treated by the ion exchange process to remove perchlorate. Effluent from the ion exchange process will then be discharged to the environment via NPDES Outfall 051 or will be sent for further processing by reverse osmosis (See Enclosure 1).

Six ion exchange vessels in a parallel flow arrangement are proposed. Each vessel will treat 11.7 gallons per minute. Total flow through the columns, therefore, will be 70 gallons per minute. Resin vessels showing breakthrough of perchlorate will be removed from service and replaced with a new vessel with fresh resin. Ion exchange resin with chemically attached perchlorate ions will be incinerated off-site. It is expected that the treatment upgrade to the TA-50 RLWTF will significantly improve effluent discharged at NPDES Outfall 051. Estimated completion date for this project is March 31, 2002.

Please contact Mike Saladen of the Laboratory's Water Quality and Hydrology Group at (505) 665-6085 if you have any questions or need additional information.

Sincerely,

Steven Rae
Water Quality and Hydrology Group

SR:MS/am

Cy: W. Strickley, USEPA, Region VI, Dallas, Texas, w/enc.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
M. Leavitt, NMED/GWPB, Santa Fe, New Mexico, w/o enc.
J. Vozella, DOE/OLASO, w/o enc., MS A316
G. Turner, DOE/OLASO, w/enc., MS A316
D. McLain, FWO-WFM, w/o enc., MS E518
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P. Worland, FWO-WFM, w/enc., MS E518
D. Moss, FWO-WFM, w/enc., MS E518
L. McAtee, ESH-DO, w/o enc., MS K491
P. Thullen, ESH-DO, w/o enc., MS K491
D. Stavert, ESH-DO, w/o enc., MS K491
M. Saladen, ESH-18, w/enc., MS K497
B. Beers, ESH-18, w/enc., MS K497
T. Sandoval, ESH-18, w/o enc., MS K497
T. Grieggs, ESH-19, w/o enc., MS K490
D. Woitte, UC-GEN, w/o enc., MS A187
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

:01721

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: February 4, 2002
In Reply Refer To: ESH-18/WQ&H:02-023
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Phyllis Bustamante
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: LOS ALAMOS NATIONAL LABORATORY, RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132), MINOR MODIFICATION

Dear Ms. Bustamante:

In accordance with Section 3107. of the New Mexico Water Quality Control Commission Regulations, I am notifying you of a minor modification to Los Alamos National Laboratory's Ground Water Discharge Plan (DP-1132) for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. This notification regards the installation of a perchlorate treatment upgrade at the TA-50 RLWTF.

Pilot testing of ion exchange resins at the TA-50 RLWTF has demonstrated that perchlorate can be removed from effluent to below 4 parts per billion (ppb) on a bench-scale. The use of a full-scale ion exchange treatment process should substantially reduce perchlorate concentrations in the plant's effluent.

A strong base anion exchange resin, Sybron Inc. SR-7, is proposed for use. This resin has proven capable of removing perchlorate in the effluent for more than 15,000 bed volumes. Installation of a perchlorate removal process using 54 cubic feet of SR-7 ion exchange resin will remove perchlorate from 23 million liters of effluent. This is approximately equal to one year of radioactive liquid waste effluent from the facility. All tubular ultra-filter permeate and reverse osmosis feed waters will be treated by the ion exchange process to remove perchlorate. RLWTF effluent will continue to be collected in effluent tanks and analyzed for discharge parameters prior to batch release to the environment via the National Pollutant Discharge Elimination System permitted outfall (NPDES Outfall 051). See the enclosed schematic (Enclosure 1) for additional information.

Six ion exchange vessels in a parallel flow arrangement are proposed. Each vessel will treat 11.7 gallons per minute. Total flow through the columns, therefore, will be 70 gallons per minute. Resin vessels showing breakthrough of perchlorate will be removed from service and replaced with a new vessel with fresh resin. Resins loaded with perchlorate will be shipped off-site for disposal. It is expected that this treatment upgrade to the TA-50 RLWTF will significantly improve the quality of the effluent discharged to Mortandad Canyon at Outfall 051. The estimated completion date for this project is March 31, 2002.

Please contact me at 667-7969 should you have any questions or concerns regarding this notification.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/am

Enclosures: a/s

Cy: C. Frischkorn, NMED/GWQB, Santa Fe, New Mexico, w/enc.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/OLASO, w/enc., MS A316
G. Turner, DOE/OLASO, w/enc., MS A316
J. Holt, ADO, w/o enc., MS A104
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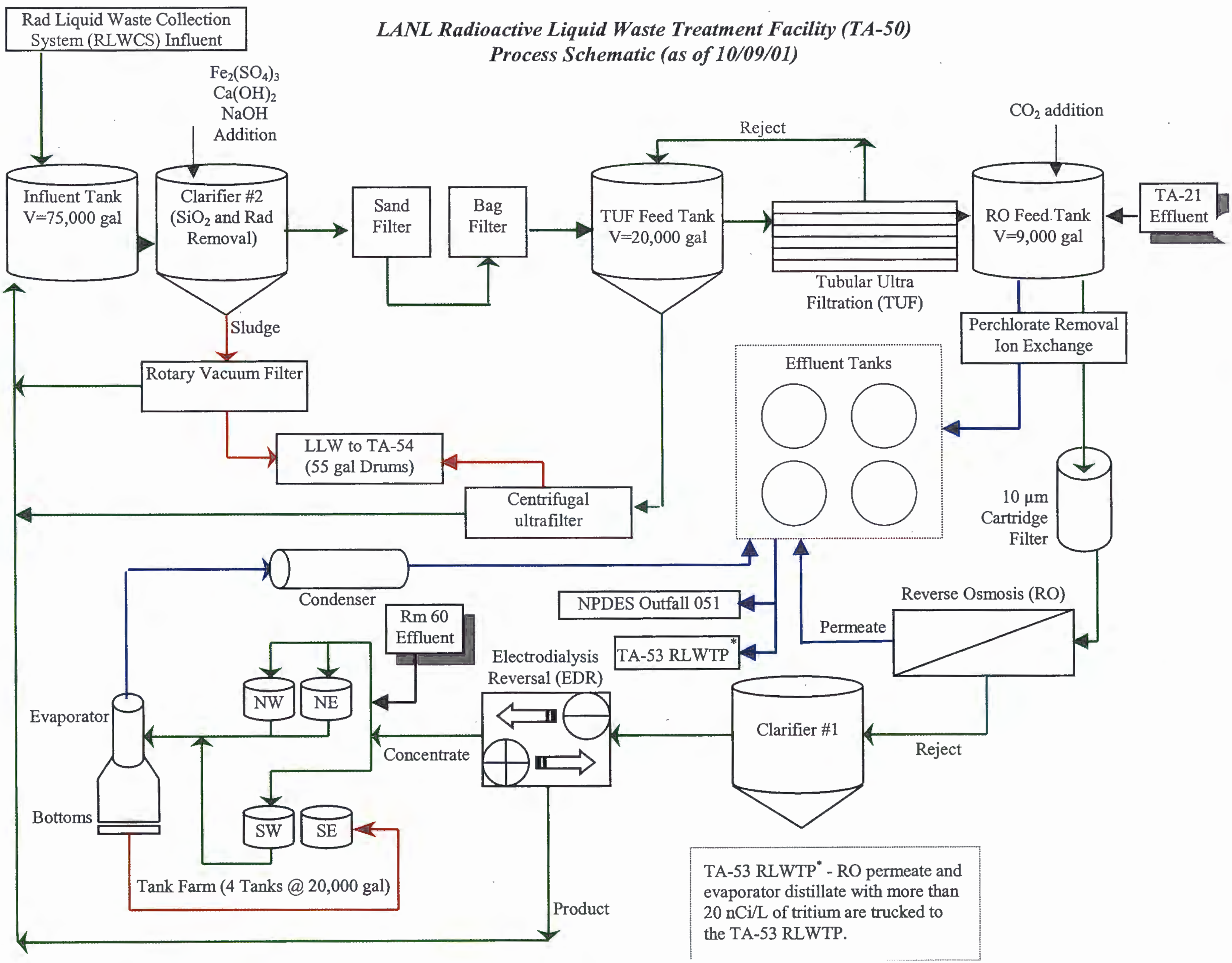
P. Worland, FWO-WFM, w/enc., MS E518
D. Woitte, UC-GEN, w/enc., MS A187
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

LANL Radioactive Liquid Waste Treatment Facility (TA-50)
Process Schematic (as of 10/09/01)



Curt Frischkorn

From: Curt Frischkorn [Curt_Frischkorn@nmenv.state.nm.us]
Sent: Tuesday, February 12, 2002 2:50 PM
To: bbeers@lanl.gov
Cc: Maura Hanning
Subject: NMED-GWQB Correspondence

Bob:

Please direct all future letters, reports, and other correspondence related to DP-857, DP-1052, and DP-1132 to me. Please remove Phyllis Bustamante from your mailing list.
Thanks.

Curt Frischkorn
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department

: 01727

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

RECEIVED
FEB 2 2 2002

Date: February 22, 2002
In Reply Refer To: ESH-18/WQ&H:02-069
Mail Stop: K497
Telephone: (505) 667-7969

Mr. Curt Frischkorn
Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

RECEIVED
FEB 2002

SUBJECT: RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION RADIOACTIVE LIQUID WASTE TREATMENT FACILITY AT TA-50

Dear Mr. Frischkorn:

Los Alamos National Laboratory is in receipt of your January 16, 2002, letter requesting additional information for the TA-50 Radioactive Liquid Waste Treatment Facility's Ground Water Discharge Plan Application (DP-1132). The Laboratory has endeavored in this letter and the enclosed attachments to provide comprehensive, detailed answers to the questions posed in your January 16th letter. In several instances, however, the information you requested is not available at this time. This was noted in the response and a commitment was made to provide the information as soon as it becomes available.

Below, each of the questions posed in your letter has been presented (in italics) along with the Laboratory's accompanying response.

1. **NMED Request.** *The most recent influent and effluent quality data for the RLWTF. Analytical data should include nitrate as nitrogen (NO3-N), total Kjeldahl nitrogen (TKN), radiochemistry, general chemistry, metals, and organics.*

LANL Response. Enclosed in Attachment 1.0 is a copy of the TA-50 Radioactive Liquid Waste Treatment Facility's (RLWTF) Annual Report for CY 2000. This report is a summary of all influent and effluent operational sampling conducted at the TA-50 RLWTF during CY2000. The Annual Report for CY2001 is currently being prepared and will be forwarded to your agency within the next 60 days.

Additional sampling results from the TA-50 RLWTF not included in the Annual Report are:

1. Effluent sampling conducted at NPDES Outfall 051 pursuant to the Laboratory's NPDES Permit No. NM0028355. NPDES sampling results are reported to the NMED-Surface Water Quality Bureau and the EPA at the end of each monitoring period; and

2. Effluent sampling conducted at the TA-50 RLWTF effluent holding tanks in support of the Laboratory's Ground Water Discharge Plan Application DP-1132. Ground Water Discharge Plan Application DP-1132 sampling results are reported to your agency quarterly on a voluntary basis prior to plan approval by the NMED.

   Attachment 2.0, Table 1.0, contains a summary of all NO3/NO2-N, F, and TDS weekly composite sample results collected from the TA-50 RLWTF's effluent holding tanks in CY2001 and reported to your agency quarterly. In addition, all available ammonia (NH3-N) and TKN sampling results not reported in the quarterly reports has been included in Table 1.0.

2. **NMED Request.** *Analytical results from the most recent ground water samples collected from the alluvial aquifer in Mortendad Canyon. Analytical data should include NO3-N, TKN, radiochemistry, general chemistry, metal, and organics.*

   LANL Response. Attachment 3.0, Tables 2.0 through 8.0, presents the analytical results from sampling alluvial ground water in Mortandad Canyon in CY2001. Quality assurance reviews have not been completed for all of this data and it should be considered "preliminary" until published in the Laboratory's 2001 Environmental Surveillance Report.

   - Table 2.0. Results for Perchlorate, 2001.
   - Table 3.0. Results for NH3, NO3/NO2, TKN, 2001.
   - Table 4.0. Results for Cl, CN, F, SO4, 2001.
   - Table 5.0. Results for TDS, 2001.
   - Table 6.0. Results for Metals, 2001.
   - Table 7.0. Results for Radiochemicals, 2001.
   - Table 8.0. Results for VOA and SVOA, 2001.

   All data reported in Tables 2.0 through 8.0 are also available on the Water Quality & Hydrology Group's (ESH-18) website: http://wqdbworld.lanl.gov/.

3. **NMED Request.** *Analytical results and disposal plan for the sediment that has been excavated from the sediment traps in Mortandad Canyon.*

   LANL Response. At the conclusion of the Laboratory's Ground Water Integration Team (GIT) Quarterly Meeting in Santa Fe on January 30, 2002, we discussed NMED Request No. 3, as presented above. It is my understanding from our conversation that the sediment at issue is the large material pile located southwest of Sediment Trap No. 1 (the uppermost sediment trap) and adjacent to the road. Attachment 4.0, Figure 2.3.1-1 *Locations of the sediment traps and sediment shafts in Mortandad Canyon* (Mortandad Canyon Work Plan, LA-UR-97-3291, September 1997), illustrates the location of the sediment pile in question (labeled as "Clean-out pile"). Hereafter, I will refer to this pile as the "SW sediment pile".

The SW sediment pile is fully described, including analytical results from preliminary RFI sampling, in the Laboratory's Mortandad Canyon Work Plan (Mortandad Canyon Work Plan, LA-UR-97-3291, September 1997). A copy of the work plan has been enclosed in Attachment 5.0. Below, I have provided a brief overview of the history and characterization of the SW sediment pile.

Sediment Trap No. 1 in Mortandad Canyon was constructed 1986, enlarged in 1987, and cleaned out and enlarged again in 1992. The available records indicate that the SW sediment pile was formed during the 1987 and 1992 enlargements. It is important to note that the SW sediment pile does not contain any sediment from the post-Cerro Grande Wildfire sediment trap cleaning that occurred in 2000 (all sediment removed from the cleaning of the sediment traps in 2000 was disposed of at TA-54 Area G). → see study (separate)

During the 1987 and 1992 cleaning and enlargements, a strategy was employed to segregate the sediment produced during cleaning the traps from those produced during enlargement of the traps. The contaminated sediment that was cleaned from the bottom of Sediment Trap No.1 were placed in a pile NW of Sediment Trap No. 1 (see Attachment 4.0, Figure 2.3.1-1) while the older, uncontaminated, alluvial material generated during enlargement of Sediment Trap No. 1 was deposited in the SW sediment pile. This strategy is supported by the sampling results presented in Table 3.4.4-4 of the Mortandad Canyon Work Plan; sample results were below background screening values for ^{239}Pu at the SW sediment pile whereas elevated ^{239}Pu concentrations in the NW sediment pile represent the contaminated sediment material from the bottom of the sediment trap. The NW sediment pile was removed during the 2000 sediment trap cleaning and disposed of at TA-54 Area G. The Laboratory's Environmental Restoration Project currently has no disposal plan for the SW sediment pile.

4. **NMED Request.** *Analytical results and well construction diagram for monitoring well R - 14, located at the confluence of Ten Site Canyon and Mortendad Canyon. Analytical data should include NO3-N, TKN, radiochemistry, general chemistry, metals, and organics.*

LANL Response. The construction of R-14 has been delayed until May 2002 due to threatened and endangered (T&E) species limitations. The final well completion report will not be available until May 2003. Analytical results from screening and characterization sampling will be available after data validation.

5. **NMED Request.** *The most recent description of the stratigraphy of Mortendad Canyon.*

LANL Response. Attachment 6.0 contains a cross section showing the stratigraphy in Mortandad Canyon.

6. **NMED Request.** *A description of the sources of wastewater generated at TA-55 that are not currently being treated in the nitric acid reduction system (NARS).*

LANL Response. Aqueous waste is discharged from TA-55 for treatment at TA-50 RLWTF by three liquid waste lines:

- Process "Acid" waste line;
- Process "Caustic" waste line; and
- "Industrial" waste line.

A description of each wastestream is provided below.

Process Acid Waste Line
Solutions of approximately 3-molar nitric acid are drained from approximately 20 release points in PF-4 laboratories to the Process Acid Waste Line (PAWL). The release points include: the Evaporator Distillate Storage Tanks (EDST); the glovebox drain; and the automatic overflows for seal or circulating water in wet vacuum and chilled circulating water pumps in PF-4. The EDST contributes the largest volume of waste to the PAWL.

Evaporator distillate that is stored in the EDST has been a problematic waste stream for many years because of radioactivity and high concentrations of nitrates being sent through the TA-55 PAWL to the RLWTF. In April 2001, the Nitric Acid Recovery System (NARS) was brought online at the Plutonium Processing and Handling Facility (TA-55). Evaporator distillate is now sent to a recycle distillation unit – the heart of NARS - that recovers HNO_3 through fractional distillation. The recovered acid is reused in TA-55 processes and the treated water is sent to the RLWTF. By April 2002, it is projected that NARS will allow TA-55 to avoid further discharges of high concentrations of nitrates to the RLWTF. NARS will also recycle 100% of radioactivity back into the TA-55 system, generating activity-free product water.

Process Caustic Waste Line
The "caustic" waste line receives discharges from a dozen discharge points containing sodium, potassium, calcium, and magnesium hydroxide solutions. Most discharge points are in gloveboxes. Many of the caustic solutions are the result of neutralizations to precipitate plutonium. The caustic wastes range from weakly basic (pH 8-10) to molar concentrations.

Industrial Waste Line
The "industrial" waste line receives discharges from 61 locations in laboratories and mezzanine rooms on the main floor and approximately 15 additional discharge locations in the basement of PF-4. A variety of industrial sources contribute to the "industrial" waste line including the following: laboratory-bench sinks; janitor's sinks; safety showers; decontamination showers; overflow drain for the caustic scrubber system; near-floor drains for the disposal of water or solutions piped to that area; steam condensate lines; ventilation condensate lines; drains for lightly contaminated or non-contaminated water tanks; and reservoirs/ automated basement sumps. In addition, overhead product from the NARS is discharge into the "industrial" waste line when the concentration of nitrate (as Nitrogen) is below 10 ppm. All discharges to the "industrial" waste line flow by gravity through a sediment interceptor designed to remove materials (e.g., mop strings) that might plug the line.

NMED Request. *In addition to submitting the information requested above, please commit to the following addition to the current monitoring requirements, or propose an alternative for NMED approval:*

1. *LANL shall collect weekly flow-proportioned composite samples from the effiuent holding tank at the RL WTF , and quarterly ground water samples from monitoring wells MCO-3, MC0-4B, MCO-6, and MCO- 7. Samples shall be analyzed for perchlorate (CIO4). Analytical results shall be submitted with the RL WTF quarterly reports.*

LANL Response. The Laboratory will commit to the above request for quarterly perchlorate monitoring at Mortandad Canyon observation wells MCO-3, MCO-4B, MCO-6, and MCO-7. Sample results will be reported to the NMED quarterly beginning with the first quarter of 2002.

Presently, the Laboratory reports perchlorate results from monthly composites of the RLWTF's effluent in a monthly Derived Concentration Guideline (DCG) Report. Attachment 7.0 contains a copy of the September 2001 DCG Report. The DCG report is submitted by the Laboratory to the Department of Energy (DOE) with copies to the NMED/DOE Oversight Bureau and the NMED-Surface Water Quality Bureau. The Laboratory proposes to add the NMED-Ground Water Quality Bureau to the monthly DCG Report distribution list in lieu of your request for weekly composite sampling for perchlorate.

Please contact me at 667-7969 should you have any questions or concerns regarding this information.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/am

Attachments: a/s

Cy: J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/o att.
J. Bearzi, NMED/HWB, Santa Fe, New Mexico, w/o att.
J. Vozella, DOE/OLASO,w/o att., MS A316
G. Turner, DOE/OLASO, w/att., MS A316
J. Holt, ADO, w/o att., MS A104
A Stanford, FWO-DO, w/o att., MS K492
S. Yarbro, NMT-DO, w/o att., MS E500
S. Evans-Carmichael, NMT-7, w/o att., MS E539
D. McLain, FWO-WFM, w/o att., MS J593
R. Alexander, FWO-WFM, w/o att., MS E518

Cy (continued):
D. Moss, FWO-WFM, w/att., MS 518
P. Worland, FWO-WFM, w/att., MS E518
L. McAtee, ESH-DO, w/o att., MS K491
P. Thullen, ESH-DO, w/o att., MS K491
D. Stavert, ESH-DO. w/o att., MS K491
S. Rae, ESH-18, w/att., MS K497
C. Nylander, ESH-18, w/att., MS K497
D. Rogers, ESH-18, w/att., MS K497
M. Saladen, ESH-18, w/att., MS K497
D. Woitte, LC-GL, w/o att., MS A187
WQ&H File, w/att., MS K497
IM-5, w/att., MS A150

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: March 13, 2002
In Reply Refer To: ESH-18/WQ&H:02-094
Mail Stop: K497
Telephone: (505) 667-7969

Mr. Curt Frischkorn
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: LOS ALAMOS NATIONAL LABORATORY, RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN APPLICATION DP-1132, MINOR MODIFICATION

Dear Mr. Frischkorn:

In accordance with Section 3107 of the New Mexico Water Quality Control Commission Regulations, I am notifying you of a minor modification to Los Alamos National Laboratory's Ground Water Discharge Plan Application DP-1132 for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. This notification regards a change in location for monitoring alluvial ground water in Mortandad Canyon from MCO-6 and MCO-7 to MCO-6B and MCO-7A.

Since the first quarter of 1999, the Laboratory has conducted quarterly monitoring at Mortandad Canyon alluvial observations wells MCO-3, MCO-4B, MCO-6 and MCO-7 for nitrate/nitrite (as N), fluoride, and total dissolved solids (TDS). Analytical results are voluntarily submitted to your agency in quarterly reports as supporting documentation for Ground Water Discharge Plan Application DP-1132. In April 2002, the Laboratory will begin sampling from MCO-6B and MCO-7A in lieu of MCO-6 and MCO-7; MCO-6B and MCO-7A are newer and better constructed wells.

In 1990, the Laboratory installed Mortandad Canyon alluvial observation wells MCO-6B and MCO-7A in accordance with the requirements of the Laboratory's Hazardous Waste Permit and EPA's RCRA standards. Attachment I contains the following information about observation wells MCO-6B and MCO-7A: (1) a description of the drilling and construction methods, (2) a table showing the well locations and elevations, (3) a table showing well characteristics and water levels, (4) a figure showing geologic log and well construction data, and (5) a map showing the location of the MCO-6B and MCO-7A.

In 1995, a comparison of chemical analyses from the old (MCO-6, MCO-7) and new (MCO-6B, MCO-7A) wells showed, for the most part, similar results between the well pairs. Exceptions to this generalization were found in (1) higher lead concentrations in MCO-7A than in MCO-7, and (2) higher barium in both the newer wells than the older wells. Results from the 1995 sampling showed no significant difference in radiochemical concentrations between the old and new wells. These findings have been excerpted from a Laboratory report, *Perched Zone Monitoring Well 1995 Analytical Results* (LA-UR-00-949, December 1997), that is available upon request.

Please contact me at 667-7969 should you have any questions or concerns regarding this notification.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/am

Enclosures: a/s

Cy:

J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/OLASO, w/o enc., MS A316
G. Turner, DOE/OLASO, w/enc., MS A316
J. Holt, ADO, w/o enc., MS A104
L. McAtee, ESH-DO, w/o enc., MS K491
P. Thullen, ESH-DO, w/o enc., MS K491
D. Stavert, ESH-DO, w/o enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
B. Ramsey, FWO-DO, w/enc., MS K492
D. McLain, FWO-WFM, w/o enc., MS J593
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P. Worland, FWO-WFM, w/enc., MS E518
D. Woitte, UC-GEN, w/enc., MS A187
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

ATTACHMENT 1.0

Mortandad Canyon Alluvial Observation Wells

MCO-6B
MCO-7A

Table of Contents

The above pages 137, 147, 148, 153, and 154 were taken from:
Geologic and Hydrologic Records of Observation Wells, Test Holes, Test Wells, Supply Wells, and Surface Water Stations in the Los Alamos Area, W.D. Purtymun, LA-12883-MS, January 1995.

VIII. OBSERVATION WELLS TO MEET SPECIAL PERMIT CONDITIONS

The special permit conditions (dictated by the operating permit issued to the Department of Energy and the Los Alamos National Laboratory by the U.S. Environmental Protection Agency) required construction of special observation wells to monitor the quality of water in the alluvium.

Observation wells were constructed in Pueblo Canyon (one well), Los Alamos Canyon (five wells), Sandia Canyon (two wells), Mortandad Canyon (five wells), Potrillo Canyon (one core hole), Fence Canyon (one well), and Water Canyon (three wells). Generalized location of the wells and core hole are shown on Fig. VIII-A.

The observation well elevations and measuring points are shown on Table VIII-A, while well characteristics and water levels are shown on Table VIII-B. The types of wellhead security locks used on these wells are shown in Fig. VIII-B. Graphic presentations of the geologic logs and construction data are shown in Figs. VIII-C through VIII-T.

The observation wells were constructed using a hollow-stem auger. The auger had an inside diameter of 6.25 in., and an outside diameter of 9.625 in. It was used with a 10.375-in.-diam bit. The holes were cased using 2-in.-diam plastic pipe in 5- or 10-ft lengths, with flush-joint, internal-upset, threaded-type connections. The hole packing material was 0.010–0.020-in.-diam Colorado silica sand with a compatible screen slot (of 0.010 in.) in the plastic casing.

REFERENCES

R. A. Bailey, R. L. Smith, and C. S. Ross, "Stratigraphic Nomenclature of the Volcanic Rocks of the Jemez Mountains, New Mexico," U.S. Geological Survey Bulletin 1274-P (1969).

Environmental Protection Group HSE-8, "Perched Zone Monitoring Wells Analytical Results," Los Alamos National Laboratory document LA-UR-90-4300.

W. D. Purtymun and A. K. Stoker, "Perched Zone Monitoring Well Installation," Los Alamos National Laboratory document LA-UR-90-3230.

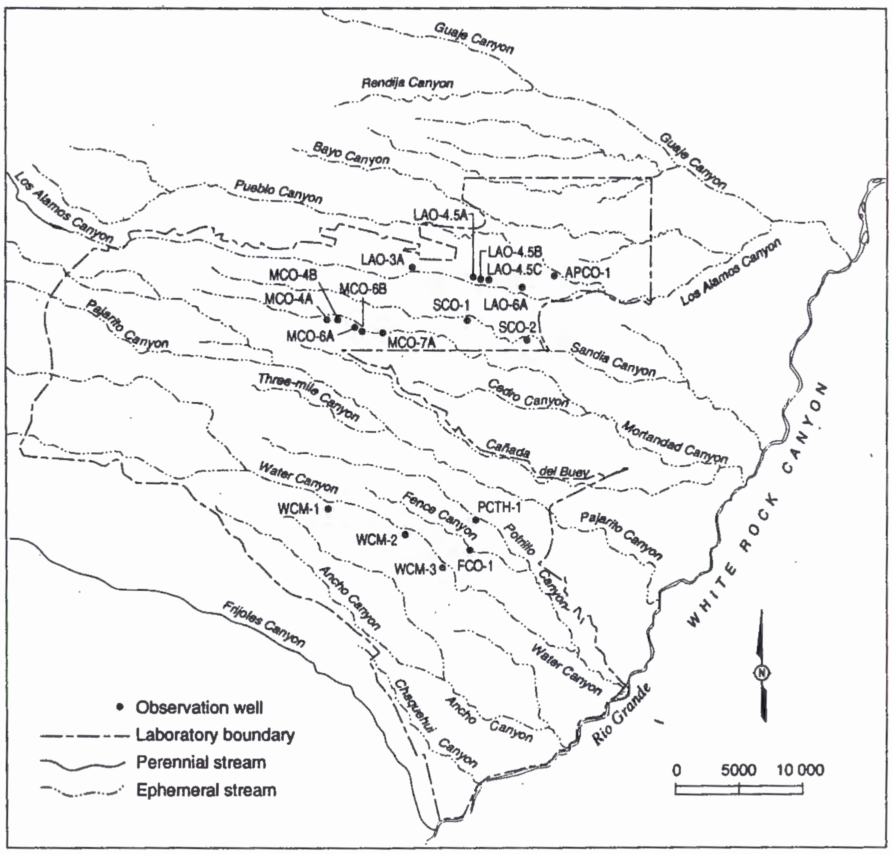


Fig. VIII-A. Locations of observation wells to meet special permit conditions.

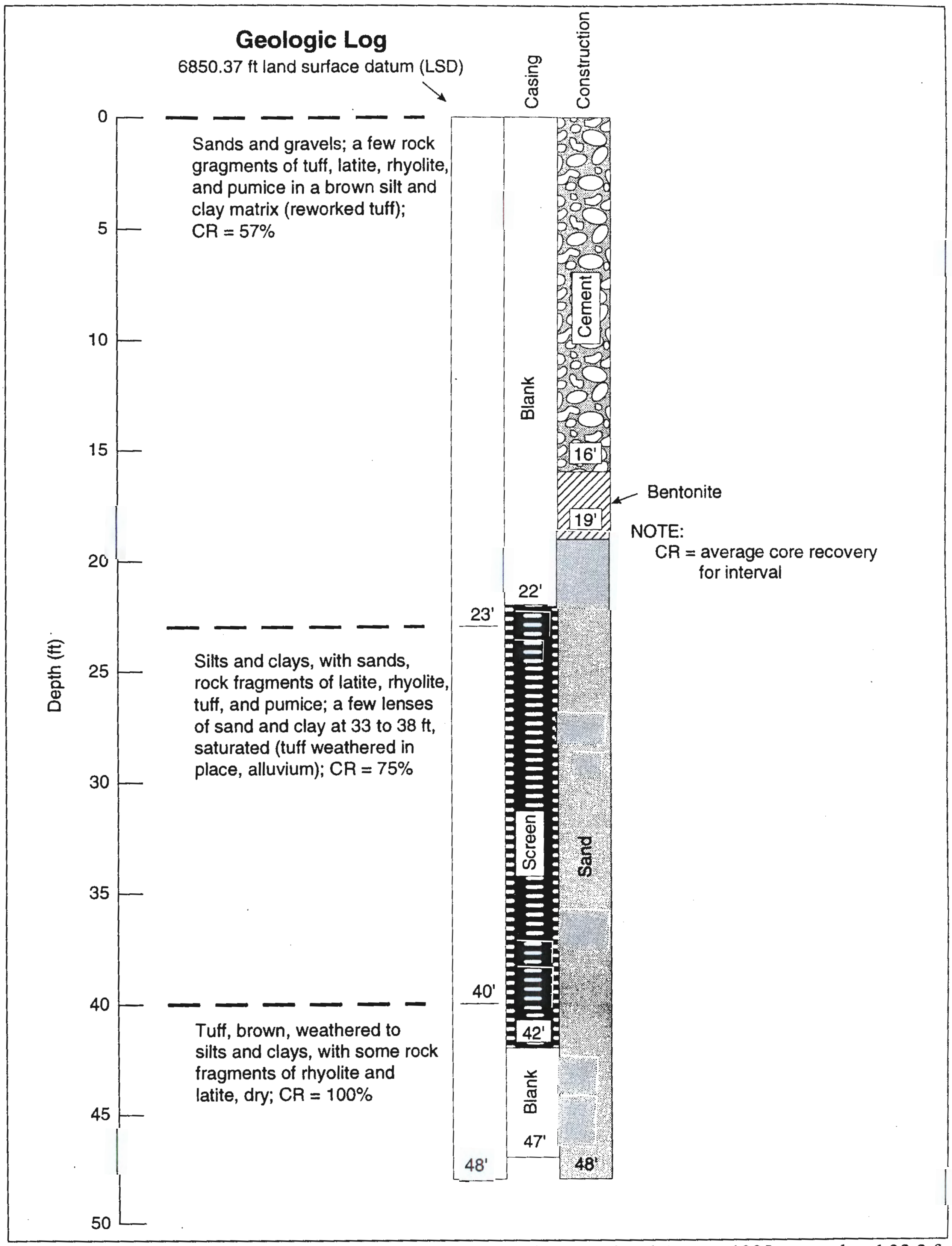


Fig. VIII-N. Mortandad Canyon observation well MCO-6B, completed August 1990, water level 32.2 ft (Purtymun and Stoker 1990).

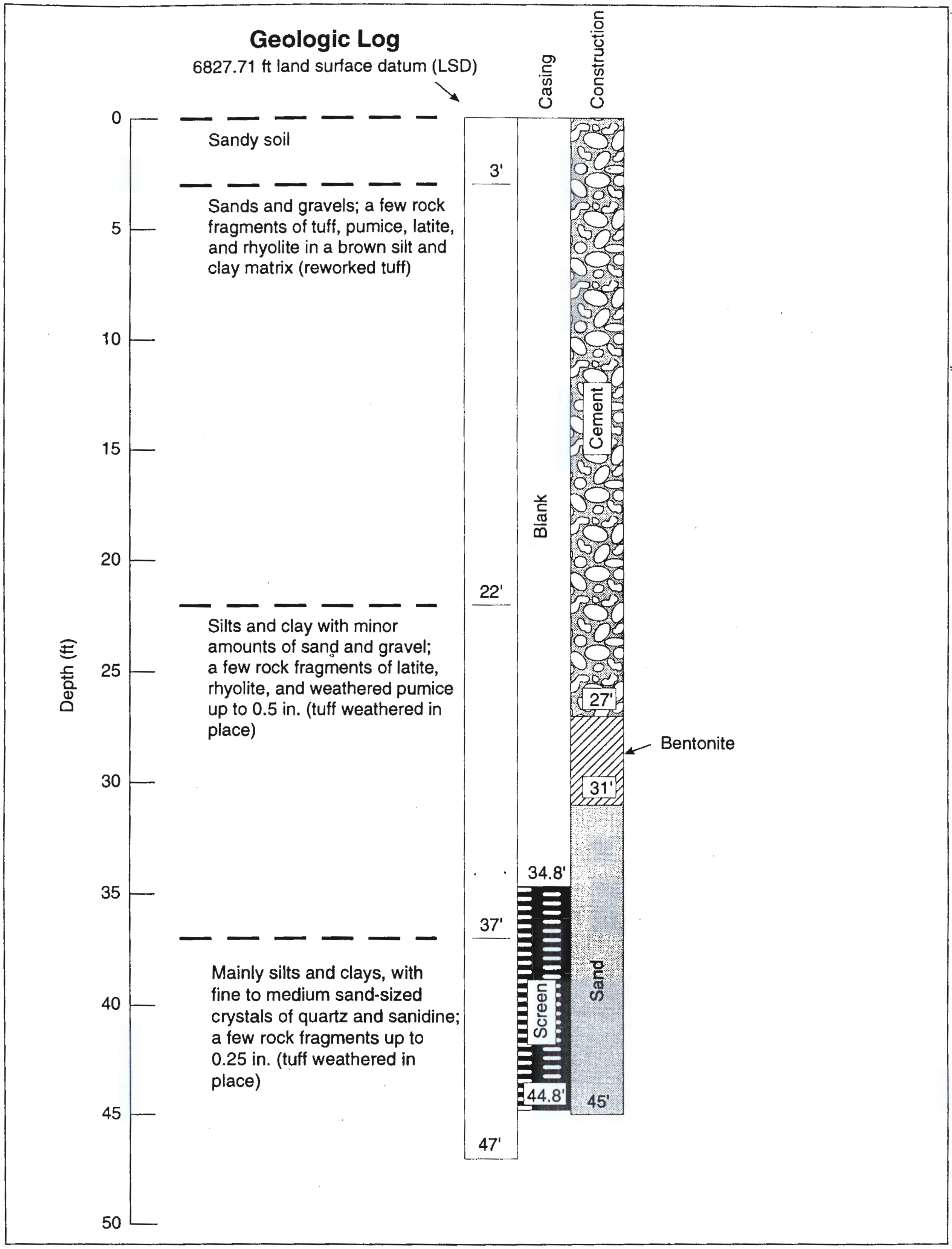


Fig. VIII-O. Mortandad Canyon observation well MCO-7A, completed November 1989, water level 35.2 ft (Purtymun and Stoker 1990).

TABLE VIII-A. Locations, Elevations, and Measuring Points (NAD 1927)

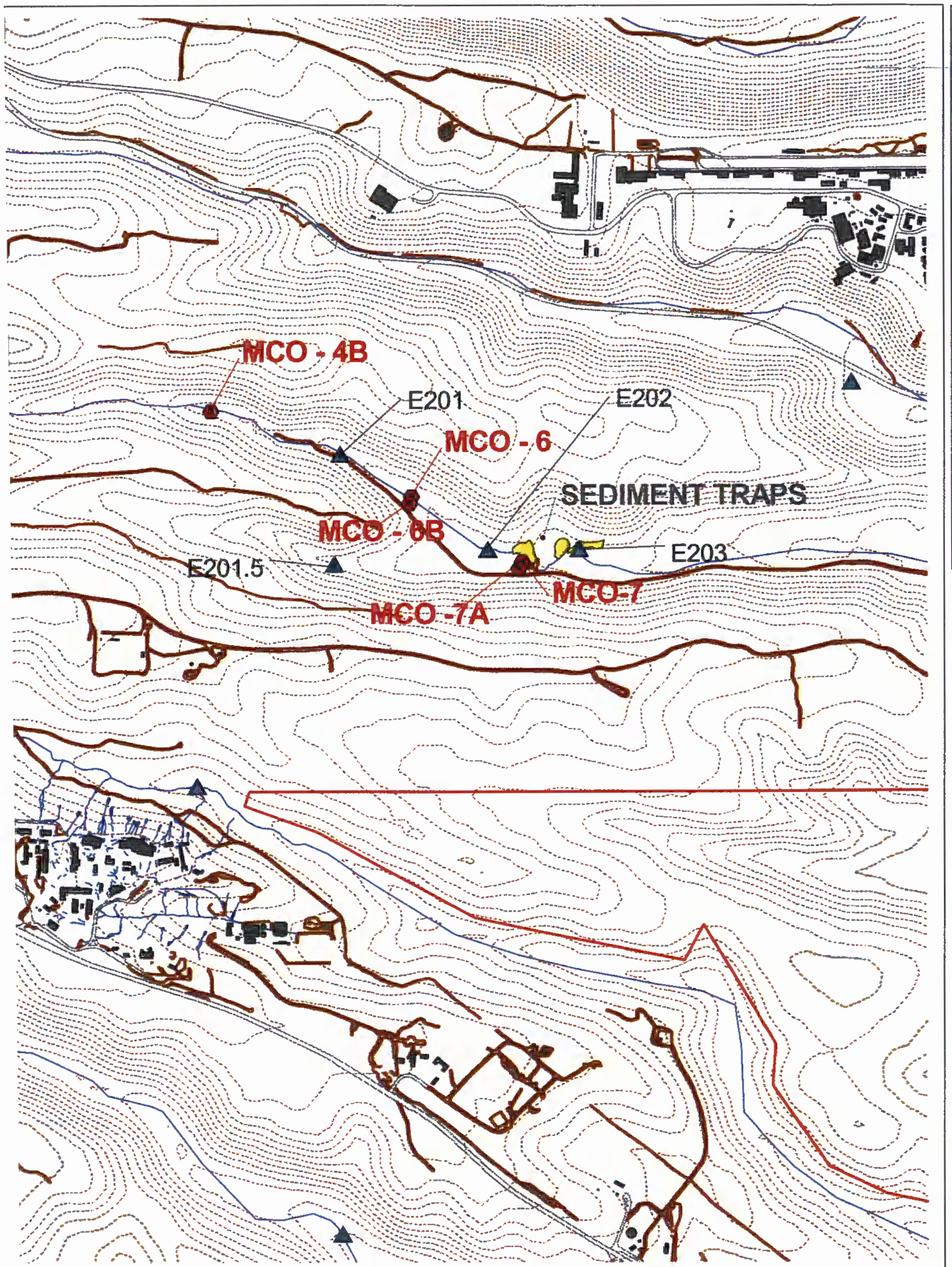
	Top of Steel Casing	PVC Casing, Measuring Point	Land-Surface Datum of Brass Cap	Measuring Point to Land-Surface Datum	NAD 1927 Coordinates of Brass Cap	
Pueblo Canyon						
APCO-1	6368.95	6368.19	6367.53	-0.66	N 1,772,957.956	E 508 965.347
Los Alamos Canyon						
LAO-3A	6580.38	6579.83	6579.40	-0.43	N 1,773,037.645	E 497,736.545
LAO-4.5A	6461.58	6460.38	6459.89	-0.49	N 1,771,989.595	E 503,255.968
LAO-4.5B	6461.76	6460.59	6459.37	-1.22	N 1,771,992.471	E 503,268.080
LAO-4.5C	6459.23	6458.72	6457.63	-1.11	N 1,772,014.413	E 503,303.058
LAO-6A	6396.73	6396.26	6395.88	-0.38	N 1,771,281.902	E 505,977.349
Sandia Canyon						
SCO-1	6619.85	6619.33	6618.67	-0.66	N 1,769,440.143	E 502,053.375
SCO-2	6502.02	6501.52	6500.67	-0.85	N 1,767,801.850	E 507,014.910
Mortandad Canyon						
MCO-4A	6889.00	6888.24	6887.53	-0.71	N 1,769,638.132	E 491,784.644
MCO-4B	6889.13	6888.71	6887.56	-1.15	N 1,769,634.899	E 491,792.173
MCO-6A	6851.80	6851.45	6850.18	-1.27	N 1,768,899.886	E 493,388.651
MCO-6B	6851.84	6851.08	6850.37	-0.71	N 1,768,921.493	E 493,386.276
MCO-7A	6829.27	6828.75	6827.71	-1.04	N 1,768,447.198	E 494,259.239
Potrillo Canyon						
PCTH-1[a]	—	—	6493.40	—	N 1,753,105.358	E 503,902.595
Fence Canyon						
FCO-1	6510.41	6509.99	6509.24	-0.75	N 1,751,120.043	E 502,168.229
Water Canyon						
WCO-1	6617.75	6617.06	6616.41	-0.65	N 1,755,007.161	E 492,514.547
WCO-2	6526.07	6525.25	6524.57	-0.68	N 1,753,166.432	E 496,626.165
WCO-3	6437.73	6437.25	6436.43	-0.82	N 1,750,558.320	E 498,968.371

[a]Cored test hole; plugged.
Source: Purtymun and Stoker 1990.

TABLE VIII-B. Characteristics and Water Levels of Observation Wells								
					Water Level (ft below Land-Surface Datum)			
	Date Drilled	Date Completed	Depth Drilled (ft)	Depth Completed (ft)	Date	Water Level	Date	Water Level
Pueblo Canyon								
APCO-1	8-15-90	8-17-90	20	19.7	—	—	8-17-90	6.2
Los Alamos Canyon								
LAO-3A	9-14-89	9-14-89	18	14.7	9-14-89	6.7	6-21-90	5.5
LAO-4.5A	9-13-89	9-14-89	20	18.5	9-14-89	Dry	6-21-90	Dry
LAO-4.5B	9-15-89	9-16-89	35	34.9	9-16-90	Dry	6-21-90	Dry
LAO-4.5C	11-21-89	11-22-89	25	23.3	11-22-89	10.6	6-21-90	10.7
LAO-6A	8-17-89	8-17-89	15	14.2	8-17-89	9.0	6-21-90	Dry
Sandia Canyon								
SCO-1	8-14-89	8-15-89	79	19.3	8-15-89	Dry	6-22-90	Dry
SCO-2	8-16-89	8-16-89	29	18.4	8-16-89	Dry	6-22-90	Dry
Mortandad Canyon								
MCO-4A	11-01-89	11-01-89	24	19.4	11-14-89	5.1	8-15-90	Dry
MCO-4B	8-20-90	8-21-90	34	33.9	—	—	8-21-90	21.7
MCO-6A	11-02-89	11-06-89	33	32.7	11-09-89	30.3	6-02-90	Dry
MCO-6B	8-09-90	8-13-90	48	47.1	—	—	8-13-90	33.2
MCO-7A	11-06-89	11-14-89	47	44.8	11-09-89	35.2	6-21-90	37.2
Potrillo Canyon								
PCTH-1[a]	10-18-89	10-20-89	74	—	10-20-89	Dry	—	—
Fence Canyon								
FCO-1	8-22-89	8-22-89	29	12.4	8-22-89	Dry	8-24-90	Dry
Water Canyon								
WCO-1	10-26-89	10-31-89	37	34.4	11-01-89	Dry	8-24-90	Dry
WCO-2	10-26-89	10-26-89	38	23.5	10-26-89	Dry	8-24-90	Dry
WCO-3	10-25-89	10-25-89	14	12.4	10-25-89	Dry	8-24-90	Dry

[a]Cored test hole; plugged.
Source: Purtymun and Stoker 1990.

'lan - Monitoring Wells



Monitoring Wells
Gage Stations
Industrial Outfall
Sediment Traps
Buildings
Building 50-01
Roads
Dirt Roads
Drainage
20 foot contours

N

Scale: 1:15,840
I Inch = 1,320 Feet

0 600 1200 1800 Feet

Water Quality & Hydrology ESH-18

Los Alamos NATIONAL LABORATORY

01742

LANL-RLWTF Meeting
March 18, 2002 10:00 am, Solid Waste Conference Room, Harold Runnels Building
Joni Arends, CCNS Linda Fair - Amigos
Brian Shields, Amigos Bravos
Coila Ash, NM Toxics Coalition
Michael Dale, DOE Oversight
Steve Yanicak, DOE Oversight
John Young, NMED, Hazardous Waste
Phyllis Bustamante/Curt Frischkorn, NMED-GWQB

1. February 22, 2002, Response to Request for Additional Information:
   1) The most recent influent and effluent quality data.
      RLWTF Annual Report for CY2000 (not included are effluent sampling results for NPDES permit Outfall 051, and Effluent sampling results reported under DP-1132 quarterly reports)

      A. 2000 Annual Report: 4.8MG total discharge, 58,352 gpd max. daily discharge volume.
         ✓Nitrate<10 mg/l in effluent
         total Nitrogen less than 12 mg/l in effluent.
         No exceedences of WQCC in minerals summary (inorganics)
         Avg. radioactivity in effluent: 13 pCi/L (WQCC=30 pCi/L)
         Rcvd. Influent data only for VOCs/SVOCs, Regulated under NPDES permit and reported in DMR?-Total Toxic Organics, RCRA Appendix IX scan required?

      B. 2001 RLWTF Weekly Composite Effluent samples (Attachment 2.0)SEE NOTES FOR MAX, MIN, AVG.
         &
         2001 GWQB Quarterly Monitoring Reports (Weekly Composite Effluent Samples-SEE NOTES):
         Nitrate / TDS <WQCC
         F >WQCC in two samples (10/23 & 10/30 J-estimated conc.) 2.65 / 2.24 mg/l, only exceedance in 2001, no exceedences in 2000.
         Operational Screening per batch<WQCC for Nitrate

   2) The most recent GW sample results collected from the Mortendad Canyon Alluvial aquifer.
      A. Attachment 3.0, Mortendad Canyon Alluvial GW Monitoring Results, 2001
         &
         2001 GWQB Quarterly Monitoring Reports (GW)
         Perchlorate: 220 ppb – 54 ppb (see attachment)
         Aug. sample (MCO7) only Alluvial GW sample >WQCC for Nitrate (10.9 mg/l)
         F: MCO7 exceed WQCC for Fluoride for the first 3 quarters of 2001 (4th quarter MCO7 out of service). Only alluvial well > WQCC in 2001 for F.

All metals reported <WQCC for 2001 alluvial aquifer sampling.
MCO3/MCO5 < WQCC(30 pCi/L) for radioactivity (sum of Radium 226 & Radium 228) Only reported for MCO3/MCO5

Appendix IX constituents in alluvial GW: (see tab w/ in appl. For wording ('No Appendix IX organic constit. Identified in alluvial GW') All appendix IX constituents detected/reported are labeled J or JB (est. conc.), and 3 were detected in field trip blanks. Are these considered detections?

3) Analytical results and disposal plan for sediments removed from Mortendad canyon sediment traps.

A. Attachment 4.0, Locations of Sediment Traps

&

Attachment 5.0, Work Plan for Mortendad Canyon
SW sediment pile (present at site) described in workplan, contains alluvial material genreated during the enlargement of Sediment trap #1. "uncontaminated", no current plans for disposal. Does not contain material from sediment trap cleanout.

2000 post Cerro Grande wildfire cleanout material placed in NW pile (removed), sampled, and disposed at TA-54, Area G.
John: characterization and disposal of sediment trap waste.
Confirm response with Mortendad Canyon Workplan.

4) Analytical Results/construction diagrams for well R-14.
R-14 delayed until May, 2002 due to threatened and endangered species limitations.

5) Recent Stratigraphy of Mortendad Canyon:
Attachment 6.0

6) Sources of TA-55 wastewater not being pretreated in the NARecoveryS.
Information for a better understanding of waste Streams.

7) Requested weekly flow-proportioned composite samples (effluent), and quarterly GW samples from alluvial wells for perchlorate.

Committed to quarterly GW sampling.
Proposed **monthly** composite sampling for groundwater DOE-DCG Report.
See NPDES requirements: 1 grab/yr.-no effluent limit

2. Other issues from last meeting:

A) Most recent/revised monitoring schedule for RLWTF (effluent and GW)

Radionuclides? WQCC standards: Radium 226 & 228 (30 pCi/L), Regulated under NPDES. Uranium (5.0 mg/l) Not regulated under NPDES. Tritium, regulated under NPDES.

B) Sampling and reporting requirements under NPDES permit.
C) Tritium concentrations in effluent, get DMR-SWQB.
D) Ten Site Canyon perchlorate, nitrate, and Tritium concentrations.??? Require sampling of TCO1, check for data.
E) Post Cerro Grande fire changes in alkalinity and mobility of contaminants.???
F) Characterization and disposal of dewatered sludge cake from RLWTF? TA54, Area G, Atomic Energy Act.
G) Permeable reactive barrier update. (Steve)

3. New issues / questions:
   A) Selective ion exchange system (perchlorate removal) goes on-line at the RLWTF March 31.
   B) Nitrate concs. Increasing in Regional aquifer? 5.1 mg/l in Test well #8.
   Require sampling of all Mortendad Canyon alluvial wells with potentiometric maps (quarterly). MCO2/MCO2 upgradient from outfall. MCO9,10, 11, 12 downgradient from outfall (if sufficient water to sample).
   Intermediate perched zone monitoring: MCOBT? Others?
   Regional (main) aquifer monitoring? TW-8, R-15, R-13(complete-waiting for pump installation, furthest downgradient in canyon), R-14(when complete, May, 2002, confl of 10 site/Mortendad canyon).
   Additional well needed?

4. Alternatives to holding a hearing:
   Submit lists of critical issues(in writing) that you feel should be addressed in the Discharge Permit within 15 days.

   Allow all parties to review draft permit and make comments before issuing a final DP.

Memorandum of Meeting or Phone Conversation

☐ Telephone ☐ Meeting	Time:	Date:

Individuals Attending Teleconference or Meeting:

Subject:

Discussion:

Conclusions:

Initialed

Distributions:

* Quarterly Monitoring Reports (2001) - weekly flow proportioned composite samples

1st Quarter: GW: NO_3 < WQCC TDS < WQCC F > WQCC - MC07: 1.61 mg/l
Effluent: NO_3 < WQCC (5.21 mg/l avg.) F < WQCC (0.73 mg/l avg.)
TDS < WQCC (453 mg/l avg.)
MC04B not sampled due to snow
Operational/screening (HACH) per batch (NO_3): 9.3 mg/l max. - 2.1 mg/l min
5.65 mg/l avg.

2nd Quarter: GW: NO_3 < WQCC TDS < WQCC F > WQCC - MC07: 1.74 mg/l
Effluent: NO_3 < WQCC (4.56 mg/l avg.) F < WQCC (0.73 mg/l avg.)
TDS < WQCC (408 mg/l avg.)
Operational/screening per batch (NO_3): 8.5 mg/l max. — 1.8 mg/l min.
5.09 mg/l avg.

3rd Quarter: GW: NO_3 < WQCC TDS < WQCC F > WQCC - MC07: 1.61 mg/l
Effluent: NO_3 < WQCC (5.41 avg.) F < WQCC (0.89 avg.)
TDS < WQCC (448 mg/l avg.)
MC04B - Not sampled - insufficient water in well
Operational Screening (NO_3): 9.8 mg/l max. — 1.8 mg/l min.
6.2 mg/l avg.

4th Quarter: GW: NO_3 < WQCC TDS < WQCC F < WQCC (MC07 - out of service)
Effluent: NO_3 < WQCC (2.65 avg.) F > WQCC - 2.65 mg/l 10/23/01 J
(1.06 avg.) - 2.24 mg/l 10/30/01 J
TDS < WQCC (435 mg/l avg.)
Not Sampled: MC04B - insufficient water
MC07 - bladder pump malfunctioning

Operational Screening (Ion Chromatography): 6.5 mg/l NO_3 (max)
0.1 mg/l + min. — 2.13 mg/l avg

Attachment 2.0 LANL RLWTF Weekly composite effluent samples:

CY 2001 (NO_3/NO_2, NH_3, TKN, F, TDS)

*No TKN/Total N reported prior to Sept., 2001

mg/l	RANGE	AVERAGE
NO_3/NO_2	9.0 — 0.74 mg/l	4.44
NH_3	16.0 — 0.24 mg/l	3.72
TKN	9.75 — 0.57 mg/l	5.03
* Total N	15.65 — 1.48 mg/l	8.32 *
F	2.65(J) — 0.26 mg/l	0.79
TDS	880 — 188 mg/l	434.0

(1.6 mg/L - WQCC) → Oct. 2001: 2.65 (J), 2.24 (J) (only exceedance)

Attachment 7.0

Monthly composite effluent samples: (Sept. 2001

2.7 pCi/l — Sr 90

12,000 pCi/l — Tritium

1.5 mg/l — NO_3

* 187 ug/l (ppb) — ClO_4 perchlorate

Attachment 3.0 Alluvial GW results - Mortandad Canyon (2001)

	RANGE	AVG.
(ug/l) ClO_4^-	220 — 54 ppb	
(mg/l) NO_3/NO_2	10.9 — 1.46	

→ March - Sept., 2001

10.9 @ MCO7 → only alluvial well that exceeds standard

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AR-RLW-2001

RLWTF Annual Report For 2001 – Volume 1

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Document Control Coordinator (Initials) ____________
Implementation Plan Required? Yes ☐ No ☑ N/A ☐
USQ Determination Required? Yes ☐ No ☑ N/A ☐

	Signature	Date
Report Preparation		
Rich Hassman, FWO-IIM	R J Hassman	22 Apr 02
Process Engineering		
Chris Del Signore, FWO-WFM	J. C. Del Signore	04-22-02
RLW Operations Supervisor		
Dave Moss, FWO-WFM	Wm David Moss	04/22/02
RLW Facility & Operations Lead		
Rick Alexander, FWO-WFM	Rick Alexander	4-22-02
Facility Manager		
Dennis McLain, FWO-WFM	Dennis McLain	4-22-02

: 01750

Table of Contents

Volume 1:

Volume 2:

1. Summary

LANL has three facilities for the treatment of radioactive liquid wastes. Most radioactive liquid wastes are treated at the TA-50 RLWTF; satellite facilities are located at TA-21 and TA-53. During 2001, the TA-50 RLWTF received and treated 13.6 million liters of radioactive liquid wastes; The TA-21 and TA-53 facilities received 408,000 and 322,000 liters of RLW, respectively.

A new NPDES permit became effective in February of 2001. The permit imposes more stringent discharge standards for eight of the 21 regulated water parameters. Despite the new permit, during 2001 there were zero violations of New Mexico water quality standards, zero violations of NPDES permit limits, and zero exceedances of DOE derived concentration guidelines for radioactive liquid discharges. This was the second consecutive year for this triple-crown accomplishment.

The treatment of wastes generates other (secondary) waste streams. During 2001, activities at the TA-50 RLWTF resulted in the generation of 64 cubic meters (68,480 kilograms) of process sludge, 156 cubic meters (94,132 kg) of LLW solids, and more than four million liters of LLW liquids. Sludge and solids were shipped to Area G for disposal (LLW) or storage (TRU); LLW liquids are further treated at the TA-50 RLWTF. No sludge was generated at the TA-21 facility during 2001.

The year 2001 saw the completion of several significant facility and process modifications. The cross-country line, formerly used to transfer RLW from TA-21 to the TA-50 RLWTF was taken out of service by draining all waters and then capping both ends of the pipe. At TA-50, the sludge tank, an in-ground cement tank without secondary containment, was replaced by an above-ground steel tank with secondary containment. Permanganate pretreatment of RLW was begun mid-year, resulting in greater alpha removal capability in the Main Treatment Process. Header and valves were re-designed and rebuilt for the tubular ultrafilter. A third process change, the use of gravity filter effluent for dissolving clarifier chemicals, resulted in two pollution prevention awards for the TA-50 RLWTF.

Planning and design for treatment improvements continued. A pilot program was completed for the removal of perchlorate, and a conceptual design completed. Successful completion of this 18-month project paves the way for the installation of equipment for perchlorate removal in the spring of 2002, which will expand the main treatment process from six to seven treatment steps. And the design of facility and process modifications continued under the Cerro Grande Rehabilitation Project, to mitigate impacts of future wildfires. The CGR Project will provide for a redundant membrane filtration unit and 200,000 gallons of additional influent storage.

2. RLWTF Facilities

2.1 TA-50 RLWTF

The facility at TA-50 receives and treats RLW from approximately 1800 generating points at LANL. Primary structures are Building 50-01, 50-02, 50-66, 50-248, and 50-90, 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). Radioactive liquid wastes are sent from generator facilities to TA-50 via an underground collection system. This system has about four miles of double-walled collection pipes.

The TA-50 facility has pre-treatment operations for two small waste streams from TA-55, a main treatment process that has six unit operations, and four unit operations for the treatment of secondary wastes. The facility has been designated a Hazard Category 3 nuclear facility with four Hazard Category 3 facility segments (DOE, 10/09/99). Figure 1 is an aerial photograph of the facility.

The TA-50 RLWTF is now 39 years old. Because of its age, because of changing regulations, and because it operates more than 250 days per year, this facility has undergone significant modifications. The infusion of capital into the TA-50 facility for repairs and upgrades has totaled $11 million since 1997. Projects have included stack consolidation, repair of tanks and clarifiers, and the installation of new processes to address more stringent discharge standards. As discussed in Chapter 3 below, significant additional facility modifications are underway.

2.2 TA-21 RLWTF

The facility at TA-21 pre-treats limited volumes of RLW from tritium research at TA-21 using just two unit operations (clarifier and sand filter). Effluent from this facility is trucked to TA-50 for treatment to remove alpha radioactivity, and then to TA-53 for final treatment. The facility is small (4200 ft^2) and old, but is operated less than four days per month. Associated with the facility are a small office trailer and a number of above-ground and below-grade storage tanks. The TA-21 RLWTF is not categorized as a nuclear facility.

2.3 TA-53 RLWTF

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 is brand new, having started operation in December 1999, and is not categorized as a nuclear facility.

Figure 2-1
Aerial Photograph of the TA-50 RLWTF

3. TA-50 RLWTF Operations in 2001

3.1 Flows

The TA-50 RLWTF received and treated 13.6 million liters of radioactive liquid wastes during 2001. As shown in Section 6.1, this represents about a 30% reduction from RLW volumes in recent years. The reduction was largely due to source reduction efforts led by E-Division, in which purge waters from the TA-48-01 boiler, which contain no radioactivity, were re-directed to the TA-46 sewage plant. Table 3-1and Figure 3-1 depict RLW volumes by month; the visible decrease during the last quarter reflect the re-direction of TA-48 boiler waters.

TABLE 3-1

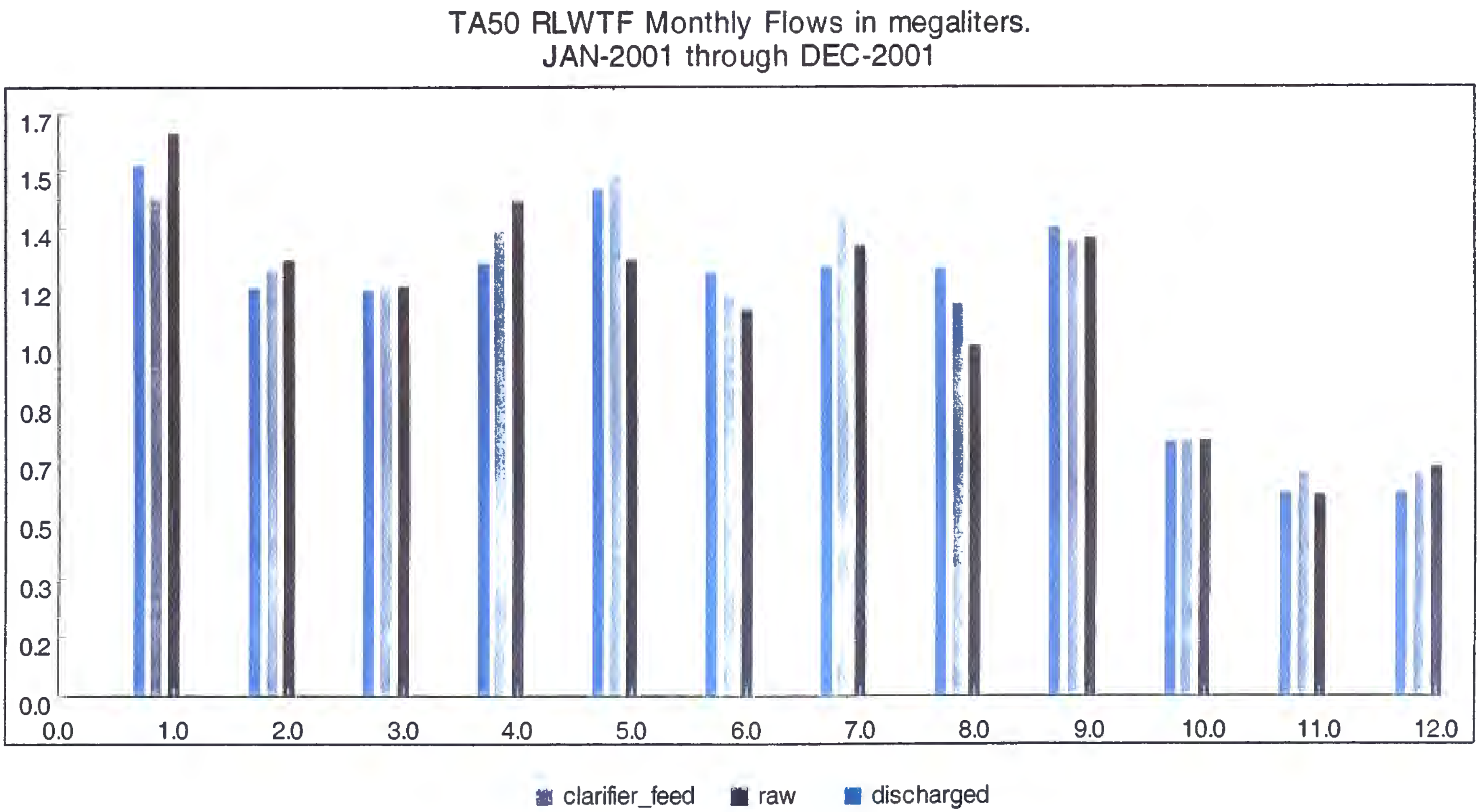
TA-50 RLWTF

FLOW SUMMARY (megaliters)

JAN-2001 through DEC-2001

Date	Influent	TA-21 Transfer	Discharged
JAN-2001	1.641	0.041	1.542
FEB-2001	1.264	0.0	1.185
MAR-2001	1.187	0.0	1.178
APR-2001	1.443	0.0	1.256
MAY-2001	1.267	0.128	1.471
JUN-2001	1.123	0.035	1.229
JUL-2001	1.311	0.191	1.246
AUG-2001	1.016	0.0	1.243
SEP-2001	1.332	0.0	1.362
OCT-2001	0.737	0.0	0.732
NOV-2001	0.578	0.0	0.585
DEC-2001	0.659	0.0	0.585
TOTAL	13.559	0.395	13.613

FIGURE 3-1



TA50 RLWTF Monthly Flows in megaliters.
JAN-2001 through DEC-2001
1.7
1.5
1.4
1.2
1.0
0.8
0.7
0.5
0.3
0.2
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
clarifier_feed
raw
discharged

3.2 Effluent Quality

The EPA issued a new NPDES permit for LANL (EPA, 12/29/00). The permit became effective 02/01/02, and replaced that which had been in effect since June 1994. The new permit changed sampling requirements and discharge standards for Outfall #051 at the TA-50 RLWTF, which is the only discharge point for RLW. While the new permit requires the monitoring of only 21 parameters, versus 24 specified in the 1994 permit, it also imposed more stringent discharge standards for eight of these 21 parameters, as summarized in Table 3-2 below.

Table 3-2
Discharge Standards That Became More Stringent
With the 2001 NPDES Permit

Parameter	Units	1994 Limit	2001 Limit	Factor
Tritium *	nC_i/L	3,000	20	150
Zinc	µg/L	95,400	4,370	22
Mercury	µg/L	10	0.77	13
Selenium	µg/L	50	5	10
Cadmium	µg/L	200	50	4
Chromium	µg/L	5,100	1,340	4
TSS	mg/L	90	30	3
Copper	µg/L	1,600	1,393	1

* Accelerator-produced

Despite the more stringent discharge standards, during 2001 there were zero violations of New Mexico water quality standards, zero violations of NPDES permit limits, and zero exceedances of DOE derived concentration guidelines for radioactive liquid discharges. This was the second consecutive year for this triple-crown accomplishment.

The following tables compare effluent quality during 2001 to DOE (DOE, 01/07/93), EPA, and New Mexico discharge standards (NMED, 11/15/96), and provide information about influent and effluent quality:

- Table 3-3, TA-50 RLWTF Effluent Compared With DCGs of Order 5400.5
- Table 3-4, TA-50 RLWTF Radionuclide Summary
- Table 3-5, TA-50 RLWTF Gross Alpha Removal
- Table 3-6, TA-50 RLWTF Effluent Compared With EPA and NMED Standards
- Table 3-7, TA-50 RLWTF Mineral Summary

TABLE 3-3

TA-50 RLWTF

EFFLUENT COMPARED WITH DCG 5400.5

JAN, 2001 through DEC, 2001

Radioactive Isotopes	Mean Concentration (picoCi/L)	DCG 5400.5 (picoCi/L)	Conc./DCG Ratio
Am-241	4.1	30	0.137
As-74		40,000	
Be-7		1,000,000	
Ce-141		50,000	
Co-56		10,000	
Co-57		100,000	
Co-58		40,000	
Co-60	4.2	5,000	8.392e-4
Cs-134		2,000	
Cs-137	15.7	3,000	0.005
Eu-152		20,000	
I-133	28.3	10,000	0.003
Mn-52		20,000	
Mn-54	53.8	50,000	0.001
Na-22		10,000	
Np-237		30	
Pu-238	5.5	40	0.137
Pu-239	1.8	30	0.06
Pu-240		30	
Ra-226		100	
Ra-228		100	
Rb-83	194.5	20,000	0.01
Rb-84	123.0	10,000	0.012
Sc-46		20,000	
Sc-48		20,000	
Sc-48		20,000	
Se-75		20,000	
Sn-113		50,000	
Sr-85		70,000	
Sr-89	2.9	20,000	1.456e-4
Sr-90	2.1	1,000	0.002
TRITIUM	9,296.9	2,000,000	0.005
Th-232		50	
U-234	2.0	500	0.004
U-235	0.1	600	2.022e-4
U-238	1.7	600	0.003
V-48		30,000	
Y-88		30,000	
Y-90		10,000	
Zn-65		9,000	

Sum of Ratios = 0.38

TABLE 3-4

TA-50 RLWTF

RADIONUCLIDE SUMMARY

JAN, 2001 through DEC, 2001

	RAW Avg (nCi/L)	Maximum (nCi/L)	Minimum (nCi/L)	Number of Samples	Total (Ci)	FINAL Avg (pCi/L)	Maximum (pCi/L)	Minimum (pCi/L)	Number of Samples	Total (Ci)
ALPHA	41.937	120.0	5.4	12.0	568.615e-3	18.261	35.0	8.6	12.0	248.594e-6
Am-241	7.376	42.0	1.1	12.0	100.01e-3	4.112	17.0	1.7	12.0	55.973e-6
BETA	5.446	16.0	980.0e-3	12.0	73.846e-3	510.11	2000.0	LDL*	12.0	6.944e-3
Co-60	No Data			0.0		4.196	78.0	78.0	1.0	57.124e-6
Cs-137	81.506e-3	1.0	340.0e-3	12.0	1.105e-3	15.69	170.0	LDL*	12.0	213.595e-6
I-133	No Data			0.0		28.295	310.0	310.0	1.0	385.191e-6
Mn-54	No Data			0.0		53.814	140.0	80.0	5.0	732.597e-6
Nb-95	89.423e-3	510.0e-3	490.0e-3	2.0	1.212e-3	55.528	350.0	290.0	2.0	755.933e-6
Pu-238	26.316	73.0	5.5	12.0	356.815e-3	5.464	15.0	1.4	12.0	74.38e-6
Pu-239	6.196	20.0	5.4e-3	12.0	84.009e-3	1.793	3.1	LDL*	12.0	24.406e-6
Rb-83	537.604e-3	3.7	2.2	3.0	7.289e-3	194.468	1800.0	1800.0	2.0	2.647e-3
Rb-84	433.079e-3	3.6	2.1	3.0	5.872e-3	123.04	1100.0	46.0	3.0	1.675e-3
Sr-85	91.554e-3	790.0e-3	430.0e-3	2.0	1.241e-3	No Data			0.0	
Sr-89	32.084e-3	400.0e-3	3.0e-3	12.0	435.024e-6	2.912	18.0	LDL*	12.0	39.64e-6
Sr-90	59.15e-3	690.0e-3	2.0e-3	12.0	802.004e-6	2.142	8.2	LDL*	12.0	29.157e-6
TOTAL PLUTONIUM	32.512	93.0	7.4	12.0	440.824e-3	7.256	15.0	1.4	12.0	98.785e-6
TRITIUM**	6.559	31.0	21.0	4.0	88.935e-3	9296.911	33000.0	1600.0	12.0	126.563e-3
U-234	37.1e-3	93.0e-3	8.7e-3	12.0	503.039e-6	2.027	5.4	LDL*	12.0	27.599e-6
U-235	2.169e-3	18.0e-3	3.5e-3	12.0	29.404e-6	121.339e-3	990.0e-3	100.0e-3	12.0	1.652e-6
U-238	22.789e-3	65.0e-3	12.0e-3	11.0	308.997e-6	1.749	5.9	540.0e-3	12.0	23.809e-6
Zr-89	620.58e-3	4.7	2.3	2.0	8.414e-3	No Data			0.0	

Volume of Flow: Influent = 13,558,873.0 liters Final = 13,613,448.0 liters

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TABLE 3-5

TA-50 RLWTF

Gross Alpha Removal

DATE	RAW (Ci)	FINAL (Ci)	REMOVAL FACTOR 100x(INF - EFF)/INF
JAN-2001	0.023	1.972e-5	99.912
FEB-2001	0.011	2.717e-5	99.752
MAR-2001	0.013	2.333e-5	99.825
APR-2001	0.074	2.581e-5	99.965
MAY-2001	0.024	1.558e-5	99.936
JUN-2001	0.045	1.206e-5	99.973
JUL-2001	0.101	4.777e-6	99.995
AUG-2001	0.053	1.241e-5	99.976
SEP-2001	0.034	1.1e-5	99.968
OCT-2001	0.035	1.498e-5	99.957
NOV-2001	0.041	2.473e-5	99.94
DEC-2001	0.087	1.022e-5	99.988
TOTAL	0.541	2.018e-4	99.963 (average)

Volume of Flow:

Treated = 13,817,010.0 liters

Final = 13,613,448.0 liters

TABLE 3-6

TA-50 RLWTF EFFLUENT

COMPARED TO NPDES & NMED STANDARDS

JAN, 2001 through DEC, 2001

Regulator	Regulated Parameter	Standard (mg/L)	FINAL Avg. (mg/L)
NMED	FLUORIDE	1.6	0.732
NMED	NITRATE-N	10.0	3.855
NMED	TDS	1,000.0	392.147
NPDES	ALUMINUM	5.0	0.05799
NPDES	ARSENIC	0.368	0.00213
NPDES	BORON	5.0	0.06369
NPDES	CADMIUM	0.05	0.00118
NPDES	COBALT	1.0	0.00015
NPDES	COD	125.0	15.35483
NPDES	COPPER	1.393	0.04467
NPDES	LEAD	0.423	0.00363
NPDES	MERCURY	7.7e-4	0.00012
NPDES	RADIUM	3.0e-11	
NPDES	SELENIUM	0.005	0.00838
NPDES	TOTAL_CHROMIUM	1.34	0.00902
NPDES	TOXIC_ORGANICS	1.0	
NPDES	TSS	30.0	1.91462
NPDES	VANADIUM	0.1	0.00409
NPDES	ZINC	4.37	0.04295
NPDES	pH	9.0	7.83287
NPDES	NICKEL	Report Only	0.01393
NPDES	PERCHLORATE	Report Only	0.07120

FINAL Avg. = Flow-weighted average concentration in effluent.

TABLE 3-7

TA-50 RLWTF

MINERAL SUMMARY

JAN, 2001 through DEC, 2001

	RAW Average	Maximum	Minimum	Number of Samples	Total (KG)	FINAL Average	Maximum	Minimum	Number of Samples	Total (KG)
ALKALINITY-MO*	56.566	111.8	1.0	12.0	766.978	168.909	334.3	104.0	12.0	2299.433
ALKALINITY-P*	0.772	LDL*	LDL*	12.0	10.466	0.76	LDL*	LDL*	12.0	10.349
ALUMINUM	0.408	1.6	LDL*	12.0	5.533	0.111	0.41	LDL*	12.0	1.513
AMMONIA-N	3.428	8.34	1.65	11.0	46.476	3.666	6.3	1.7	11.0	49.905
ANTIMONY	0.003	0.018	9.0e-4	12.0	0.035	0.002	0.017	7.0e-4	12.0	0.024
ARSENIC	0.004	0.02	LDL*	12.0	0.048	0.002	0.02	LDL*	12.0	0.03
BARIUM	0.031	0.037	0.024	12.0	0.419	0.002	0.005	LDL*	12.0	0.03
BERYLLIUM	0.002	0.007	LDL*	12.0	0.029	0.001	0.005	LDL*	12.0	0.017
BORON	0.07	0.138	0.015	12.0	0.943	0.071	0.146	0.012	12.0	0.967
CADMIUM	0.003	0.01	LDL*	12.0	0.041	0.001	0.003	LDL*	12.0	0.017
CALCIUM	12.791	14.5	11.0	12.0	173.438	35.262	59.5	6.77	12.0	480.035
CHLORIDE	21.401	47.6	13.8	11.0	290.177	28.007	55.8	12.8	11.0	381.266
COBALT	0.009	0.002	LDL*	12.0	0.124	0.009	0.001	LDL*	12.0	0.119
COD	48.398	89.0	LDL*	12.0	656.229	15.355	56.0	LDL*	12.0	209.032
CONDUCTIVITY*	276.06	473.0	213.0	12.0		714.397	937.0	586.0	12.0	
COPPER	0.417	2.27	0.139	12.0	5.655	0.045	0.077	0.009	12.0	0.608
CYANIDE	0.006	0.02	LDL*	12.0	0.077	0.007	0.02	LDL*	12.0	0.102
FLUORIDE	0.943	2.33	0.146	12.0	12.791	0.732	1.11	0.332	11.0	9.965
HARDNESS*	45.944	51.443	40.645	12.0	622.949	90.398	151.434	17.316	12.0	1230.632
IRON	1.739	2.63	0.78	12.0	23.575	0.031	0.08	0.009	12.0	0.427
LEAD	0.048	0.145	0.02	12.0	0.652	0.009	0.02	LDL*	12.0	0.128
MAGNESIUM	3.401	3.7	2.43	12.0	46.108	0.571	1.3	LDL*	12.0	7.767
MERCURY	0.003	0.005	0.002	12.0	0.042	1.247e-4	4.0e-4	2.0e-5	12.0	0.002
NICKEL	0.1	0.24	0.03	12.0	1.353	0.015	0.03	LDL*	12.0	0.201
NITRATE-N	6.138	20.2	2.3	12.0	83.225	3.855	6.61	0.198	12.0	52.484
PERCHLORATE	0.293	0.743	0.094	6.0	3.971	0.169	0.227	0.123	6.0	2.294
PHOSPHORUS	3.317	9.17	0.55	11.0	44.972	0.217	1.51	0.01	11.0	2.952
POTASSIUM	4.954	8.4	3.3	12.0	67.175	7.357	11.5	3.5	12.0	100.156
SELENIUM	0.01	0.093	LDL*	11.0	0.136	0.01	0.056	LDL*	11.0	0.137
SILICA DIOXIDE	69.755	79.6	LDL*	12.0	945.802	31.204	46.0	LDL*	12.0	424.789
SILICON	30.058	41.4	LDL*	12.0	407.551	14.313	21.1	LDL*	12.0	194.849
SILVER	0.013	0.042	LDL*	12.0	0.178	0.005	0.01	LDL*	12.0	0.063
SODIUM	24.431	68.0	0.047	12.0	331.251	106.389	177.0	10.0	12.0	1448.326
STRONTIUM	0.055	0.055	0.055	1.0	0.742	0.02	0.02	0.02	1.0	0.272
SULFATE	31.454	135.6	12.9	11.0	426.476	103.797	168.0	55.9	10.0	1413.037
TDS	178.942	270.0	LDL*	12.0	2426.245	410.204	576.0	200.0	12.0	5584.29
THALLIUM	1.771e-4	0.002	LDL*	12.0	0.002	1.55e-4	8.4e-4	LDL*	12.0	0.002
TIN	0.418	0.42	0.42	1.0	5.663	LDL*	LDL*	LDL*	1.0	
TKN	24.858	29.5	18.5	3.0	337.052	8.334	15.1	12.0	2.0	113.454
TOTAL CATIONS*	2.24	4.81	1.99	11.0		6.916	9.12	4.45	12.0	
TOTAL CHROMIUM	0.045	0.141	0.014	12.0	0.614	0.009	0.028	0.001	12.0	0.123
TSS	10.308	18.0	1.0	10.0	139.765	2.368	12.0	LDL*	10.0	32.23
~~URANIUM~~	~~0.085~~	~~0.185~~	~~0.049~~	~~12.0~~	~~1.154~~	~~0.007~~	~~0.014~~	~~3.0e-5~~	~~12.0~~	~~0.089~~
VANADIUM	0.02	0.08	0.003	12.0	0.265	0.012	0.026	LDL*	12.0	0.159
ZINC	0.296	2.15	LDL*	12.0	4.015	0.045	0.249	LDL*	12.0	0.611
pH	7.219	7.79	5.04	12.0		7.833	8.4	7.53	12.0	

Volume of Flow: Influent = 13,558,873.0 liters Final = 13,613,448.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. *LDL: Less than Detection Limit. Otherwise: mg/l

3.3 Wastes

The treatment of wastes generates other (secondary) waste streams. These secondary wastes can be grouped under three headings – process sludge, solid wastes, and secondary and tertiary radioactive liquid wastes (RLW). Influent to the TA-50 RLWTF contained 5616 kilograms of solids and about 0.75 curie of radioactivity. The treatment of this RLW, to achieve compliance with DOE, EPA, and NMED discharge standards, resulted in the generation of 68,480 kilograms of process sludge (307 drums), 94,132 kilograms of solid wastes (780 drum equivalents), and more than four million liters of secondary RLW. Waste types included chemical wastes, low-level radioactive wastes (LLW), mixed chemical and low-level radioactive wastes (MLLW), and transuranic wastes. Details appear in the below sections.

3.3.1 Process Sludge

During 2001, influent to the TA-50 RLWTF contained 2,566 kilograms of suspended and dissolved solids. These radioactive and mineral contaminants were removed by chemical precipitation (clarifier, Room 60) and through the off-site drying of evaporator bottoms. To treat the influent so that it met discharge standards, totals of 11,767 and 2,015 kilograms of lime and iron, respectively, were added to the clarifier. Other chemicals were also added at other stages of the treatment process: sodium hydroxide for pH adjustment at the neutralization chamber and at the clarifier, carbon dioxide prior to discharge, polymer at the clarifier, and potassium and sodium permanganate at the neutralization chamber.
Influent solids and process chemicals are ultimately either discharged to Mortandad Canyon as dissolved solids in treated waters, or wind up as process sludge that is shipped to Area G for disposal (LLW) or storage (TRU). Totals of 5,616 kilograms of dissolved and suspended solids were discharged as effluent, and 68,480 kilograms were sent to Area G as process sludge. Process sludge consisted of 180 drums of LLW sludge weighing 25,396 kilograms, 104 drums of grouted concentrate from the reverse osmosis unit (32,347 kilograms), and 23 drums of TRU sludge (10,737 kilograms).

Table 3-8, TA-50-1-116 Vacuum Filter Drums Shipped for Disposal, provides some detail about the drums of LLW sludge.

TABLE 3-8

TA-50 RLWTF

TA-50-1-116, Vacuum Filter Drums Shipped For Disposal

01-JAN-2001 through 31-DEC-2001

MONTH	NO of DRUMS	TOTAL VOLUME (Liters)	GROSS WEIGHT (KG)	U-235 (Curies)	PU-238 (Curies)	PU-239 (Curies)	AM-241 (Curies)
JAN-2001	26	5408.0	4534.0	507.361e-6 +/- 78.923e-6	27.059e-3 +/- 3.382e-3	29.314e-3 +/- 3.382e-3	77.795e-3 +/- 7.892e-3
FEB-2001	21	4368.0	3783.0	426.591e-6 +/- 66.359e-6	22.752e-3 +/- 2.844e-3	24.647e-3 +/- 2.844e-3	65.411e-3 +/- 6.636e-3
MAR-2001	32	6656.0	5860.0	422.685e-6 +/- 65.751e-6	39.151e-3 +/- 4.536e-3	36.449e-3 +/- 4.536e-3	77.411e-3 +/- 7.721e-3
APR-2001	23	4784.0	3976.0	15.795e-6 +/- 15.795e-6	18.583e-3 +/- 1.858e-3	13.008e-3 +/- 1.858e-3	17.654e-3 +/- 1.858e-3
MAY-2001	0	0	0	0	0	0	0
JUN-2001	12	2496.0	2134.0	8.538e-6 +/- 8.538e-6	10.045e-3 +/- 1.004e-3	7.031e-3 +/- 1.004e-3	9.543e-3 +/- 1.004e-3
JUL-2001	0	0	0	0	0	0	0
AUG-2001	0	0	0	0	0	0	0
SEP-2001	66	13728.0	11365.0	48.426e-6 +/- 28.227e-6	62.933e-3 +/- 7.275e-3	30.303e-3 +/- 3.98e-3	28.266e-3 +/- 3.339e-3
OCT-2001	0	0	0	0	0	0	0
NOV-2001	0	0	0	0	0	0	0
DEC-2001	0	0	0	0	0	0	0
TOTAL	180	37440.0	31652.0	1.429e-3 +/- 0.264e-3	180.523e-3 +/- 20.9e-3	140.752e-3 +/- 17.605e-3	276.079e-3 +/- 28.451e-3

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3.3.2 Solid Wastes

Solid wastes result from both day-to-day activities and from facility and equipment repairs and modifications. Examples of wastes resulting from day-to-day activities include paper towels, discarded liquid scintillation vials from laboratory procedures, used sample containers, protective gloves, and spent filter cartridges. Examples of waste from repairs and modifications include piping and worn pumps and motors. During 2001, the TA-50 RLWTF generated 220 cubic meters and 94,132 kilograms of such wastes. Details about waste types and quantities are provided in Table 3-10 below. As can be seen, lab wastes accounted for about one-third of the volume of TA-50 solid wastes, while wastes from facility modifications and repairs accounted for 90% of the weight of TA-50 solid wastes.

Table 3-9
Solid Wastes Generated at the TA-50 RLWTF During 2001

	Chemical Waste	LLW	Mixed LLW	Totals
Volume (m^3):				
Laboratory wastes	0.12	45	0.02	46
Modifications & Repairs	55	53	0.13	108
E-ET wastes *	0.03	0	2.42	2
Totals	55	98	2.57	156
Weight (kg):				
Laboratory wastes	81	5,117	18	5,216
Modifications & Repairs	68,682	16,785	51	85,518
E-ET wastes *	29	0	3,369	3,398
Totals	68,792	21,902	3,438	94,132

* Primarily lead bricks

3.3.3 Secondary RLW

No treatment operation is 100% efficient, and secondary liquid wastes result. Examples include waters used to backwash the gravity and RP filters, membrane flush waters and cleaning agents, TUF daily purge waters, concentrate from the RO, and acid cleaning solutions used at the evaporator. During 2001, the Main Treatment Plant generated more than four million liters of secondary RLW (Table 3-10), or more than 30% of the total volume of influent to the TA-50 RLWTF.

3.4 Unit Operations

Historically, this Annual Report provided the statistic "hours of operation", which referred to clarifier operations during a calendar year. Due to the complexity of today's operations, and the flexibility offered by the different unit operations, "hours of operation" currently has little meaning at today's TA-50 RLWTF. Rather, each unit operation (a) operates a different length of time, (b) treats a different volume of radioactive liquid wastes, and (c) generates its own quantities of secondary wastes. Data (Del Signore, 03/31/02) is summarized in the Table 3-10 below, and is discussed in the following paragraphs.

Table 3-10
Unit Operations Data for CY 2001

Unit Operation	Operation (days)	Operation (hours)	Treated (liters)	Rate (gpm)	Waste (liters)	Waste (%)
Main:						
Clarifier/ Gravity Filter	203	1,218	13,360,000	48	880,000	7%
Tubular Ultrafilter	177	1,089	13,180,000	54	1,000,000	8%
Reverse Osmosis	83	874	16,802,000	85	2,770,000	15%
Secondary:						
Rotary Vacuum Filter	150	700	216,000	1.4	14,144	7%
Evaporator	17	253	371,403	6.5	95,728	26%

The unit operations for the Main Treatment Process treated from 15-17 million liters of RLW, compared to an influent volume of 10.7 million liters. The additional volumes result from the need to treat recycled secondary wastes in addition to fresh influent. For example, the gravity filter is backwashed with about 60,000 liters of process waters monthly, or 700,000 liters annually. Backwash waters are sent to the headworks, and then recycled back through the main treatment process. These 700,000 liters of backwash waters are therefore additional workload for the clarifier, TUF, and RO. Similarly, daily purge waters from the TUF are sent to the headworks and then recycled back through the main treatment process.

The above data also shows the relative efficiency of the clarifier (7% waste) versus the RO (15% waste), and the average processing rates for the three unit operations – 48, 54, and 85 gpm, respectively.

Secondary treatment operations are largely independent of one another. The rotary vacuum filter treats sludge from the clarifier and creates two waste streams – drums of sludge that are sent to TA-54 for disposal, and decant and filtrate streams that are recycled to the Main Treatment Process. The evaporator treats the concentrate or reject stream from the reverse osmosis unit. As the table shows, the evaporator achieved a net volume reduction of about 3:1. Unit operations data was not available for the RP filter or electrodialysis reversal.

3.5 Facility and Process Modifications

3.5.1 Facility Modifications

During 2001, the cross-country transfer line was taken out of service. This line was dedicated to the transfer of radioactive liquid wastes from the TA-21 tritium facilities to the TA-50 RLWTF. Environmental protection was the primary reason for removing this pipeline from service; it was a single-walled pipe for its entire length (~two miles). Reduction of RLW waste volumes generated at the TA-21 facilities enabled the line to be taken out of service; the smaller volumes can now be transported from TA-21 to TA-50 by truck.

The sludge tank was also removed from service during the summer of 2001. An in-ground cement tank without secondary containment, the sludge tank had been used for nearly 40 years to collect clarifier sludge before the sludge was processed in the rotary vacuum filter. TK-8 is now being used for sludge storage. It is an above-ground stainless steel vessel located in Room 61 of the RLWTF. While the new tank has the benefit of secondary containment, it also has a much smaller capacity (8,000 versus 28,000 gallons). As a result, environmental safety has been increased, but operational flexibility has been reduced. In fact, the risk posed by sludge treatment operations has been assessed with moderate risk, versus a low-risk ranking of a year ago, because of this reduction in storage capacity.

3.5.2 Process Modifications

Three process modifications were made during 2001 consistent with recommendations of the Secondary Stream Study. The most effective change was the routine pretreatment of influent with potassium or sodium permanganate to enhance alpha removal. The 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. Following the change, TUF permeate was not only less than DCGs more than 95% of the time, but was also in single digits more than half the time. Of particular note was the day when feed to the clarifier had a concentration of 640 nC_i/L. TUF permeate was 17 pC_i/L, meaning that alpha radioactivity had been reduced by five orders of magnitude without the use of reverse osmosis.

Header and valves for the tubular ultrafilter (TUF) were re-designed. The TUF was purchased with 25 banks of 12 tubes each. It also came equipped with a cleaning mechanism that uses 50 air-actuated valves. The cleaning cycle isolates one bank at a time for cleaning while allowing the other 24 banks to remain in production. The 50 air-actuated valves had received heavy duty and had developed leaks, but could not be individually repaired. Repairing any single valve necessitated the removal of the entire valve header. To overcome this design deficiency, the TUF header and valves were re-designed and rebuilt.

The re-design of the TUF now allows for individual repair of the isolation valves, and will allow leaks to be repaired when they develop (improved worker safety). In addition, the redesign and re-build enabled an expansion from 12 to 14 tubes per bank, and from 300 to 350 total tubes. This increased the capacity of the TUF by 5-8%.

The third process modification was the use of gravity filter effluent for dissolving clarifier chemicals (lime and ferric sulfate). The plant test of April 2000 revealed that six gallons per minute of industrial water was being used for chemical dissolution. This industrial water, about ten per cent of the feed to the clarifier or 2,000 gallons per day, thus became radioactively contaminated. Use of gravity filter effluent eliminated this large secondary waste stream. The RLWTF received pollution prevention awards from both DOE Headquarters and LANL's Environmental Stewardship Office for this process modification.

3.6 Planning for the Future

The California Department of Public Health issued a health advisory limit of 18 μg/L of perchlorate in drinking water during 2000 (CDHS, 06/01/00). While neither California, New Mexico, or the EPA have yet imposed discharge standards for perchlorate, the DOE requested that the RLWTF investigate perchlorate removal technologies that may limit perchlorate concentrations in the RLWTF effluent. Such investigations were undertaken, and ion exchange was selected as a candidate technology worthy of further investigation. Pilot tests using actual RLW were conducted at TA-50 during late 2000 and the first eight months of 2001. The tests show that ion exchange is a feasible treatment option, and have paved the way for the installation of equipment for perchlorate removal in the spring of 2002. This will expand the main treatment process from six to seven treatment steps.

Alternatives were evaluated and a conceptual design completed during 2001 for improving safety during a wildfire. These include upgrades to the RLWTF ventilation system , the installation of 200,000 gallons of additional influent storage capacity, and the construction of new headworks (pump house and influent monitoring and pre-treatment). About one million dollars was devoted to the specification, evaluation, and conceptual design studies, and requests have been formally submitted for proceeding with these major facility and process changes. Approval to proceed with Title II design was received from the DOE in October 2001. Detailed design and construction will proceed during FY02 and FY03 on these major upgrades (more than $15 million) to the TA-50 RLWTF.

4. TA-21 RLWTF Operations in 2001

The TA-21 RLWTF received 408,000 liters of influent, treated 457,000 liters, and transferred 351,000 liters to the TA-50 facility for further treatment. Monthly flow data for the TA-21 RLWTF is summarized in Table 4-1, TA-21 Monthly Flows, and depicted in Figure 4-1, TA-21 Monthly Flows. Sludge was not treated in the vacuum filter during 2001, so that there were no drums of sludge shipped to TA-54 for disposal.

A major change occurred in August when cleanup waters from the TSTA boiler were routed to the TA-46 sewage plant. These non-radioactive waste waters formerly contributed 85%-90% of the volume of influent to the TA-21 facility. Influent volume averaged 47,000 liters per month prior to this change, but only 6,000 liters per month after

Reduction in the volume of influent to the TA-21 RLWTF enabled the closure of the Cross Country line to be closed. The Cross Country line had been used to transfer treated water to the TA-50 RLWTF. The smaller RLW volumes will henceforth be transported from TA-21 to TA-50 by truck. The reduction in influent also means that the TA- 21 facility will be operated less frequently. Operations have been reduced to about one day per month, versus 3-6 days per month in recent years.

5. TA-53 RLWTF Operations in 2001

The TA-53 RLWTF received 322,000 liters of radioactive liquid waste from TA-53 operations during 2001. In addition, another 353,000 liters of RLW were trucked from TA-50 to TA-53 for evaporation.

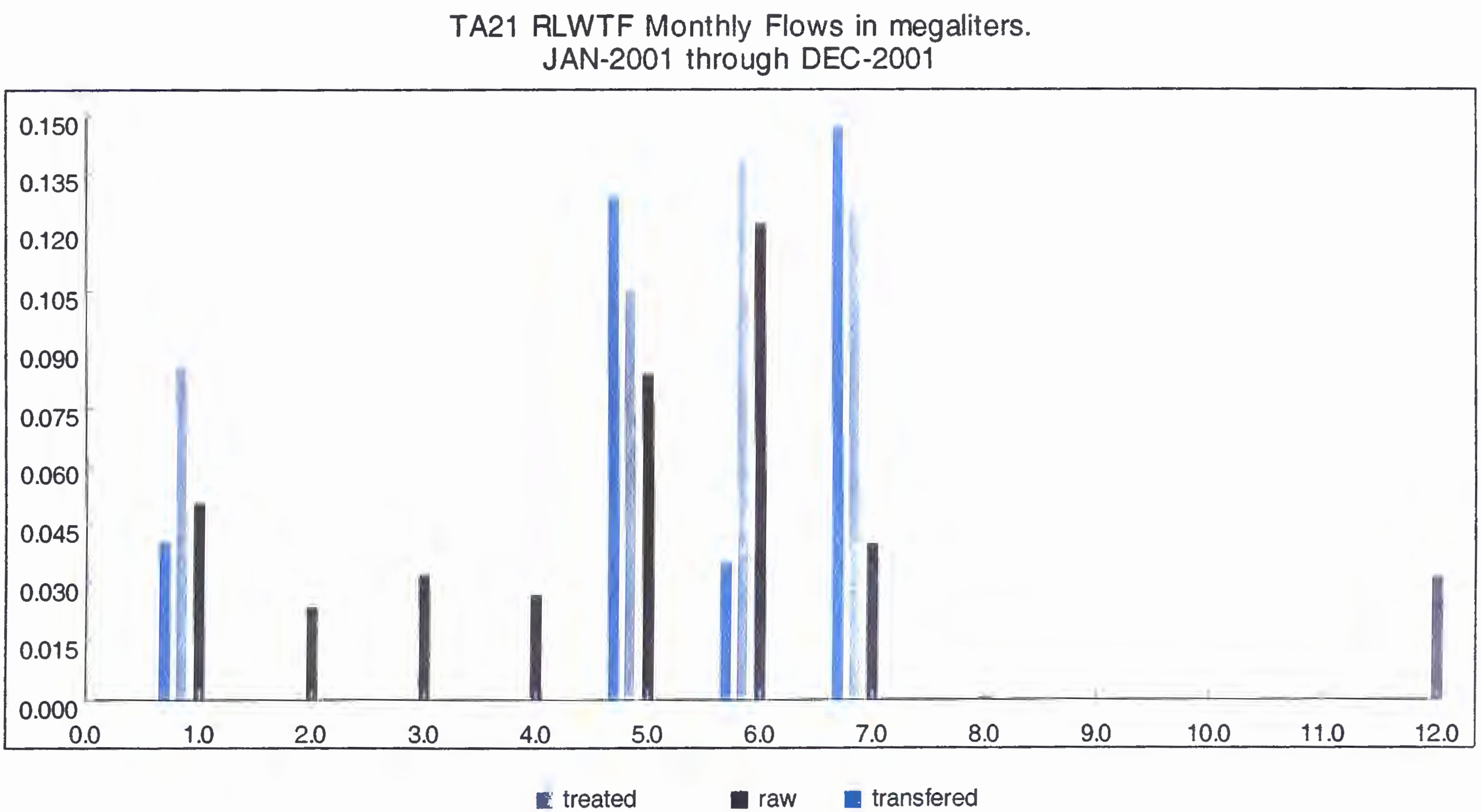
Waters from TA-50 had tritium concentrations that were less than the DOE discharge standard of 2,000 nC_i/L, and had been treated so that alpha concentrations were less than 30 pC_i/L. These waters thus met DOE standards for discharge to the environment. However, DOE had requested that LANL discharge waters that had tritium concentrations no greater than 20 nC_i/L, or 1% of the discharge standard. In order to meet this new request, about 4% of the RLW treated at the TA-50 RLWTF had to be sent for solar evaporation. There is at no known technology for removing tritium from radioactive liquid wastes.

Table 4-1
TA-21 RLWTF Flow Summary
(January 2001 through December 2001)

Date	Influent	Treated	Transfer
January 2001	50,203	85,281	40,664
February 2001	23,377	0	0
March 2001	31,918	0	0
April 2001	26,310	0	0
May 2001	83,220	105,454	128,441
June 2001	121,879	138,918	35,022
July 2001	39,838	127,013	146,871
August 2001	212	0	0
September 2001	0	0	0
October 2001	0	0	0
November 2001	0	0	0
December 2001	31,264	0	0
Totals	408,221	456,666	350,998

* All volumes in liters

FIGURE 4-1



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RLWTF Annual Report For 2001

Volume 2 – Supplemental Data

Volume 2 of the RLWTF Annual Report For 2001 is a collection of appendices that provide operational details such as monthly and weekly sample results. Because it consists of details and minutia, distribution of Volume 2 has been limited.

There are four appendices in Volume 2:

Appendix A, Other 2001 Data for the TA-50 RLWTF
Appendix B, Other 2001 Data for the TA-21 RLWTF
Appendix C, Historical Perspective
Appendix D, VOC and SVOC Data for the TA-50 RLWTF

Appendix A
Other 2001 Data for the TA-50 RLWTF

Highlight and summary data for operations at the TA-50 RLWTF appear in Volume 1 of this Annual Report. This appendix contains additional information about concentrations in plant influent and effluent. Data comes from chemical and radiochemical analysis of monthly composite samples. Specifically, this appendix contains the following information:

- Appendix A.1: TA-50 Monthly Flows – primarily plant influent, plant effluent, and transfers from the TA-21 RLWTF. (3 pages)
- Appendix A.2: Radioisotope summary by month – concentrations and quantities in plant influent and effluent. (12 pages)
- Appendix A.3: Mineral summary by month – concentrations and quantities in plant influent and effluent. (12 pages)
- Appendix A.4: Concentration charts – concentrations of radioisotopes and minerals in plant influent and effluent. Parameters that have been graphed are critical indicators to either regulatory compliance or successful treatment operations. The following charts are included:

Radioactive Parameters (7):
- Alpha radioactivity
- Beta radioactivity
- Tritium
- Am-241, Pu-238, Pu-239
- Sr-90

Anions (4):
- Fluoride
- NO_3-N (Nitrate)
- Perchlorate
- Sulfate

Cations (6):
- Calcium, Potassium
- Iron
- Mercury
- Sodium, Zinc

Conventional Water-Quality Parameters (6):
- Alkalinity
- NH_3-N (Ammonia)
- COD (Chemical Oxygen Demand)
- Silica
- TDS (Total Dissolved Solids)
- TSS (Total Suspended Solids)

Appendix A.1
Monthly Flows, TA-50 RLWTF

TA50 MONTHLY FLOWS (liters)

JAN-2001 through DEC-2001

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
JAN-2001											
Total	1,641,245	1,451,393	143.583		1,541,613	40,664	25,806	0	0	0	0
Maximum/Day	133,678	138,321	9.633	265.924	152,680						
Minimum/Day	9,074	21,068	3.767	43.874	64,932						
Average/Day	52,943	69,114	6.837	170.295	96,351						
FEB-2001											
Total	1,263,772	1,240,602	96.633		1,184,850	0	0	0	0	2,052	0
Maximum/Day	145,086	100,196	8.6	528.927	152,404						
Minimum/Day	6,524	15,231	0.0	80.162	73,236						
Average/Day	45,135	68,922	5.369	213.136	78,990						
MAR-2001											
Total	1,187,217	1,183,187	100.3		1,178,076	0	37,850	0	8,494	0	0
Maximum/Day	150,707	105,076	9.0	266.475	146,691						
Minimum/Day	21,081	24,398	-3.933	99.887	72,740						
Average/Day	38,297	62,273	5.279	179.365	84,148						
APR-2001											
Total	1,443,265	1,351,329	134.317		1,256,439	0	0	0	36,629	0	0
Maximum/Day	88,160	96,054	9.15	856.77	146,691				21,234		
Minimum/Day	17,712	31,560	1.067	57.486	71,480				15,395		
Average/Day	48,109	67,566	6.716	203.782	78,527				18,314		
MAY-2001											
Total	1,266,572	1,531,374	124.867		1,470,763	128,441	27,895	61,332	0	0	0
Maximum/Day	91,620	130,580	8.05	464.683	146,691	49,827					
Minimum/Day	17,809	24,500	2.033	53.145	71,480	38,571					
Average/Day	40,857	76,569	6.243	212.498	86,515	42,814					

TA50 MONTHLY FLOWS (liters)

JAN-2001 through DEC-2001

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
JUN-2001											
Total	1,123,491	1,164,751	106.2		1,229,333	35,022	0	82,933	12,209	5,124	0
Maximum/Day	87,180	102,759	9.083	307.378	146,691						
Minimum/Day	2,911	22,875	2.0	75.248	58,929						
Average/Day	37,450	64,708	5.9	182.828	76,833						
JUL-2001											
Total	1,310,855	1,405,057	113.917		1,245,781	191,080	30,000	28,743	0	20	0
Maximum/Day	94,780	140,872	9.95	375.479	146,691	87,403					
Minimum/Day	2,069	15,063	1.0	67.386	73,236	8,343					
Average/Day	42,286	70,253	5.696	207.797	77,861	47,770					
AUG-2001											
Total	1,015,549	1,138,402	114.7		1,242,552	0	15,363	0	0	0	0
Maximum/Day	104,491	96,815	8.333	293.284	146,472		12,263				
Minimum/Day	11,965	446	2.017	58.249	72,006		3,100				
Average/Day	32,760	51,745	5.462	169.332	77,659		7,682				
SEP-2001											
Total	1,332,342	1,324,892	106.317		1,361,741	0	0	0	0	0	0
Maximum/Day	119,432	173,228	13.767	348.052	146,472						
Minimum/Day	12,398	21,778	2.25	141.899	43,493						
Average/Day	44,411	77,935	6.254	214.923	90,783						
OCT-2001											
Total	737,284	737,829	67.483		732,360	0	0	121,991	0	0	7,409
Maximum/Day	59,839	94,295	9.133	422.03	146,472			61,355			
Minimum/Day	4,878	20,872	2.017	46.909	73,236			60,636			
Average/Day	23,783	49,189	4.499	209.59	91,545			60,995			

TA50 MONTHLY FLOWS (liters)

JAN-2001 through DEC-2001

	Influent	Treated	Time (hrs)	Rate (liters/min)	Effluent	DP	Misc	Recirc	Sludge	Caustic	Acid
NOV-2001											
Total	577,898	645,675	65.85		584,658	0	42,006	0	0	0	0
Maximum/Day	84,877	122,819	6.833	342.116	73,236						
Minimum/Day	7,172	17,219	4.017	46.164	72,006						
Average/Day	19,263	53,806	5.487	163.093	73,082						
DEC-2001											
Total	659,383	642,519	43.767		585,282	0	0	0	11,730	0	0
Maximum/Day	65,807	104,288	7.3	362.479	73,236						
Minimum/Day	10,310	28,051	2.183	193.929	72,630						
Average/Day	21,270	64,252	4.377	248.994	73,160						
SUMMARY											
Total	13,558,873	13,817,010	1217.933		13,613,448	395,207	178,920	294,999	69,062	7,196	7,409
Maximum/Month	1,641,245	1,531,374			1,541,613	191,080	42,006	121,991	36,629	5,124	7,409
Minimum/Month	577,898	642,519			584,658	35,022	15,363	28,743	8,494	20	7,409
Average/Month	1,129,906	1,151,418	101.494	189.077	1,134,454	32,934	14,910	24,583	5,755	600	617

Appendix A.2
Analyses of Monthly Composite Radiological Samples, TA-50 RLWTF

TA50 RADIOISOTOPES

JAN-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	8.0	11.611e-3		9.1	14.029e-6
Am-241	4.1	5.951e-3		3.0	4.625e-6
BETA	2.5	3.628e-3		400.0	616.645e-6
Cs-137	LDL*			LDL*	
Pu-238	9.5	13.788e-3		3.0	4.625e-6
Pu-239	1.9	2.758e-3		3.0	4.625e-6
Sr-89	49.0e-3	71.118e-6		18.0	27.749e-6
Sr-90	96.0e-3	139.334e-6		3.1	4.779e-6
TOTAL PLUTONIUM	11.4	16.546e-3		6.0	9.25e-6
TRITIUM**				4200.0	6.475e-3
U-234	8.7e-3	12.627e-6		3.6	5.55e-6
U-235	3.5e-3	5.08e-6		990.0e-3	1.526e-6
U-238				5.9	9.096e-6
Total Alpha		22.514e-3			20.951e-6

Volume of Flow: Influent = 1,641,245.0 liters Final = 1,541,613.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

FEB-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	5.4	6.699e-3		14.0	16.588e-6
Am-241	1.4	1.737e-3		3.1	3.673e-6
BETA	2.1	2.605e-3		300.0	355.455e-6
Cs-137	LDL*			LDL*	
Mn-54				110.0	130.334e-6
Nb-95	510.0e-3	632.707e-6		290.0	343.607e-6
Pu-238	5.5	6.823e-3		11.0	13.033e-6
Pu-239	1.9	2.357e-3		2.3	2.725e-6
Sr-89	3.0e-3	3.722e-6		LDL*	
Sr-90	2.0e-3	2.481e-6		4.0	4.739e-6
TOTAL PLUTONIUM	7.4	9.18e-3		13.3	15.759e-6
TRITIUM**				33000.0	39.1e-3
U-234	45.0e-3	55.827e-6		5.4	6.398e-6
U-235	LDL*			100.0e-3	118.485e-9
U-238	18.0e-3	22.331e-6		4.6	5.45e-6
Zr-89	2.3	2.853e-3			
Total Alpha		10.973e-3			25.948e-6

Volume of Flow: Influent = 1,263,772.0 liters Final = 1,184,850.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

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TA50 RADIOISOTOPES

MAR-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	11.0	13.015e-3		27.0	31.808e-6
Am-241	1.1	1.302e-3		2.1	2.474e-6
BETA	1.5	1.775e-3		480.0	565.476e-6
Cs-137	LDL*			LDL*	
Mn-54				130.0	153.15e-6
Nb-95	490.0e-3	579.762e-6		350.0	412.327e-6
Pu-238	8.3	9.82e-3		8.1	9.542e-6
Pu-239	1.9	2.248e-3		1.9	2.238e-6
Sr-89	12.0e-3	14.198e-6		LDL*	
Sr-90	24.0e-3	28.396e-6		LDL*	
TOTAL PLUTONIUM	10.2	12.069e-3		10.0	11.781e-6
TRITIUM**				2600.0	3.063e-3
U-234	LDL*			7.5	8.836e-6
U-235	LDL*			120.0e-3	141.369e-9
U-238	LDL*			4.8	5.655e-6
Zr-89	4.7	5.561e-3			
Total Alpha		13.37e-3			23.232e-6

Volume of Flow: Influent = 1,187,217.0 liters Final = 1,178,076.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

APR-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	59.0	79.728e-3		21.0	26.385e-6
Am-241	4.1	5.54e-3		7.2	9.046e-6
BETA	12.0	16.216e-3		LDL*	
Cs-137	340.0e-3	459.452e-6		LDL*	
Mn-54				80.0	100.515e-6
Pu-238	41.0	55.404e-3		5.6	7.036e-6
Pu-239	9.6	12.973e-3		2.7	3.392e-6
Sr-89	5.4e-3	7.297e-6		1.4	1.759e-6
Sr-90	40.0e-3	54.053e-6		8.2	10.303e-6
TOTAL PLUTONIUM	50.6	68.377e-3		8.3	10.428e-6
TRITIUM**	31.0	41.891e-3		6900.0	8.669e-3
U-234	55.0e-3	74.323e-6		3.5	4.398e-6
U-235	18.0e-3	24.324e-6		100.0e-3	125.644e-9
U-238	26.0e-3	35.135e-6		2.2	2.764e-6
Total Alpha		74.016e-3			23.998e-6

Volume of Flow: Influent = 1,443,265.0 liters Final = 1,256,439.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

MAY-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	15.0	22.971e-3		20.0	29.415e-6
Am-241	1.2	1.838e-3		2.9	4.265e-6
BETA	4.7	7.197e-3		2000.0	2.942e-3
Cs-137	LDL*			220.0	323.568e-6
Mn-54				120.0	176.492e-6
Pu-238	12.0	18.376e-3		4.6	6.766e-6
Pu-239	2.7	4.135e-3		1.6	2.353e-6
Rb-83	3.7	5.666e-3		1800.0	2.647e-3
Rb-84	2.1	3.216e-3		1100.0	1.618e-3
Sr-85	430.0e-3	658.491e-6			
Sr-89	LDL*			LDL*	
Sr-90	13.0e-3	19.908e-6		500.0e-3	735.382e-9
TOTAL PLUTONIUM	14.7	22.511e-3		6.2	9.119e-6
TRITIUM**				6800.0	10.001e-3
U-234	42.0e-3	64.318e-6		1.0	1.471e-6
U-235	LDL*			75.0e-3	110.307e-9
U-238	12.0e-3	18.376e-6		880.0e-3	1.294e-6
Total Alpha		24.413e-3			14.965e-6

Volume of Flow: Influent = 1,266,572.0 liters Final = 1,470,763.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

JUN-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	27.0	31.448e-3		8.6	10.572e-6
Am-241	7.9	9.202e-3		4.9	6.024e-6
BETA	4.5	5.241e-3		LDL*	
Cs-137	LDL*			590.0	725.306e-6
Mn-54				140.0	172.107e-6
Pu-238	23.0	26.789e-3		4.0	4.917e-6
Pu-239	7.8	9.085e-3		990.0e-3	1.217e-6
Rb-83	LDL*			890.0	1.094e-3
Rb-84	LDL*			540.0	663.84e-6
Sr-89	LDL*			LDL*	
Sr-90	LDL*			LDL*	
TOTAL PLUTONIUM	30.8	35.874e-3		4.99	6.134e-6
TRITIUM**				12000.0	14.752e-3
U-234	LDL*			460.0e-3	565.493e-9
U-235	LDL*			LDL*	
U-238	LDL*			230.0e-3	282.747e-9
Total Alpha		45.076e-3			12.724e-6

Volume of Flow: Influent = 1,123,491.0 liters Final = 1,229,333.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

JUL-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	100.0	140.506e-3		11.0	13.704e-6
Am-241	15.0	21.076e-3		2.0	2.492e-6
BETA	16.0	22.481e-3		LDL*	
Cs-137	LDL*			LDL*	
Pu-238	46.0	64.633e-3		1.4	1.744e-6
Pu-239	11.0	15.456e-3		LDL*	
Sr-89	31.0e-3	43.557e-6		LDL*	
Sr-90	25.0e-3	35.126e-6		LDL*	
TOTAL PLUTONIUM	57.0	80.088e-3		LDL*	
TRITIUM**				7700.0	9.593e-3
U-234	35.0e-3	49.177e-6		LDL*	
U-235	LDL*			LDL*	
U-238	65.0e-3	91.329e-6		540.0e-3	672.722e-9
Total Alpha		101.213e-3			4.236e-6

Volume of Flow: Influent = 1,310,855.0 liters Final = 1,245,781.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

AUG-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	86.0	97.903e-3		15.0	18.638e-6
Am-241	5.8	6.603e-3		3.0	3.728e-6
BETA	2.4	2.732e-3		460.0	571.574e-6
Cs-137	LDL*			LDL*	
I-133				310.0	385.191e-6
Pu-238	32.0	36.429e-3		3.0	3.728e-6
Pu-239	8.3	9.449e-3		2.3	2.858e-6
Rb-84				46.0	57.157e-6
Sr-89	LDL*			LDL*	
Sr-90	13.0e-3	14.799e-6		LDL*	
TOTAL PLUTONIUM	40.3	45.878e-3		5.3	6.586e-6
TRITIUM**				6900.0	8.574e-3
U-234	31.0e-3	35.29e-6		2.6	3.231e-6
U-235	LDL*			LDL*	
U-238	46.0e-3	52.366e-6		2.4	2.982e-6
Total Alpha		52.516e-3			13.544e-6

Volume of Flow: Influent = 1,015,549.0 liters Final = 1,242,552.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

SEP-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	14.0	18.548e-3		35.0	47.661e-6
Am-241	3.9	5.167e-3		1.7	2.315e-6
BETA	980.0e-3	1.298e-3		320.0	435.757e-6
Cs-137	LDL*			LDL*	
Pu-238	22.0	29.148e-3		4.0	5.447e-6
Pu-239	5.4e-3	7.154e-6		1.1	1.498e-6
Sr-89	LDL*			LDL*	
Sr-90	LDL*			LDL*	
TOTAL PLUTONIUM	22.005	29.155e-3		5.1	6.945e-6
TRITIUM**				12000.0	16.341e-3
U-234	70.0e-3	92.742e-6		1.5	2.043e-6
U-235	LDL*			LDL*	
U-238	36.0e-3	47.696e-6		730.0e-3	994.071e-9
Total Alpha		34.415e-3			11.302e-6

Volume of Flow: Influent = 1,332,342.0 liters Final = 1,361,741.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

OCT-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	42.0	30.989e-3		16.0	11.718e-6
Am-241	9.3	6.862e-3		4.5	3.296e-6
BETA	10.0	7.378e-3		350.0	256.326e-6
Co-60				78.0	57.124e-6
Cs-137	LDL*			LDL*	
Pu-238	31.0	22.873e-3		9.5	6.957e-6
Pu-239	6.7	4.943e-3		2.3	1.684e-6
Rb-83	2.2	1.623e-3			
Rb-84	3.6	2.656e-3			
Sr-85	790.0e-3	582.885e-6			
Sr-89	400.0e-3	295.132e-6		LDL*	
Sr-90	LDL*			4.3	3.149e-6
TOTAL PLUTONIUM	37.7	27.816e-3		11.8	8.642e-6
TRITIUM**	21.0	15.494e-3		7500.0	5.493e-3
U-234	93.0e-3	68.618e-6		4.0	2.929e-6
U-235	LDL*			LDL*	
U-238	LDL*			720.0e-3	527.299e-9
Total Alpha		34.747e-3			14.867e-6

Volume of Flow: Influent = 737,284.0 liters Final = 732,360.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

NOV-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	59.0	38.095e-3		28.0	16.37e-6
Am-241	12.0	7.748e-3		17.0	9.939e-6
BETA	5.1	3.293e-3		590.0	344.948e-6
Cs-137	1.0	645.675e-6		LDL*	
Pu-238	40.0	25.827e-3		15.0	8.77e-6
Pu-239	12.0	7.748e-3		LDL*	
Sr-89	LDL*			LDL*	
Sr-90	100.0e-3	64.567e-6		LDL*	
TOTAL PLUTONIUM	52.0	33.575e-3		LDL*	
TRITIUM**	21.0	13.559e-3		6100.0	3.566e-3
U-234	LDL*			6.3	3.683e-6
U-235	LDL*			LDL*	
U-238	LDL*			3.8	2.222e-6
Total Alpha		41.323e-3			22.392e-6

Volume of Flow: Influent = 577,898.0 liters Final = 584,658.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA50 RADIOISOTOPES

DEC-2001

	RAW nCi/L	RAW Total (Ci)		FINAL pCi/l	FINAL Total (Ci)
ALPHA	120.0	77.102e-3		20.0	11.706e-6
Am-241	42.0	26.986e-3		7.0	4.097e-6
BETA	LDL*			LDL*	
Cs-137	LDL*			LDL*	
Pu-238	73.0	46.904e-3		3.1	1.814e-6
Pu-239	20.0	12.85e-3		3.1	1.814e-6
Sr-89	LDL*			LDL*	
Sr-90	690.0e-3	443.338e-6		LDL*	
TOTAL PLUTONIUM	93.0	59.754e-3		6.2	3.629e-6
TRITIUM**	28.0	17.991e-3		1600.0	936.451e-6
U-234	78.0e-3	50.116e-6		2.7	1.58e-6
U-235	LDL*			LDL*	
U-238	65.0e-3	41.764e-6		950.0e-3	556.018e-9
Total Alpha		86.79e-3			9.306e-6

Volume of Flow: Influent = 659,383.0 liters Final = 585,282.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

Appendix A.3
Analyses of Monthly Composite Mineral Samples, TA-50 RLWTF

TA50 MINERALS

JAN-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	51.0	74.021		188.0	289.823
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	1.6	2.322		LDL*	
AMMONIA-N	2.4	3.483		3.1	4.779
ANTIMONY	0.002	0.003		0.002	0.003
ARSENIC	0.002	0.003		LDL*	
BARIUM	0.029	0.042		0.002	0.003
BERYLLIUM	0.001	0.001		LDL*	
BORON	0.052	0.075		0.077	0.119
CADMIUM	0.01	0.015		LDL*	
CALCIUM	12.8	18.578		40.0	61.665
CHLORIDE	21.0	30.479		55.8	86.022
COBALT	LDL*			LDL*	
COD	45.0	65.313		16.0	24.666
CONDUCTIVITY*	281.0			937.0	
COPPER	2.27	3.295		0.058	0.089
CYANIDE	LDL*			0.006	0.009
FLUORIDE	1.07	1.553		1.03	1.588
HARDNESS*	46.828	67.966		103.71	159.881
IRON	1.7	2.467		0.04	0.062
LEAD	LDL*			LDL*	
MAGNESIUM	3.61	5.24		0.93	1.434
MERCURY	0.002	0.003		2.0e-4	3.083e-4
NICKEL	0.09	0.131		0.03	0.046
NITRATE-N	4.1	5.951		6.2	9.558
PHOSPHORUS	1.6	2.322		0.07	0.108
POTASSIUM	3.3	4.79		6.3	9.712
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	78.0	113.209		46.0	70.914
SILICON	36.8	53.411		21.1	32.528
SILVER	0.008	0.012		LDL*	
SODIUM	29.0	42.09		151.0	232.784
SULFATE	14.4	20.9		124.0	191.16
TDS	240.0	348.334		576.0	887.969
THALLIUM	1.9e-4	2.758e-4		1.7e-4	2.621e-4
TOTAL CATIONS*	2.35			8.76	
TOTAL CHROMIUM	0.043	0.062		0.008	0.012
TSS	12.0	17.417		12.0	18.499
URANIUM	0.079	0.115		0.014	0.022
VANADIUM	LDL*			LDL*	
ZINC	0.12	0.174		LDL*	
pH	7.26			7.83	

Volume of Flow: Influent = 1,641,245.0 liters Final = 1,541,613.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

FEB-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	70.0	86.842		156.0	184.837
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	LDL*			LDL*	
AMMONIA-N	2.5	3.102		6.3	7.465
ANTIMONY	9.0e-4	0.001		0.001	0.001
ARSENIC	0.003	0.004		LDL*	
BARIUM	0.025	0.031		0.003	0.004
BERYLLIUM	0.001	0.001		LDL*	
BORON	0.045	0.056		0.052	0.062
CADMIUM	0.003	0.004		LDL*	
CALCIUM	11.0	13.647		44.0	52.133
CHLORIDE	13.8	17.12		25.7	30.451
COBALT	LDL*			LDL*	
COD	50.0	62.03		8.0	9.479
CONDUCTIVITY*	268.0			762.0	
COPPER	0.28	0.347		0.045	0.053
CYANIDE	0.005	0.006		0.005	0.006
FLUORIDE	0.72	0.893		0.81	0.96
HARDNESS*	40.645	50.424		115.221	136.52
IRON	0.78	0.968		0.02	0.024
LEAD	LDL*			LDL*	
MAGNESIUM	3.2	3.97		1.3	1.54
MERCURY	0.002	0.002		4.0e-5	4.739e-5
NICKEL	0.03	0.037		0.03	0.036
NITRATE-N	2.3	2.853		5.5	6.517
PHOSPHORUS	1.73	2.146		0.12	0.142
POTASSIUM	4.3	5.335		7.0	8.294
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	72.0	89.323		36.0	42.655
SILICON	36.0	44.662		19.0	22.512
SILVER	LDL*			LDL*	
SODIUM	25.0	31.015		100.0	118.485
SULFATE	14.2	17.617		124.0	146.921
TDS	176.0	218.346		474.0	561.619
THALLIUM	LDL*			LDL*	
TOTAL CATIONS*	2.35			6.64	
TOTAL CHROMIUM	0.015	0.019		0.003	0.004
TSS	5.0	6.203		LDL*	
URANIUM	0.053	0.066		0.014	0.017
VANADIUM	LDL*			LDL*	
ZINC	0.09	0.112		LDL*	
pH	7.6			7.8	

Volume of Flow: Influent = 1,263,772.0 liters Final = 1,184,850.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

01796

TA50 MINERALS

MAR-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	71.0	84.006		138.0	162.574
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	LDL*			LDL*	
AMMONIA-N	2.62	3.1		2.33	2.745
ANTIMONY	0.001	0.001		7.0e-4	8.247e-4
ARSENIC	LDL*			0.001	0.001
BARIUM	0.027	0.032		LDL*	
BERYLLIUM	LDL*			LDL*	
BORON	0.029	0.034		LDL*	
CADMIUM	0.004	0.005		LDL*	
CALCIUM	13.4	15.855		34.5	40.644
CHLORIDE	17.6	20.824		12.8	15.079
COBALT	LDL*			LDL*	
COD	34.0	40.228		28.0	32.986
CONDUCTIVITY*	254.0			586.0	
COPPER	0.14	0.166		0.036	0.042
CYANIDE	0.003	0.004		0.004	0.005
FLUORIDE	0.54	0.639		0.39	0.459
HARDNESS*	47.379	56.058		90.059	106.096
IRON	1.71	2.023		LDL*	
LEAD	LDL*			LDL*	
MAGNESIUM	3.38	3.999		0.95	1.119
MERCURY	0.002	0.002		LDL*	
NICKEL	LDL*			LDL*	
NITRATE-N	2.72	3.218		2.1	2.474
PHOSPHORUS	1.74	2.059		0.11	0.13
POTASSIUM	3.7	4.378		3.5	4.123
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	78.3	92.644		31.4	36.992
SILICON	37.2	44.015		16.9	19.909
SILVER	LDL*			LDL*	
SODIUM	25.4	30.053		73.1	86.117
SULFATE	12.9	15.263		77.5	91.301
TDS	38.0	44.961		238.0	280.382
THALLIUM	6.0e-5	7.099e-5		5.0e-5	5.89e-5
TOTAL CATIONS*	2.36			4.76	
TOTAL CHROMIUM	0.014	0.017		LDL*	
TSS	15.0	17.748		LDL*	
URANIUM	0.052	0.062		0.012	0.014
VANADIUM	LDL*			LDL*	
ZINC	0.2	0.237		LDL*	
pH	7.4			8.03	

Volume of Flow: Influent = 1,187,217.0 liters Final = 1,178,076.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

APR-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	48.0	64.864		136.0	170.876
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	LDL*			LDL*	
AMMONIA-N	2.5	3.378		2.8	3.518
ANTIMONY	0.001	0.001		9.0e-4	0.001
ARSENIC	0.002	0.003		LDL*	
BARIUM	0.03	0.041		0.002	0.003
BERYLLIUM	0.001	0.001		LDL*	
BORON	0.031	0.042		0.043	0.054
CADMIUM	0.002	0.003		LDL*	
CALCIUM	13.6	18.378		40.3	50.634
CHLORIDE	23.6	31.891		28.3	35.557
COBALT	LDL*			LDL*	
COD	41.0	55.404		13.0	16.334
CONDUCTIVITY*	249.0			620.0	
COPPER	0.152	0.205		0.037	0.046
CYANIDE	0.002	0.003		0.005	0.006
FLUORIDE	0.95	1.284		0.59	0.741
HARDNESS*	48.249	65.2		104.129	130.832
IRON	2.05	2.77		LDL*	
LEAD	0.06	0.081		0.02	0.025
MAGNESIUM	3.47	4.689		0.85	1.068
MERCURY	0.002	0.003		4.0e-5	5.026e-5
NICKEL	0.04	0.054		0.01	0.013
NITRATE-N	4.2	5.676		3.4	4.272
PHOSPHORUS	7.24	9.784		1.51	1.897
POTASSIUM	4.0	5.405		5.1	6.408
SELENIUM	LDL*			0.003	0.004
SILICA DIOXIDE	79.5	107.431		34.5	43.347
SILICON	31.9	43.107		16.5	20.731
SILVER	0.013	0.018		LDL*	
SODIUM	21.7	29.324		81.2	102.023
SULFATE	16.3	22.027		121.0	152.029
TDS	160.0	216.213		282.0	354.316
THALLIUM	7.0e-5	9.459e-5		8.4e-4	0.001
TOTAL CATIONS*	2.12			6.02	
TOTAL CHROMIUM	0.041	0.055		0.008	0.01
TSS	14.0	18.919		1.0	1.256
URANIUM	0.056	0.076		0.007	0.009
VANADIUM	LDL*			LDL*	
ZINC	0.2	0.27		LDL*	
pH	7.19			7.74	

Volume of Flow: Influent = 1,443,265.0 liters Final = 1,256,439.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

01798

TA50 MINERALS

MAY-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	40.0	61.255		130.0	191.199
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.18	0.276		LDL*	
AMMONIA-N	1.65	2.527		1.7	2.5
ANTIMONY	0.003	0.005		0.001	0.001
ARSENIC	0.001	0.002		LDL*	
BARIUM	0.037	0.057		0.002	0.003
BERYLLIUM	0.002	0.003		LDL*	
BORON	0.095	0.145		0.061	0.09
CADMIUM	0.003	0.005		0.001	0.001
CALCIUM	11.9	18.223		44.5	65.449
CHLORIDE	16.7	25.574		25.2	37.063
COBALT	0.001	0.002		LDL*	
COD	38.0	58.192		10.0	14.708
CONDUCTIVITY*	231.0			623.0	
COPPER	0.16	0.245		0.054	0.079
CYANIDE	0.003	0.005		0.006	0.009
FLUORIDE	1.1	1.685		1.11	1.633
HARDNESS*	42.768	65.494		114.164	167.908
IRON	1.61	2.466		LDL*	
LEAD	0.032	0.049		LDL*	
MAGNESIUM	3.17	4.854		0.74	1.088
MERCURY	0.003	0.005		1.0e-4	1.471e-4
NICKEL	0.112	0.172		0.019	0.028
NITRATE-N	4.57	6.998		4.35	6.398
PHOSPHORUS	2.65	4.058		0.05	0.074
POTASSIUM	4.83	7.397		7.75	11.398
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	75.2	115.159		37.9	55.742
SILICON	38.3	58.652		19.7	28.974
SILVER	0.012	0.018		LDL*	
SODIUM	23.9	36.6		91.0	133.839
SULFATE	23.5	35.987		135.0	198.553
TDS	206.0	315.463		402.0	591.247
THALLIUM	3.0e-5	4.594e-5		LDL*	
TOTAL CATIONS*	2.06			5.96	
TOTAL CHROMIUM	0.027	0.041		LDL*	
TSS	6.0	9.188		LDL*	
URANIUM	0.049	0.075		0.003	0.004
VANADIUM	0.008	0.012		0.004	0.006
ZINC	0.396	0.606		0.029	0.043
pH	7.1			7.76	

Volume of Flow: Influent = 1,266,572.0 liters Final = 1,470,763.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

01799

TA50 MINERALS

JUN-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	55.0	64.061		180.0	221.28
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.15	0.175		0.084	0.103
AMMONIA-N	1.86	2.166		2.68	3.295
ANTIMONY	0.002	0.002		0.001	0.001
ARSENIC	0.002	0.002		LDL*	
BARIUM	0.03	0.035		0.004	0.005
BERYLLIUM	0.001	0.001		LDL*	
BORON	0.13	0.151		0.11	0.135
CADMIUM	0.004	0.005		0.003	0.004
CALCIUM	11.7	13.628		42.7	52.493
CHLORIDE	19.8	23.062		33.0	40.568
COBALT	LDL*			LDL*	
COD	43.0	50.084		16.0	19.669
CONDUCTIVITY*	240.0			780.0	
COPPER	0.141	0.164		0.046	0.057
CYANIDE	0.004	0.005		0.007	0.009
FLUORIDE	1.13	1.316		0.8	0.983
HARDNESS*	42.31	49.281		107.528	132.188
IRON	2.0	2.33		0.033	0.041
LEAD	0.02	0.023		LDL*	
MAGNESIUM	3.18	3.704		0.22	0.27
MERCURY	0.002	0.002		4.0e-5	4.917e-5
NICKEL	0.216	0.252		0.018	0.022
NITRATE-N	3.68	4.286		5.73	7.044
PHOSPHORUS	1.58	1.84		0.11	0.135
POTASSIUM	4.02	4.682		9.96	12.244
SELENIUM	0.002	0.002		0.003	0.004
SILICA DIOXIDE	76.0	88.521		29.5	36.265
SILICON	34.8	40.533		13.6	16.719
SILVER	LDL*			LDL*	
SODIUM	27.2	31.681		116.0	142.603
SULFATE	19.9	23.179		141.0	173.336
TDS	102.0	118.805		516.0	634.336
THALLIUM	LDL*			LDL*	
TOTAL CATIONS*	2.08			7.6	
TOTAL CHROMIUM	0.141	0.164		0.028	0.034
TSS	14.0	16.307		1.0	1.229
URANIUM	0.055	0.064		LDL*	
VANADIUM	0.028	0.033		LDL*	
ZINC	0.148	0.172		LDL*	
pH	7.29			7.91	

Volume of Flow: Influent = 1,123,491.0 liters Final = 1,229,333.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

JUL-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	54.0	75.873		104.0	129.561
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.341	0.479		0.047	0.059
AMMONIA-N	4.27	6.0		3.67	4.572
ANTIMONY	0.001	0.001		9.0e-4	0.001
ARSENIC	0.003	0.004		0.002	0.002
BARIUM	0.036	0.051		0.003	0.004
BERYLLIUM	0.001	0.001		LDL*	
BORON	LDL*			LDL*	
CADMIUM	LDL*			LDL*	
CALCIUM	14.5	20.373		59.5	74.124
CHLORIDE	21.7	30.49		22.8	28.404
COBALT	LDL*			LDL*	
COD	LDL*			LDL*	
CONDUCTIVITY*	261.0			744.0	
COPPER	0.198	0.278		0.033	0.041
CYANIDE	0.002	0.003		0.009	0.011
FLUORIDE	0.87	1.222		0.95	1.183
HARDNESS*	51.443	72.28		151.434	188.654
IRON	2.63	3.695		LDL*	
LEAD	0.032	0.045		LDL*	
MAGNESIUM	3.7	5.199		0.695	0.866
MERCURY	0.003	0.004		2.6e-4	3.239e-4
NICKEL	0.07	0.098		0.01	0.012
NITRATE-N	5.92	8.318		4.17	5.195
PERCHLORATE	0.094	0.132		0.163	0.203
PHOSPHORUS	1.7	2.389		0.03	0.037
POTASSIUM	4.69	6.59		11.5	14.326
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	79.6	111.843		35.2	43.851
SILICON	41.4	58.169		19.4	24.168
SILVER	LDL*			LDL*	
SODIUM	LDL*			92.3	114.986
SULFATE	20.1	28.242		168.0	209.291
TDS	270.0	379.365		530.0	660.264
THALLIUM	1.5e-4	2.108e-4		2.0e-5	2.492e-5
TOTAL CATIONS*				6.52	
TOTAL CHROMIUM	0.032	0.045		0.012	0.015
TSS	1.0	1.405		LDL*	
URANIUM	0.136	0.191		9.0e-4	0.001
VANADIUM	0.015	0.021		0.006	0.007
ZINC	0.281	0.395		0.085	0.106
pH	6.8			7.53	

Volume of Flow: Influent = 1,310,855.0 liters Final = 1,245,781.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

AUG-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	LDL*			113.0	140.408
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	LDL*			LDL*	
AMMONIA-N	3.86	4.394		4.71	5.852
ANTIMONY	0.003	0.003		0.001	0.001
ARSENIC	LDL*			LDL*	
BARIUM	0.027	0.031		LDL*	
BERYLLIUM	LDL*			LDL*	
BORON	0.047	0.054		0.146	0.181
CADMIUM	LDL*			LDL*	
CALCIUM	13.1	14.913		36.1	44.856
COBALT	LDL*			LDL*	
COD	61.0	69.443		9.0	11.183
CONDUCTIVITY*	283.0			630.0	
COPPER	0.139	0.158		0.009	0.011
CYANIDE	0.003	0.003		0.007	0.009
FLUORIDE	0.99	1.127		0.77	0.957
HARDNESS*	42.717	48.629		LDL*	
IRON	1.39	1.582		0.009	0.011
LEAD	0.033	0.038		LDL*	
MAGNESIUM	2.43	2.766		LDL*	
MERCURY	0.004	0.005		2.0e-5	2.485e-5
NICKEL	0.087	0.099		LDL*	
NITRATE-N	8.01	9.119		6.61	8.213
PERCHLORATE	0.25	0.285		0.15	0.186
PHOSPHORUS	0.55	0.626		LDL*	
POTASSIUM	6.55	7.457		5.77	7.17
SELENIUM	0.006	0.007		0.012	0.015
SILICA DIOXIDE	77.8	88.568		26.0	32.306
SILICON	LDL*			LDL*	
SILVER	0.03	0.034		LDL*	
SODIUM	25.4	28.915		58.0	72.068
TDS	256.0	291.431		418.0	519.387
THALLIUM	LDL*			1.5e-4	1.864e-4
TOTAL CATIONS*	2.11			5.7	
TOTAL CHROMIUM	0.058	0.066		0.001	0.001
URANIUM	0.113	0.129		0.006	0.007
VANADIUM	0.003	0.003		LDL*	
ZINC	LDL*			0.021	0.026
pH	5.04			7.94	

Volume of Flow: Influent = 1,015,549.0 liters Final = 1,242,552.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

SEP-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	51.3	67.967		246.3	335.397
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.4	0.53		0.024	0.033
ANTIMONY	0.002	0.003		0.001	0.001
ARSENIC	0.005	0.007		LDL*	
BARIUM	0.032	0.042		0.001	0.001
BERYLLIUM	0.006	0.008		0.002	0.003
BORON	0.015	0.02		0.012	0.016
CADMIUM	0.002	0.003		LDL*	
CALCIUM	12.5	16.561		15.4	20.971
CHLORIDE	18.5	24.511		18.5	25.192
COBALT	0.001	0.001		LDL*	
COD	77.0	102.017		13.0	17.703
CONDUCTIVITY*	213.0			718.0	
COPPER	0.225	0.298		0.044	0.06
CYANIDE	LDL*			LDL*	
FLUORIDE	0.146	0.193			
HARDNESS*	45.708	60.558		38.969	53.066
IRON	1.49	1.974		0.009	0.012
LEAD	0.055	0.073		LDL*	
MAGNESIUM	3.52	4.664		0.125	0.17
MERCURY	0.005	0.007		1.4e-4	1.906e-4
NICKEL	0.075	0.099		0.008	0.011
NITRATE-N	20.2	26.763		1.5	2.043
PERCHLORATE	0.283	0.375		0.187	0.255
POTASSIUM	4.75	6.293		8.26	11.248
SELENIUM	0.034	0.045		0.046	0.063
SILICA DIOXIDE	LDL*			LDL*	
SILICON	LDL*			LDL*	
SILVER	0.008	0.011		LDL*	
SODIUM	23.2	30.737		164.0	223.326
STRONTIUM	0.055	0.073		0.02	0.027
SULFATE	135.6	179.655			
TDS	128.0	169.586		430.0	585.549
THALLIUM	LDL*			LDL*	
TIN	0.42	0.556		LDL*	
TOTAL CATIONS*	1.99			9.12	
TOTAL CHROMIUM	0.028	0.037		0.008	0.011
URANIUM	0.1	0.132		0.002	0.003
VANADIUM	0.006	0.008		LDL*	
ZINC	LDL*			LDL*	
pH	7.23			7.67	

Volume of Flow: Influent = 1,332,342.0 liters Final = 1,361,741.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

OCT-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	111.8	82.489		334.3	244.828
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.438	0.323		LDL*	
AMMONIA-N	8.34	6.153		4.54	3.325
ANTIMONY	0.001	7.378e-4		0.001	7.324e-4
ARSENIC	LDL*			LDL*	
BARIUM	0.028	0.021		0.001	7.324e-4
BERYLLIUM	0.003	0.002		LDL*	
BORON	0.124	0.091		0.066	0.048
CADMIUM	0.001	7.378e-4		LDL*	
CALCIUM	11.3	8.337		6.95	5.09
CHLORIDE	47.6	35.121		22.5	16.478
COBALT	0.002	0.001		LDL*	
COD	64.0	47.221		10.0	7.324
CONDUCTIVITY*	473.0			735.0	
COPPER	0.179	0.132		0.065	0.048
CYANIDE	0.02	0.015		0.02	0.015
FLUORIDE	2.33	1.719		1.04	0.762
HARDNESS*	43.329	31.969		17.947	13.144
IRON	1.31	0.967		0.025	0.018
LEAD	0.077	0.057		LDL*	
MAGNESIUM	3.67	2.708		0.144	0.105
MERCURY	0.005	0.004		4.0e-4	2.929e-4
NICKEL	0.119	0.088		0.009	0.007
NITRATE-N	7.34	5.416		0.198	0.145
PERCHLORATE	0.743	0.548		0.123	0.09
PHOSPHORUS	9.17	6.766		0.07	0.051
POTASSIUM	7.7	5.681		8.4	6.152
SELENIUM	LDL*			LDL*	
SILICA DIOXIDE	63.772	47.053		36.808	26.957
SILICON	29.8	21.987		17.2	12.597
SILVER	LDL*			LDL*	
SODIUM	68.0	50.172		177.0	129.628
SULFATE	20.3	14.978		60.9	44.601
TDS	220.0	162.322		200.0	146.472
THALLIUM	1.0e-4	7.378e-5		LDL*	
TKN	24.6	18.151			
TOTAL CATIONS*	4.81			8.87	
TOTAL CHROMIUM	0.06	0.044		0.011	0.008
TSS	14.0	10.33		LDL*	
URANIUM	0.119	0.088		0.002	0.001
VANADIUM	0.009	0.007		LDL*	
ZINC	0.19	0.14		0.051	0.037
pH	7.79			8.4	

Volume of Flow: Influent = 737,284.0 liters Final = 732,360.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

NOV-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	97.7	63.082		125.8	73.55
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.7	0.452		0.41	0.24
AMMONIA-N	5.54	3.577		5.54	3.239
ANTIMONY	0.002	0.001		7.7e-4	4.502e-4
ARSENIC	0.015	0.01		0.015	0.009
BARIUM	0.024	0.015		0.002	0.001
BERYLLIUM	0.007	0.005		0.005	0.003
BORON	0.101	0.065		0.11	0.064
CADMIUM	0.001	6.457e-4		LDL*	
CALCIUM	12.2	7.877		6.77	3.958
CHLORIDE	22.8	14.721		19.8	11.576
COBALT	0.002	0.001		LDL*	
COD	89.0	57.465		56.0	32.741
CONDUCTIVITY*	363.0			661.0	
COPPER	0.331	0.214		0.061	0.036
CYANIDE	0.02	0.013		0.02	0.012
FLUORIDE	0.78	0.504		0.332	0.194
HARDNESS*	44.506	28.736		17.316	10.124
IRON	2.27	1.466		0.033	0.019
LEAD	0.097	0.063		0.007	0.004
MAGNESIUM	3.41	2.202		0.1	0.058
MERCURY	0.004	0.003		3.3e-4	1.929e-4
NICKEL	0.24	0.155		0.011	0.006
NITRATE-N	2.45	1.582		0.334	0.195
PERCHLORATE	0.264	0.17		0.175	0.102
PHOSPHORUS	5.5	3.551		0.07	0.041
POTASSIUM	5.84	3.771		5.42	3.169
SILICA DIOXIDE	64.2	41.452		18.96	11.085
SILICON	30.0	19.37		8.86	5.18
SILVER	0.042	0.027		0.003	0.002
SODIUM	5.33	3.441		10.0	5.847
SULFATE	40.2	25.956		55.9	32.682
TDS	250.0	161.419		200.0	116.932
THALLIUM	2.8e-4	1.808e-4		8.0e-5	4.677e-5
TKN	29.5	19.047		12.0	7.016
TOTAL CATIONS*	3.76			4.45	
TOTAL CHROMIUM	0.033	0.021		0.005	0.003
TSS	18.0	11.622		LDL*	
URANIUM	0.06	0.039		0.013	0.008
VANADIUM	0.08	0.052		LDL*	
ZINC	2.15	1.388		0.249	0.146
pH	7.35			7.81	

Volume of Flow: Influent = 577,898.0 liters Final = 584,658.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA50 MINERALS

DEC-2001

	RAW Concentration	Total (KG)		FINAL Concentration	Total (KG)
ALKALINITY-MO*	64.4	41.378		265.0	155.1
ALKALINITY-P*	LDL*			LDL*	
ALUMINUM	0.344	0.221		0.03	0.018
AMMONIA-N	6.27	4.029		6.19	3.623
ANTIMONY	0.018	0.012		0.017	0.01
ARSENIC	0.02	0.013		0.02	0.012
BARIUM	0.034	0.022		0.001	5.853e-4
BERYLLIUM	0.005	0.003		0.003	0.002
BORON	0.138	0.089		0.126	0.074
CADMIUM	0.001	6.425e-4		0.001	5.853e-4
CALCIUM	11.0	7.068		13.7	8.018
CHLORIDE	22.8	14.649		34.3	20.075
COBALT	0.001	6.425e-4		0.001	5.853e-4
COD	76.0	48.831		38.0	22.241
CONDUCTIVITY*	277.0			720.0	
COPPER	0.237	0.152		0.077	0.045
CYANIDE	0.02	0.013		0.02	0.012
FLUORIDE	1.02	0.655		0.862	0.505
HARDNESS*	41.015	26.353		34.538	20.214
IRON	1.35	0.867		0.053	0.031
LEAD	0.145	0.093		0.006	0.004
MAGNESIUM	3.29	2.114		0.08	0.047
MERCURY	0.005	0.003		8.0e-5	4.682e-5
NICKEL	0.152	0.098		0.015	0.009
NITRATE-N	4.74	3.046		0.735	0.43
PERCHLORATE	0.217	0.139		0.227	0.133
PHOSPHORUS	7.8	5.012		0.05	0.029
POTASSIUM	8.4	5.397		10.1	5.911
SELENIUM	0.093	0.06		0.056	0.033
SILICA DIOXIDE	78.752	50.6		42.158	24.674
SILICON	36.8	23.645		19.7	11.53
SILVER	0.038	0.024		0.005	0.003
SODIUM	26.7	17.155		148.0	86.622
SULFATE	16.7	10.73		75.5	44.189
TDS	LDL*			420.0	245.818
THALLIUM	0.002	0.001		6.4e-4	3.746e-4
TKN	18.5	11.887		15.1	8.838
TOTAL CATIONS*	2.79			8.15	
TOTAL CHROMIUM	0.065	0.042		0.008	0.005
TSS	10.0	6.425		LDL*	
URANIUM	0.185	0.119		0.005	0.003
VANADIUM	0.039	0.025		0.026	0.015
ZINC	0.81	0.52		0.147	0.086
pH	7.35			7.84	

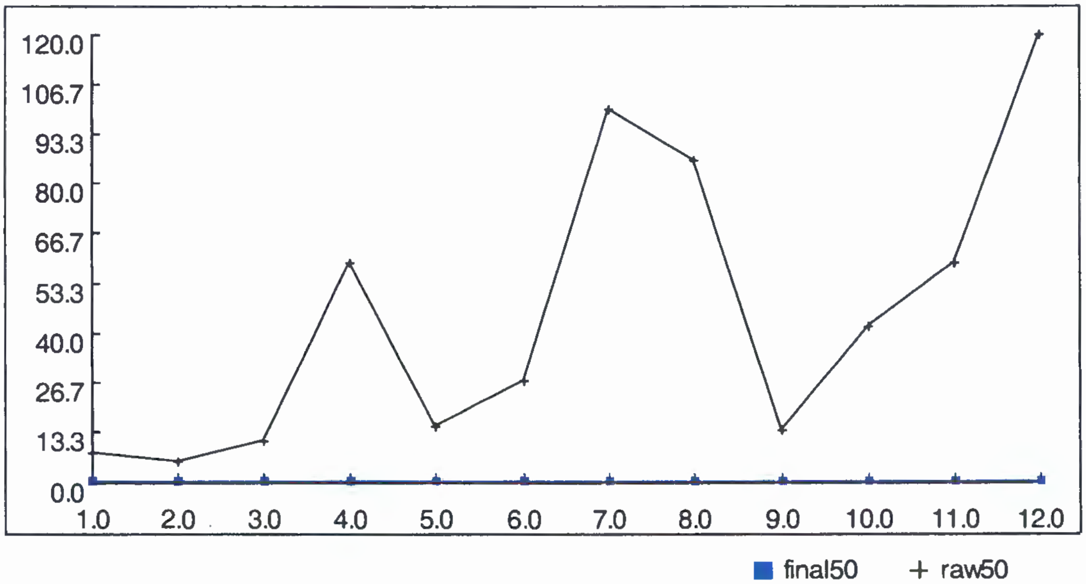
Volume of Flow: Influent = 659,383.0 liters Final = 585,282.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

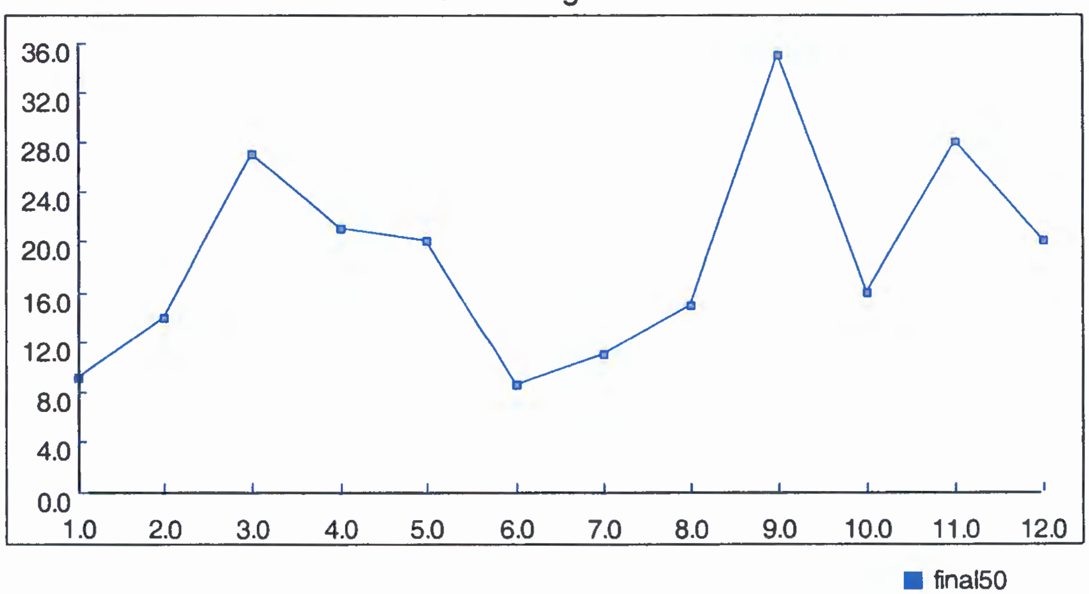
*LDL: Less than Detection Limit.

Appendix A.4
TA-50 RLWTF Concentration Charts,
Plant Influent and Effluent

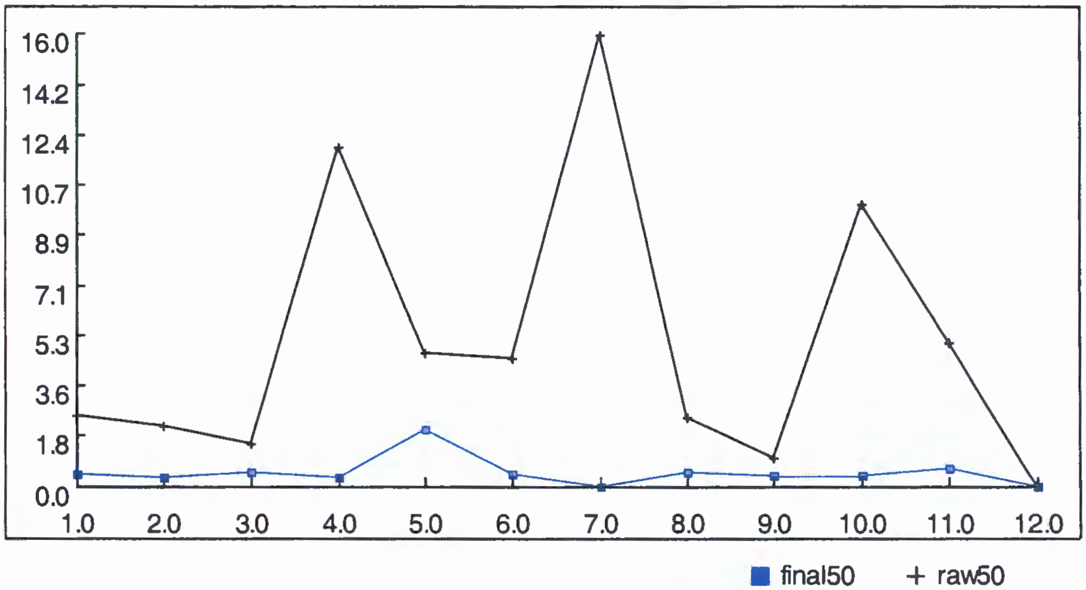
RAW50 and FINAL50
ALPHA concentration (nCi/L).
JAN-2001 through DEC-2001



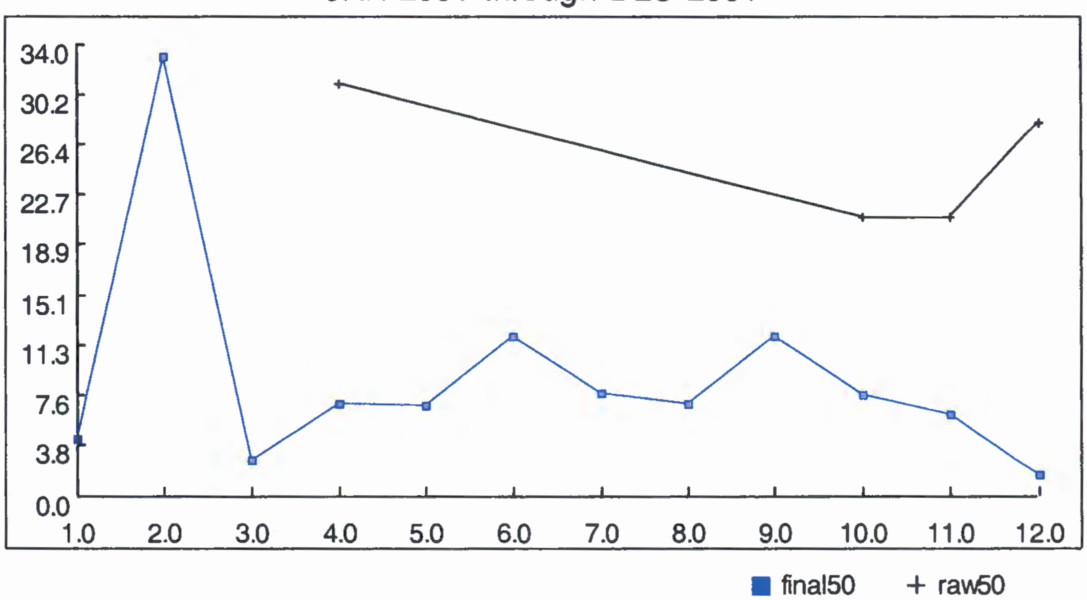
FINAL50
ALPHA concentration (pCi/L).
JAN-2001 through DEC-2001



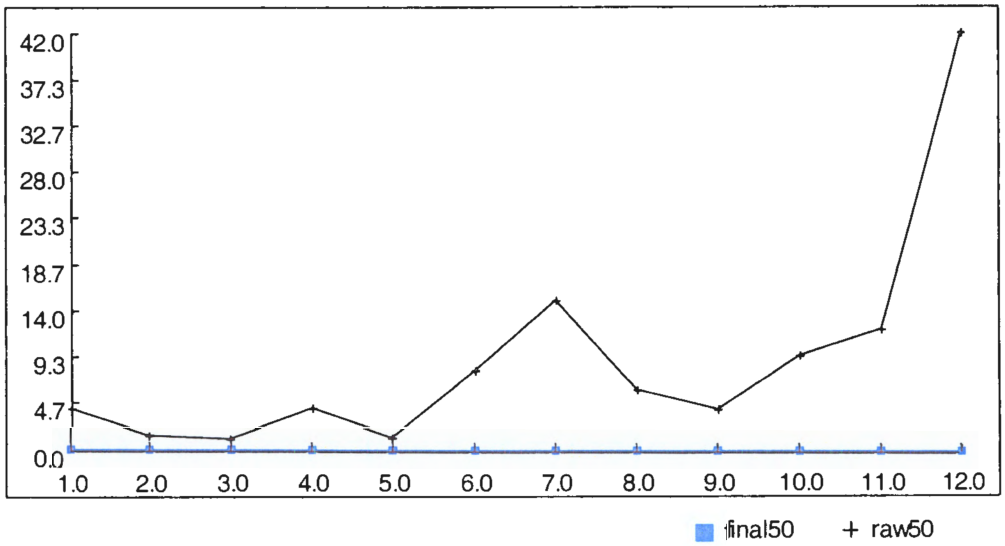
RAW50 and FINAL50
BETA concentration (nCi/L).
JAN-2001 through DEC-2001



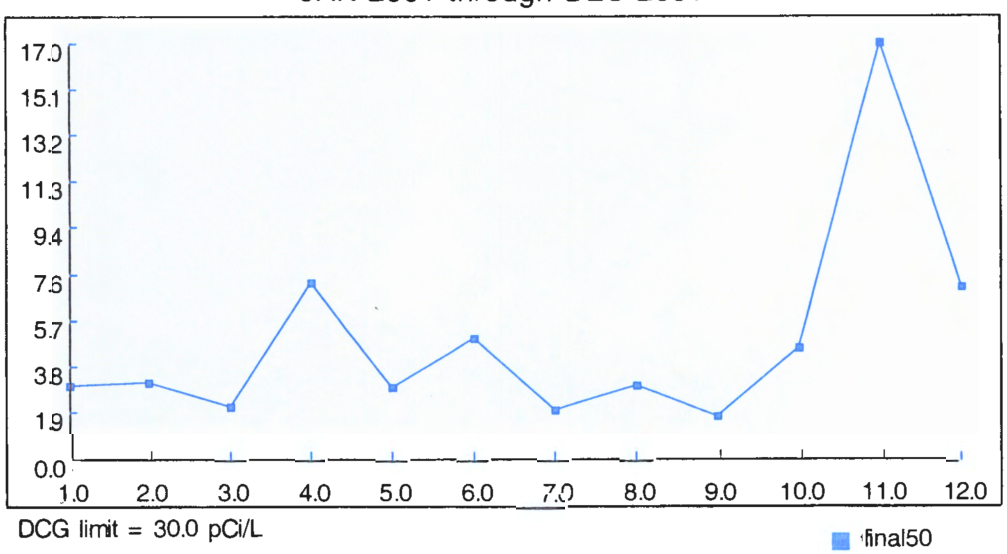
RAW50 and FINAL50
TRITIUM concentration (nCi/L).
JAN-2001 through DEC-2001



RAW50 and FINAL50
Am-241 concentration (nCi/L).
JAN-2001 through DEC-2001

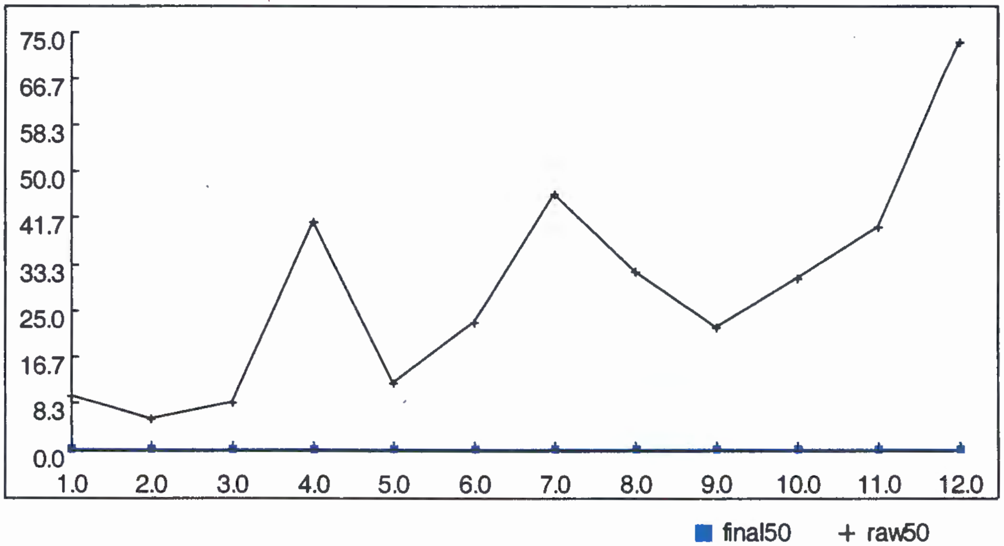


FINAL50
Am-241 concentration (pCi/L).
JAN-2001 through DEC-2001

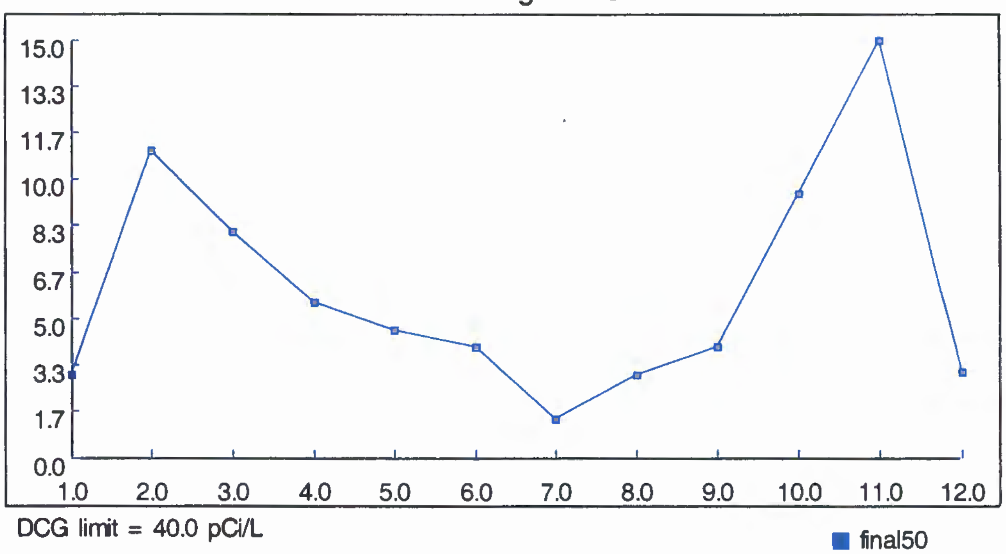


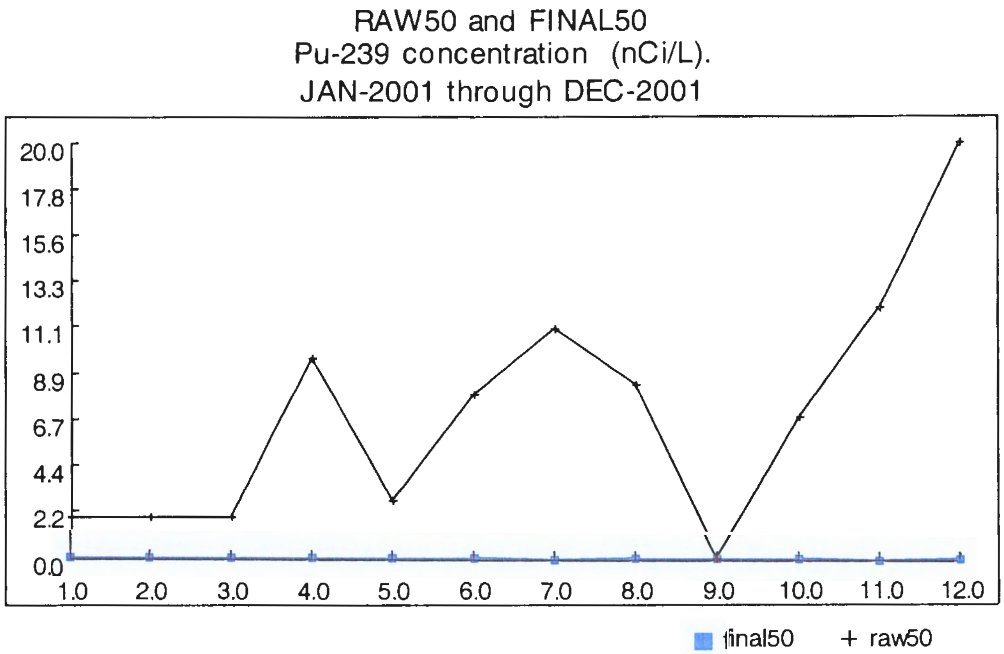
DCG limit = 30.0 pCi/L

RAW50 and FINAL50
Pu-238 concentration (nCi/L).
JAN-2001 through DEC-2001

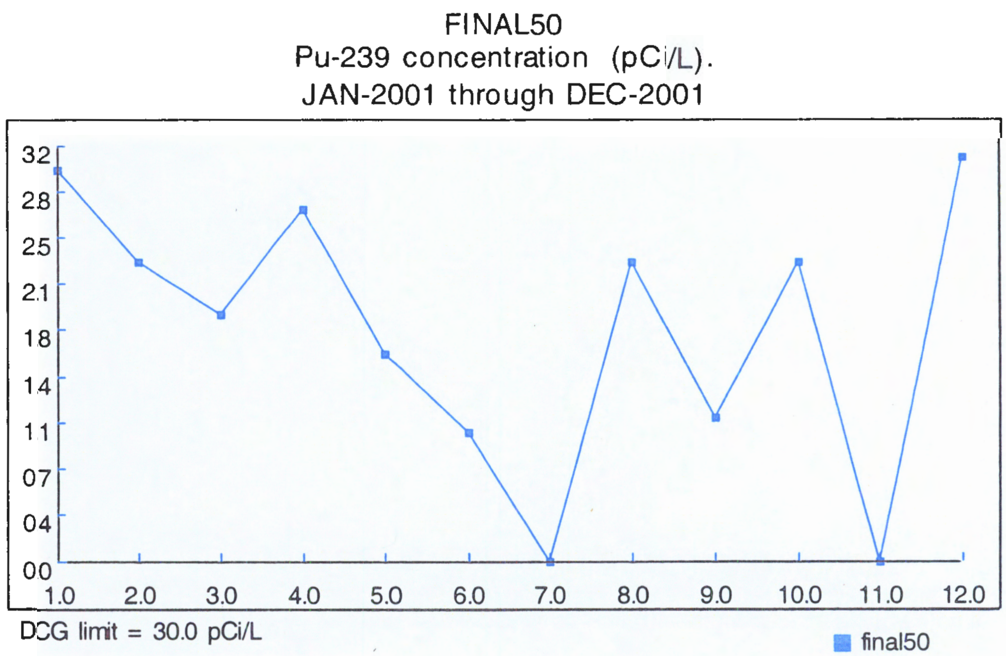


FINAL50
Pu-238 concentration (pCi/L).
JAN-2001 through DEC-2001



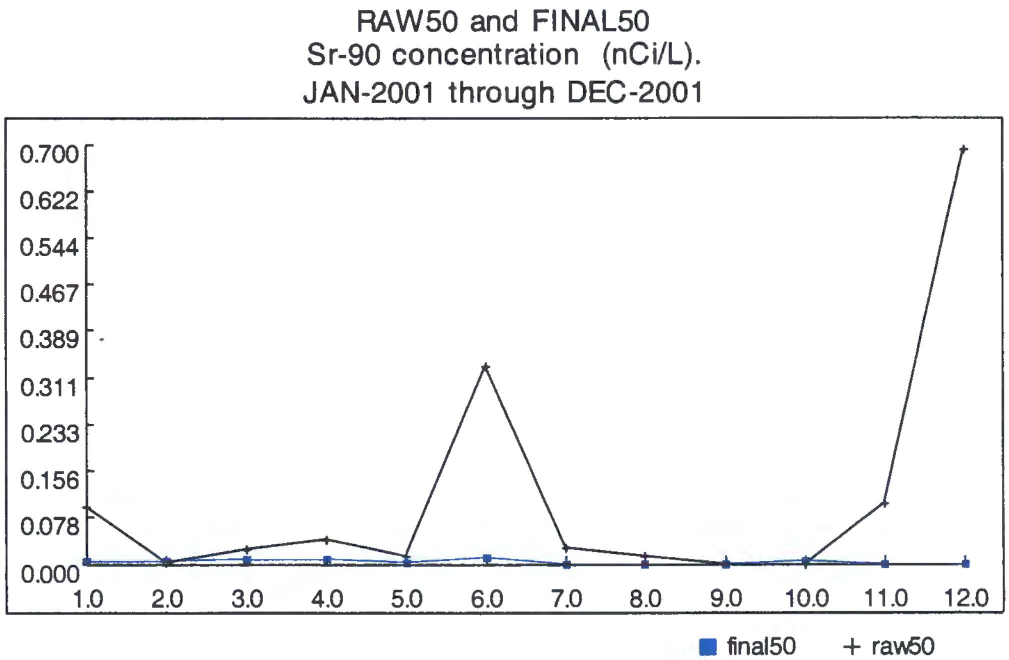


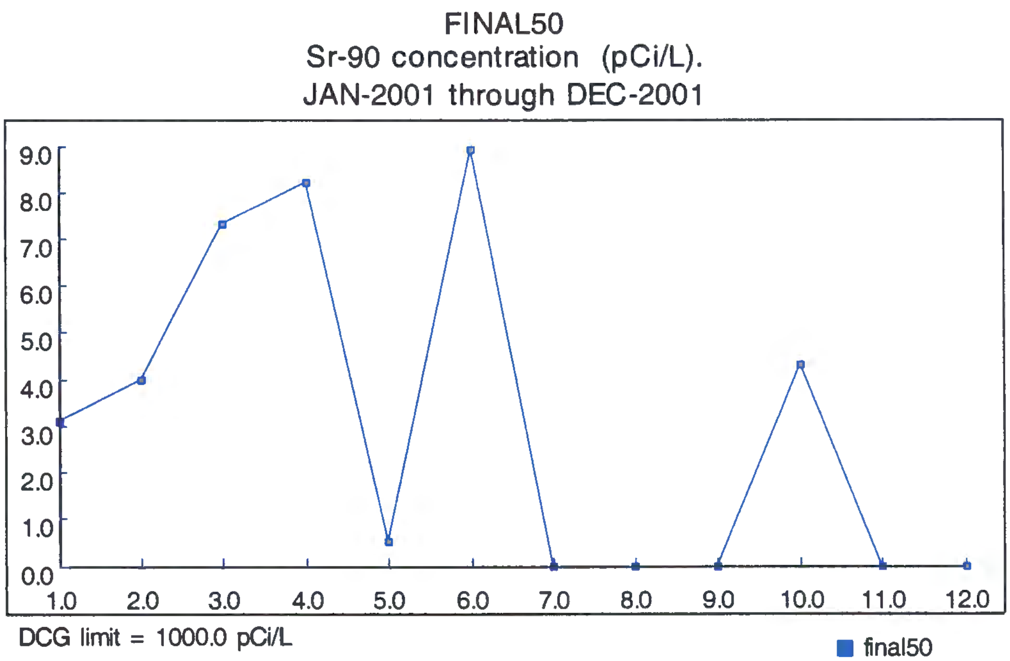
RAW50 and FINAL50
Pu-239 concentration (nCi/L).
JAN-2001 through DEC-2001
20.0
17.8
15.6
13.3
11.1
8.9
6.7
4.4
2.2
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
final50
+ raw50



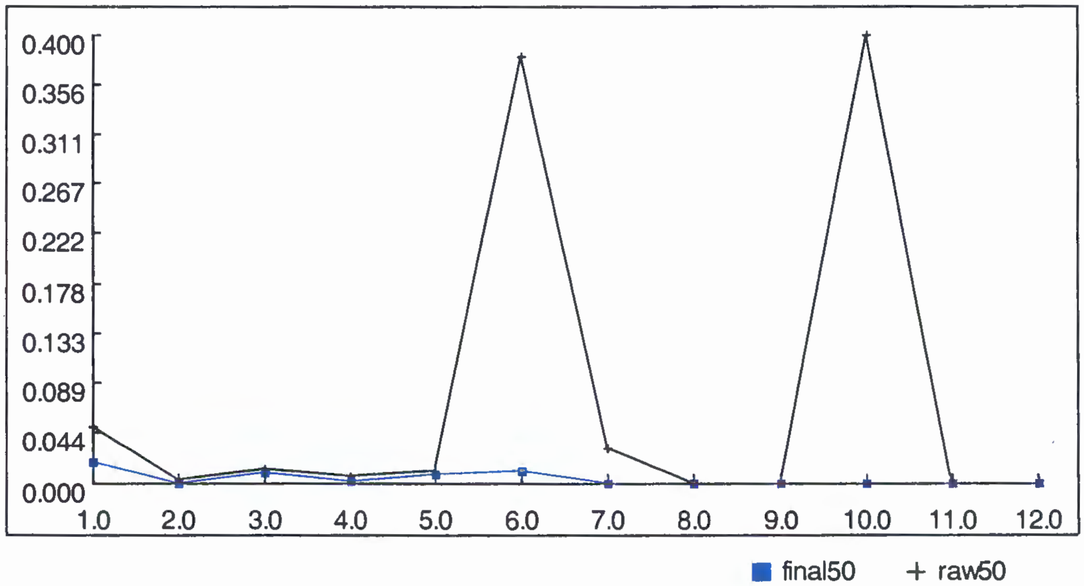
FINAL50
Pu-239 concentration (pCi/L).
JAN-2001 through DEC-2001
32
28
25
21
18
14
11
07
04
00
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
DCG limit = 30.0 pCi/L
final50

01812

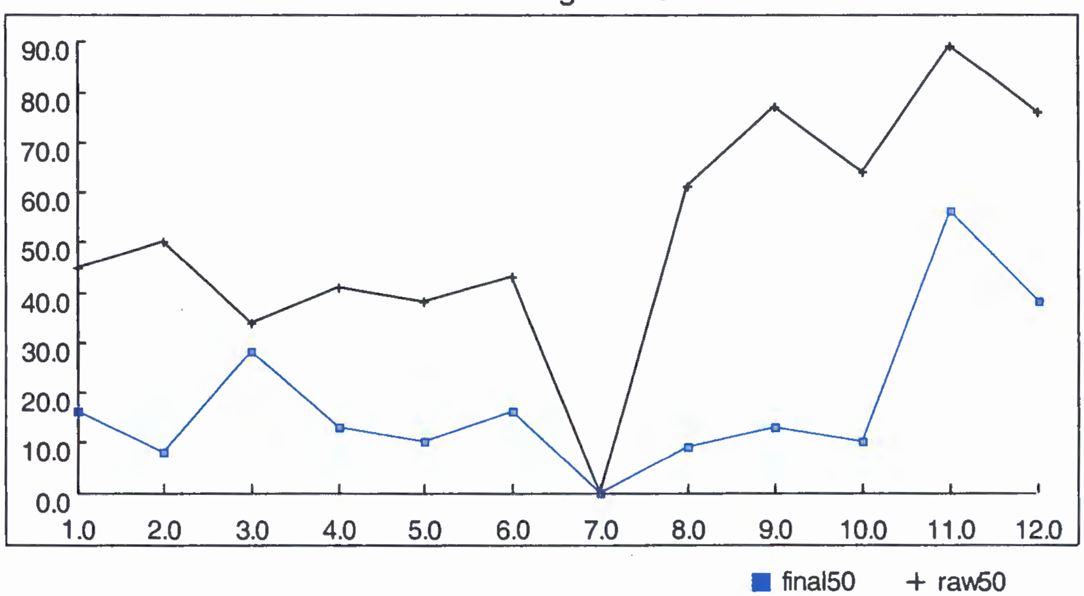

RAW50 and FINAL50
Sr-90 concentration (nCi/L).
JAN-2001 through DEC-2001
0.700
0.622
0.544
0.467
0.389
0.311
0.233
0.156
0.078
0.000
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
final50
+ raw50


FINAL50
Sr-90 concentration (pCi/L).
JAN-2001 through DEC-2001
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
DCG limit = 1000.0 pCi/L
final50

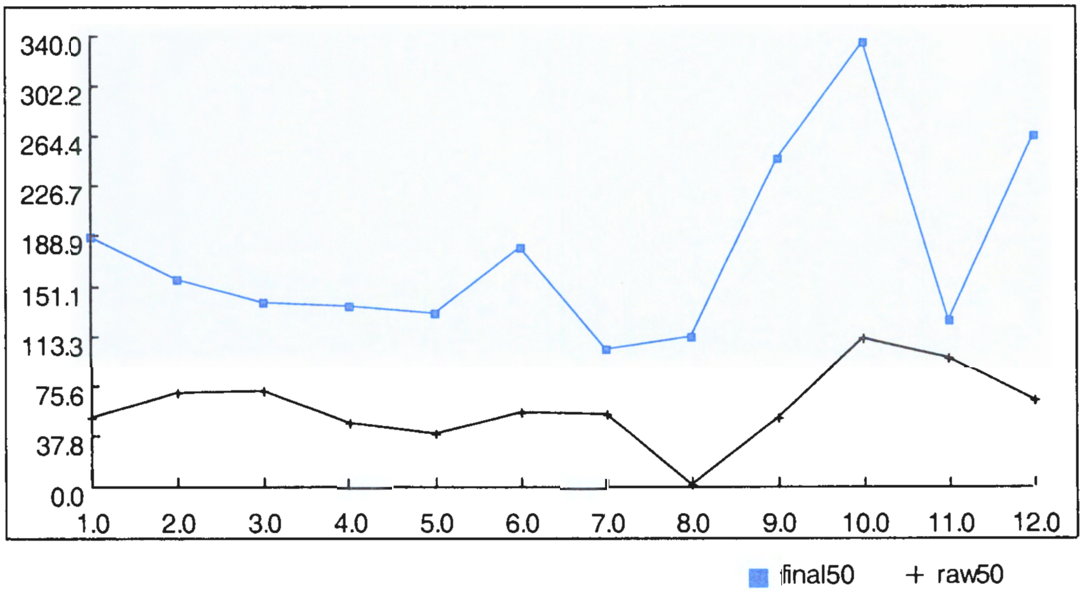
RAW50 and FINAL50
Sr-89 concentration (nCi/L).
JAN-2001 through DEC-2001



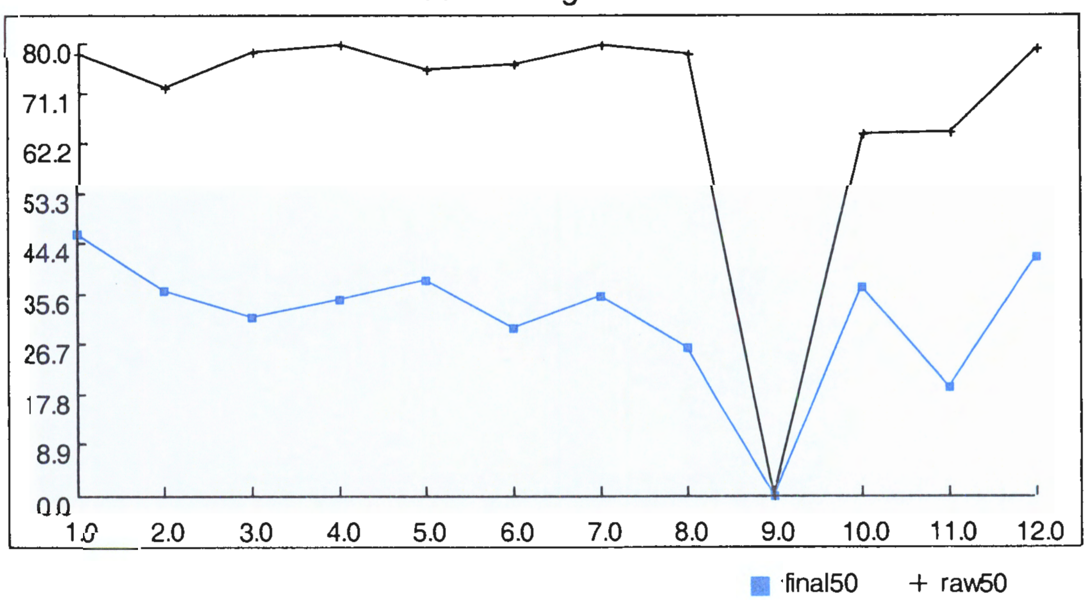
RAW50 and FINAL50
COD concentration (mg/L).
JAN-2001 through DEC-2001



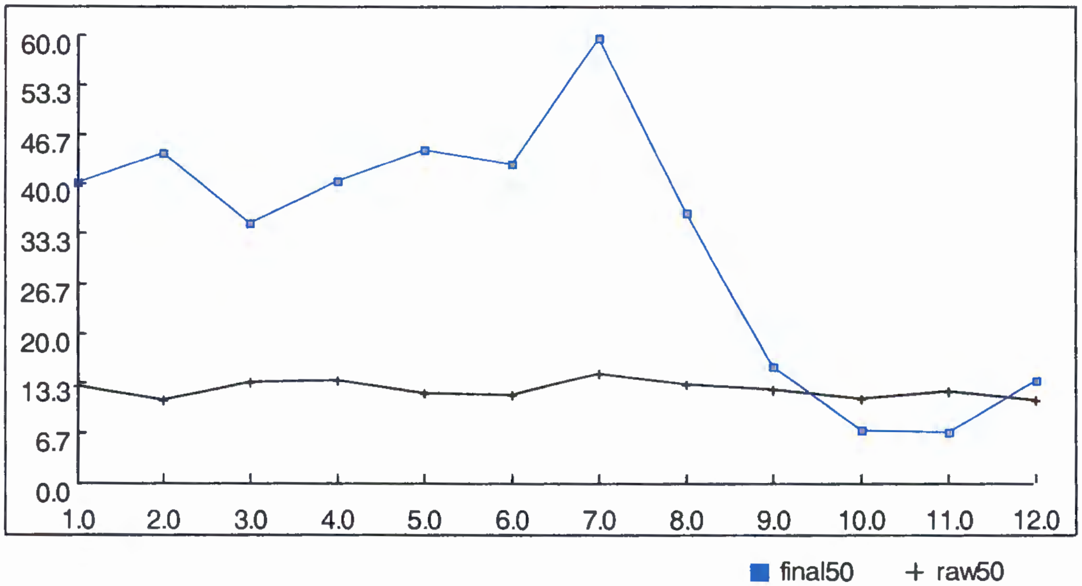
RAW50 and FINAL50
ALKALINITY-MO concentration (mg/L).
JAN-2001 through DEC-2001



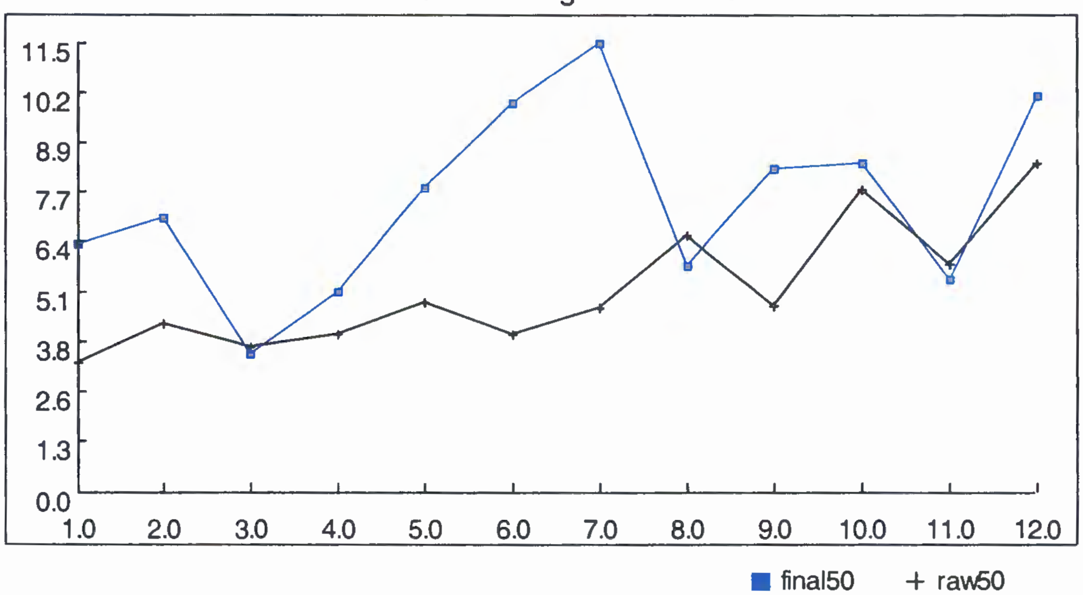
RAW50 and FINAL50
SILICA_DIOXIDE concentration (mg/L).
JAN-2001 through DEC-2001



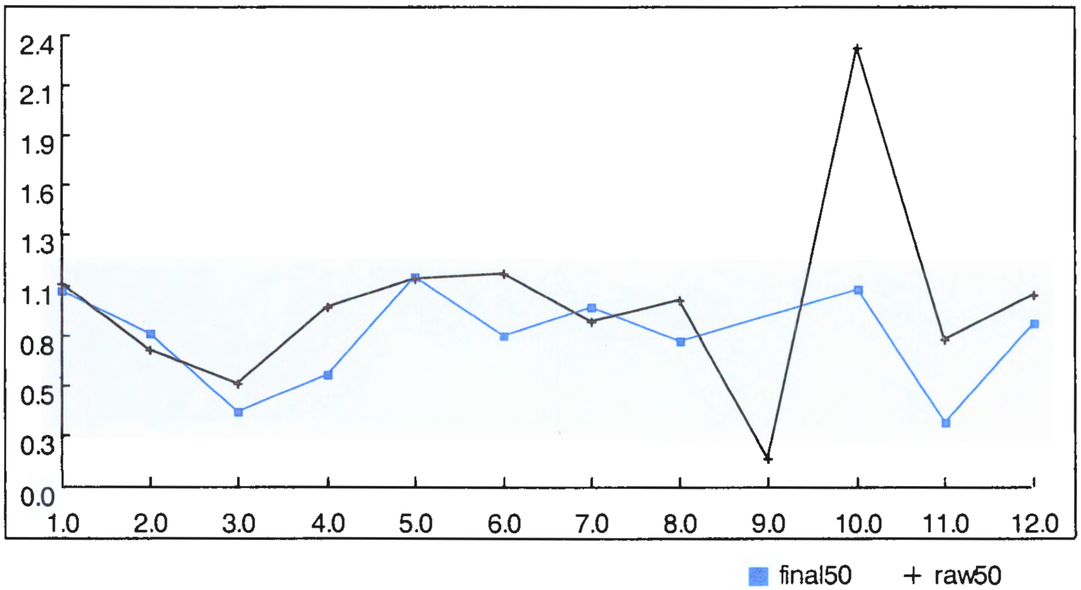
RAW50 and FINAL50
CALCIUM concentration (mg/L).
JAN-2001 through DEC-2001



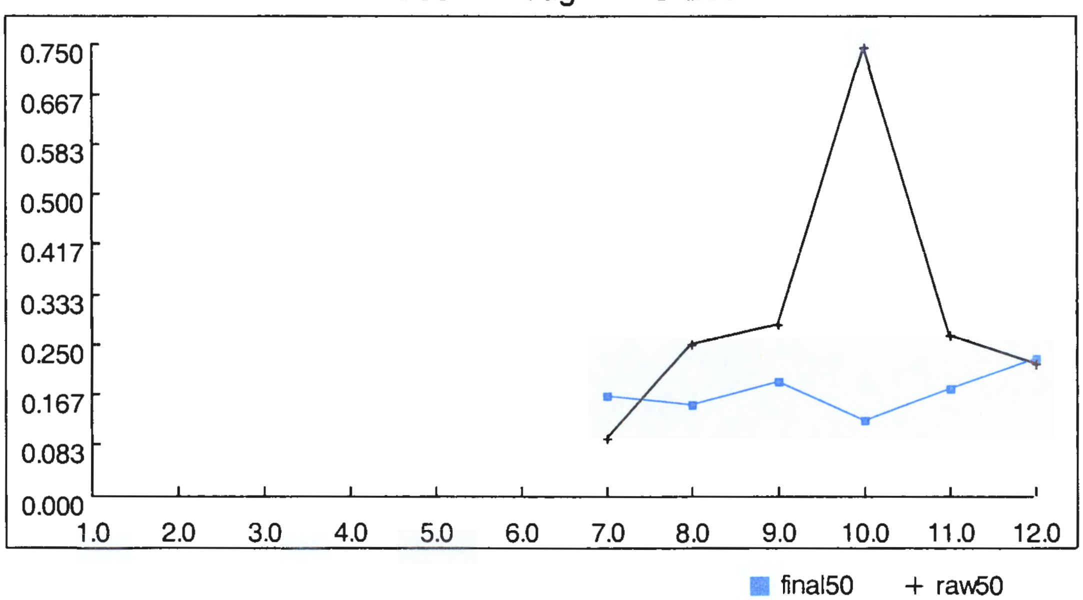
RAW50 and FINAL50
POTASSIUM concentration (mg/L).
JAN-2001 through DEC-2001



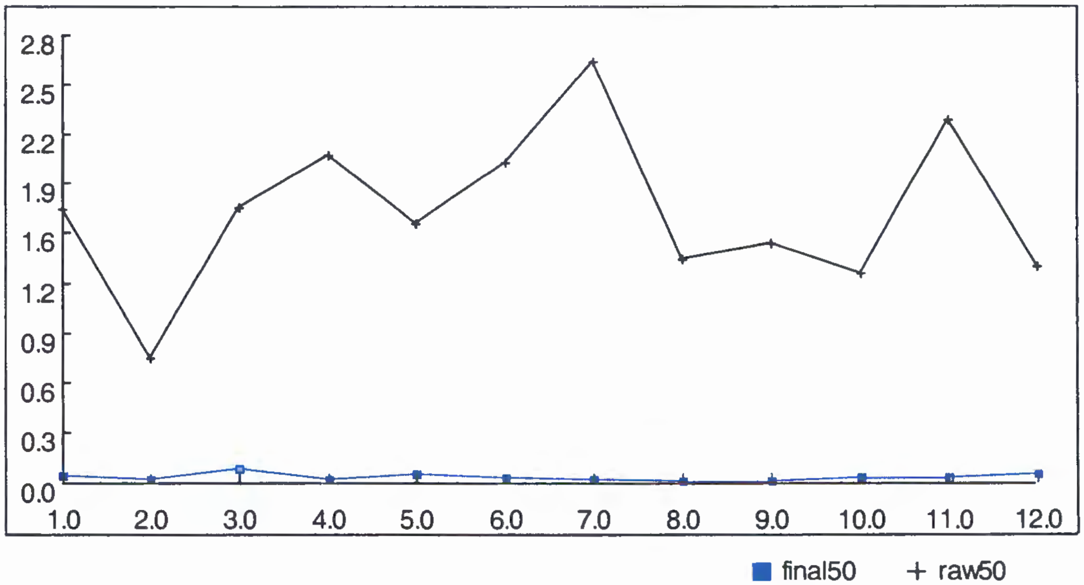
RAW50 and FINAL50
FLUORIDE concentration (mg/L).
JAN-2001 through DEC-2001



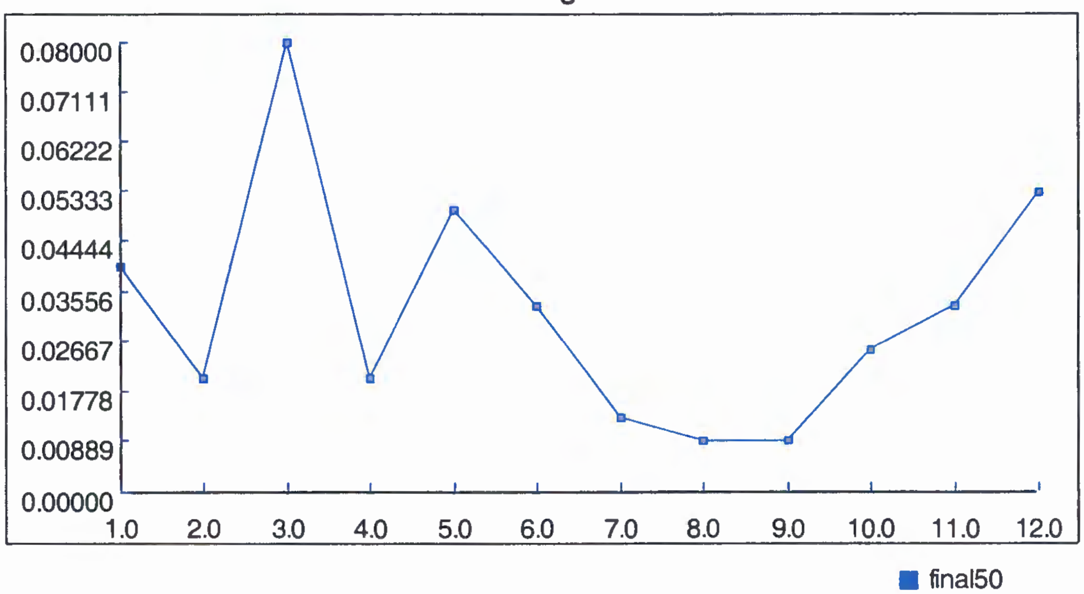
RAW50 and FINAL50
PERCHLORATE concentration (mg/L).
JAN-2001 through DEC-2001

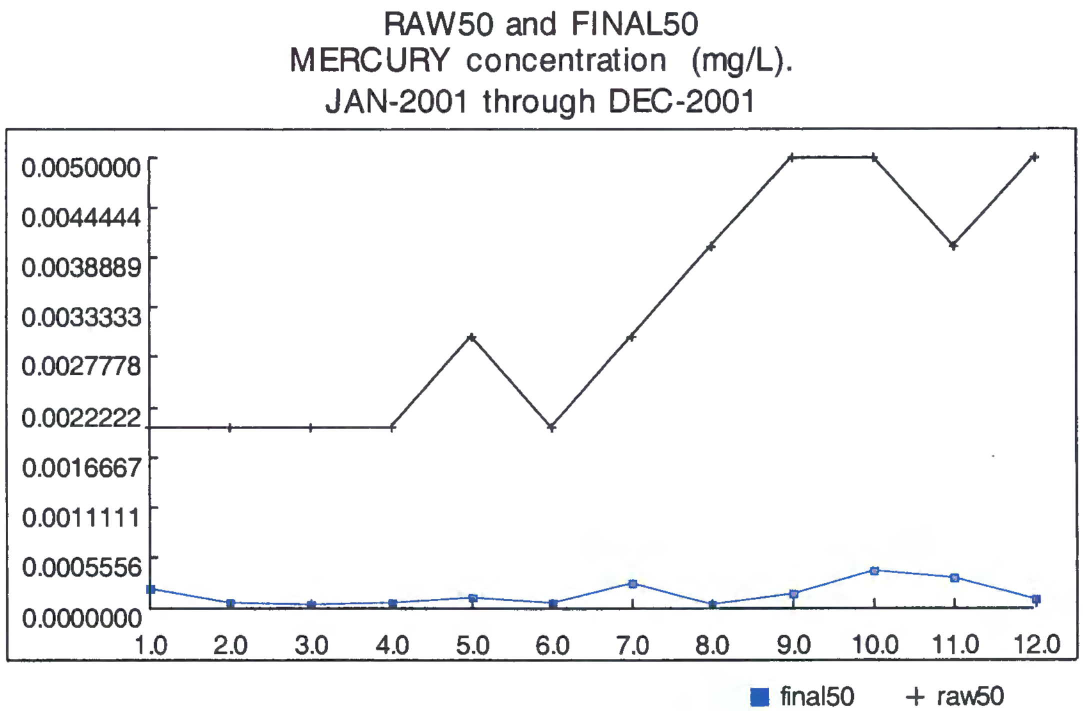


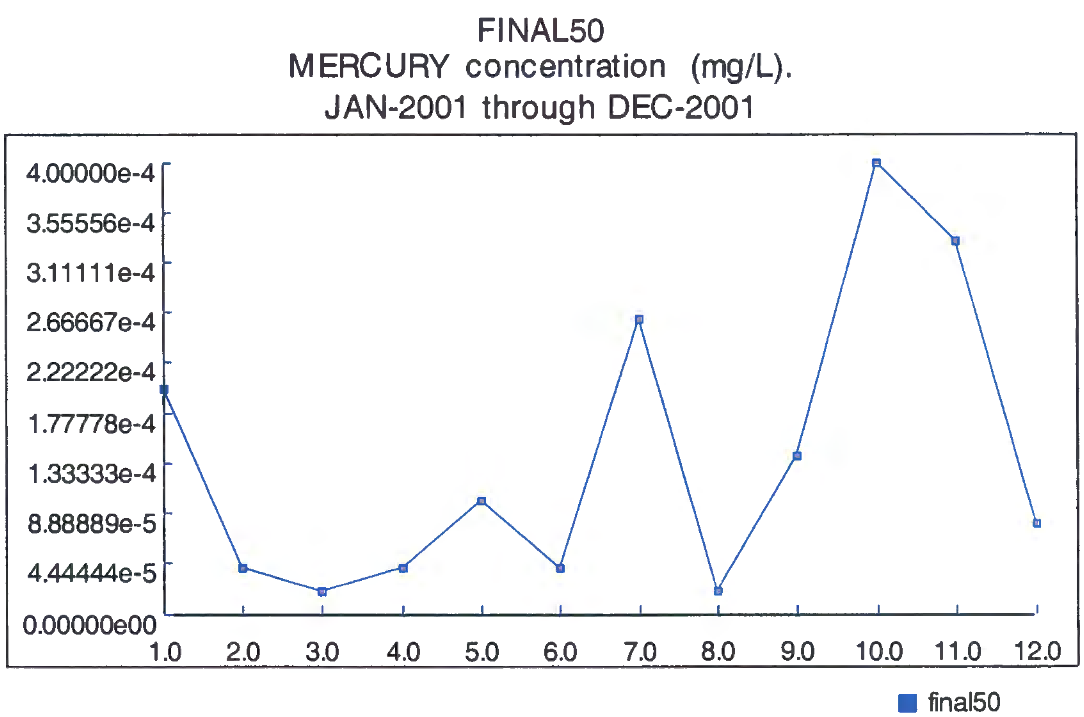
RAW50 and FINAL50
IRON concentration (mg/L).
JAN-2001 through DEC-2001



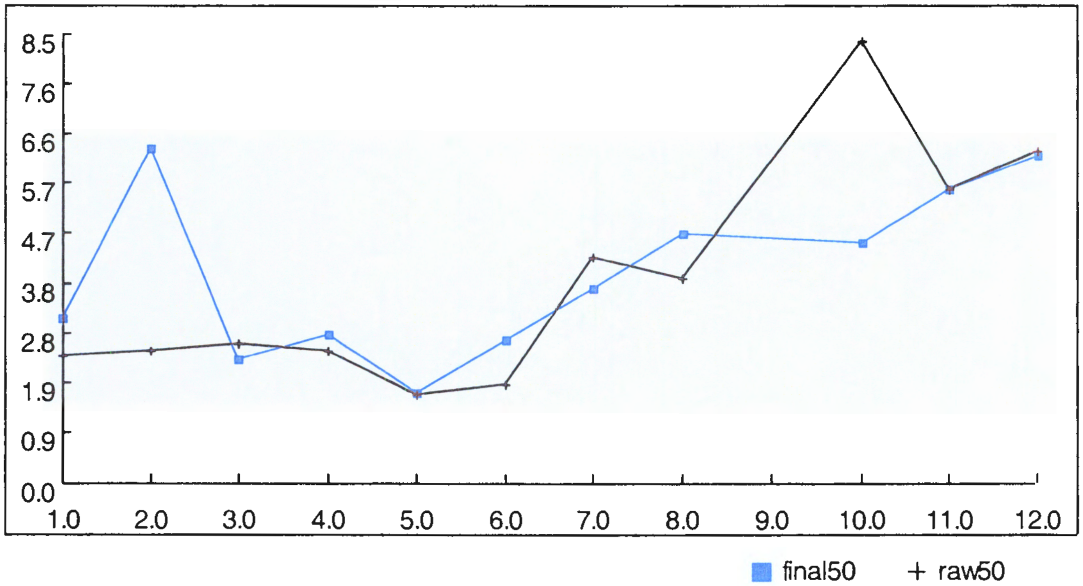
FINAL50
IRON concentration (mg/L).
JAN-2001 through DEC-2001



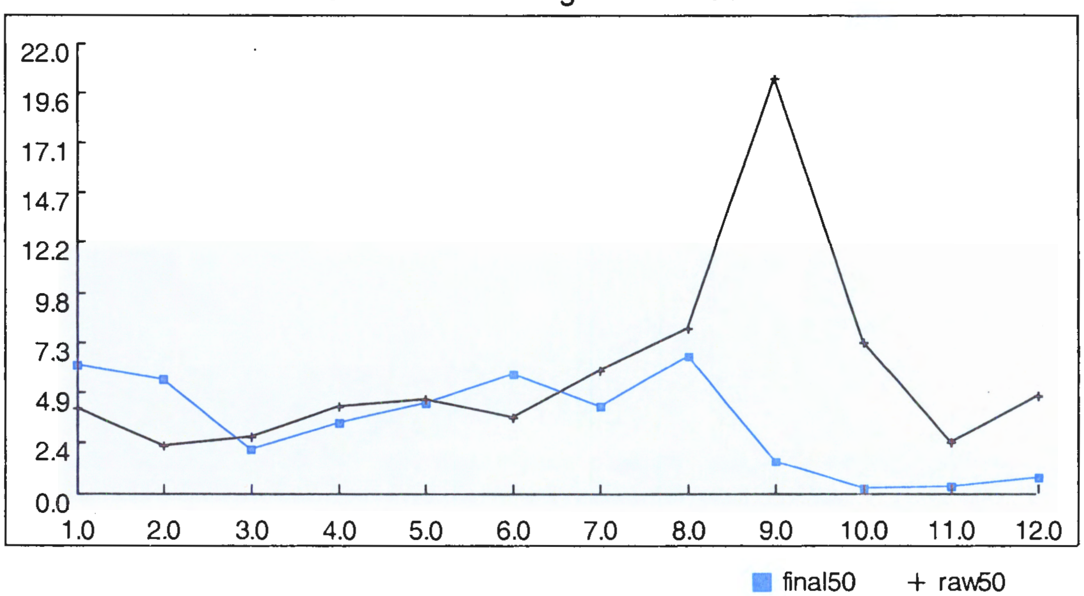

RAW50 and FINAL50
MERCURY concentration (mg/L).
JAN-2001 through DEC-2001
0.0050000
0.0044444
0.0038889
0.0033333
0.0027778
0.0022222
0.0016667
0.0011111
0.0005556
0.0000000
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
final50
+ raw50


FINAL50
MERCURY concentration (mg/L).
JAN-2001 through DEC-2001
4.00000e-4
3.55556e-4
3.11111e-4
2.66667e-4
2.22222e-4
1.77778e-4
1.33333e-4
8.88889e-5
4.44444e-5
0.00000e00
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
final50

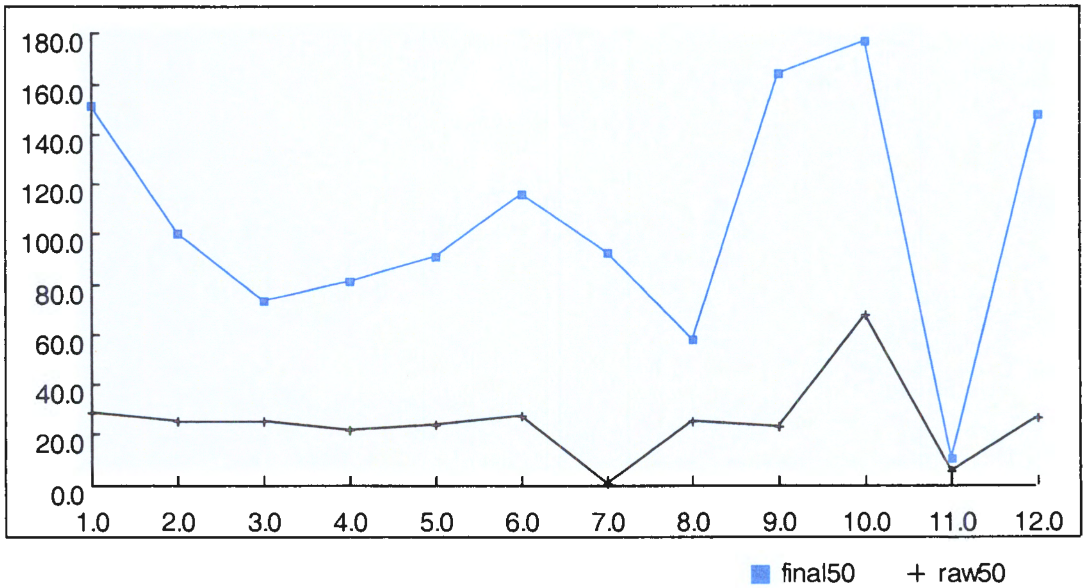
RAW50 and FINAL50
AMMONIA-N concentration (mg/L).
JAN-2001 through DEC-2001



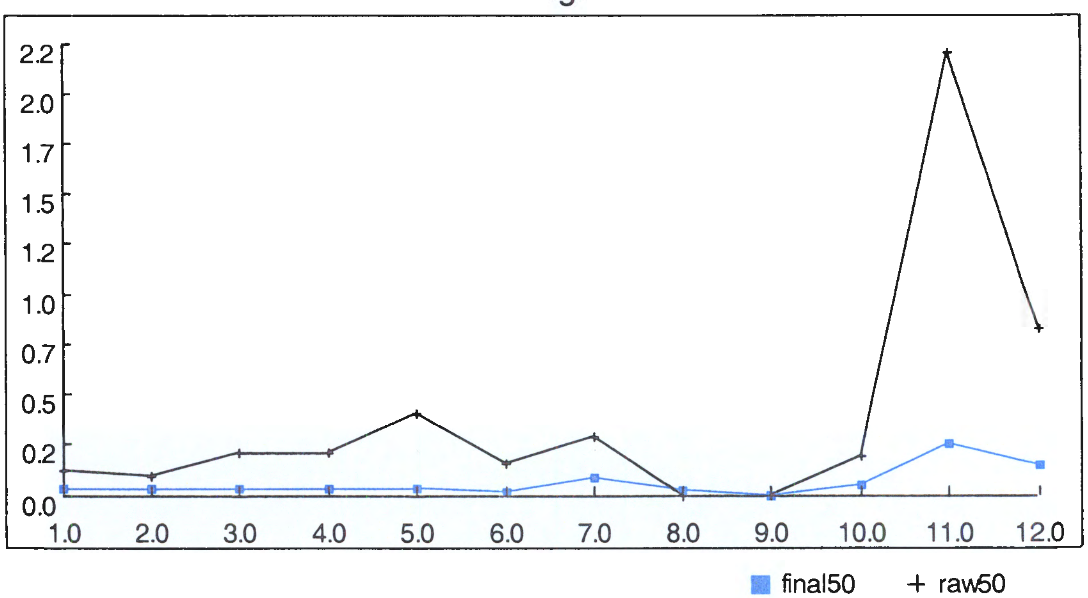
RAW50 and FINAL50
NITRATE-N concentration (mg/L).
JAN-2001 through DEC-2001



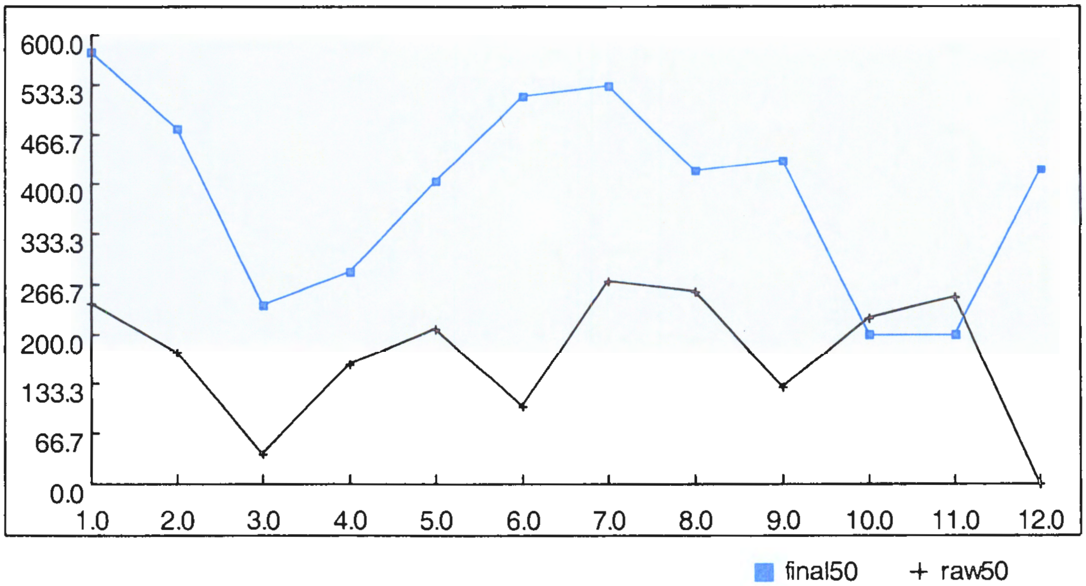
RAW50 and FINAL50
SODIUM concentration (mg/L).
JAN-2001 through DEC-2001



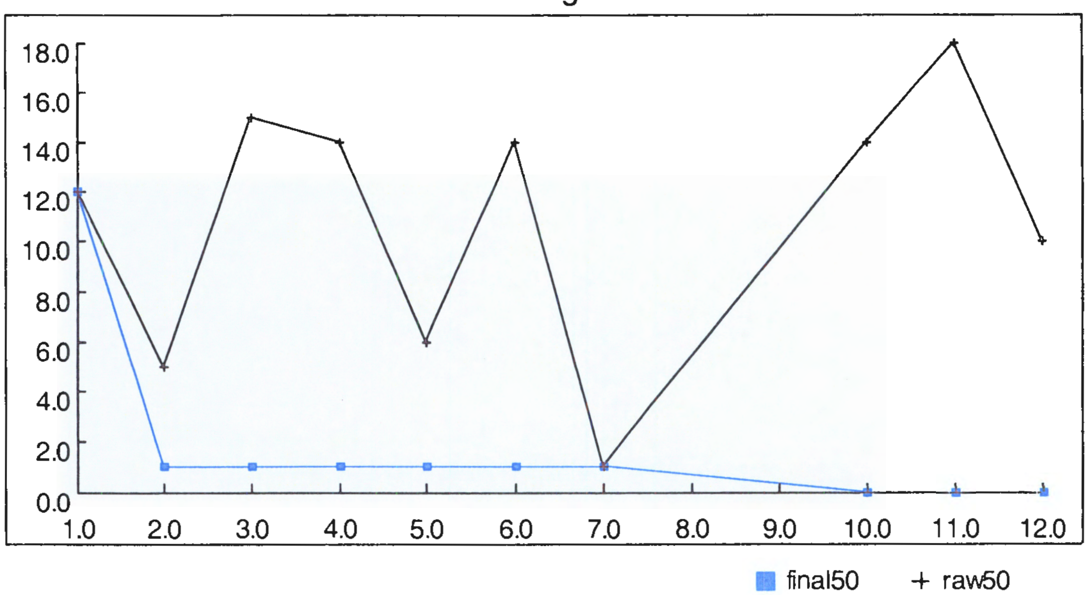
RAW50 and FINAL50
ZINC concentration (mg/L).
JAN-2001 through DEC-2001



RAW50 and FINAL50
TDS concentration (mg/L).
JAN-2001 through DEC-2001



RAW50 and FINAL50
TSS concentration (mg/L).
JAN-2001 through DEC-2001



Appendix B
Other 2001 Data for the TA-21 RLWTF

Highlight and summary data for operations at the TA-21 RLWTF appear in Volume 1 of this Annual Report. This appendix contains additional information about concentrations in plant influent and effluent. Data comes from chemical and radiochemical analysis of monthly composite samples. Specifically, this appendix contains the following tables:

- Appendix B.1: TA-21 Monthly Flows – primarily plant influent, plant effluent, and transfers from the TA-21 RLWTF. (3 pages)
- Appendix B.2 Radioisotope summary by month – concentrations and quantities in plant influent and effluent. (4 pages)
- Appendix B.3: Mineral summary by month – concentrations and quantities in plant influent and effluent. (4 pages)

Samples were collected only when the TA-21 facility was in operation, which occurred only in January, May, June, and July. Appendices B.2 and B.3, therefore, only contain four pages each.

Appendix B.1
Monthly Flows, TA-21 RLWTF

TA21 MONTHLY FLOWS (liters)

JAN-2001 through DEC-2001

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
JAN-2001									
Total	50203	85281	7.367		5.45		40664	1022	0
Maximum/Day	19315	71991	5.667	211.739	4.583	63.85			
Minimum/Day	1039	13290	1.7	130.294	0.867	62.336			
Average/Day	1619	42641	3.683	171.017	2.725	63.093			
FEB-2001									
Total	23377	0	0.0		0.0		0	0	0
Maximum/Day	9432								
Minimum/Day	1546								
Average/Day	835			0.0		0.0			
MAR-2001									
Total	31918	0	0.0		0.0		0	0	0
Maximum/Day	8683								
Minimum/Day	803								
Average/Day	1030			0.0		0.0			
APR-2001									
Total	26310	0	0.0		0.0		0	0	0
Maximum/Day	14552								
Minimum/Day	1166								
Average/Day	877			0.0		0.0			
MAY-2001									
Total	83220	105454	5.517		3.317		128441	0	0
Maximum/Day	28648	62987	2.95	355.856	1.833	139.66	49827		
Minimum/Day	1378	42467	2.567	275.763	1.483	116.381	38571		
Average/Day	2685	52727	2.758	315.81	1.658	128.02	42814		

TA21 MONTHLY FLOWS (liters)

JAN-2001 through DEC-2001

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
JUN-2001									
Total	121879	138918	12.017		9.75		35022	0	0
Maximum/Day	68063	87749	6.933	210.935	5.833	61.149			
Minimum/Day	25416	51169	5.083	167.766	3.917	53.107			
Average/Day	4063	69459	6.008	189.351	4.875	57.128			
JUL-2001									
Total	39838	127013	5.917		4.083		146871	0	0
Maximum/Day	23046						87403		
Minimum/Day	433						8343		
Average/Day	1285			357.783		126.444	48957		
AUG-2001									
Total	212	0	0.0		0.0		0	0	0
Maximum/Day									
Minimum/Day									
Average/Day				0.0		0.0			
SEP-2001									
Total	0	0	0.0		0.0		0	0	0
Maximum/Day									
Minimum/Day									
Average/Day				0.0		0.0			
OCT-2001									
Total	0	0	0.0		0.0		0	0	0
Maximum/Day									
Minimum/Day									
Average/Day				0.0		0.0			

TA21 MONTHLY FLOWS (liters)

JAN-2001 through DEC-2001

	Influent	Treated	Time (hrs)	Rate (liters/min)	Filter Time (hrs)	Filter Rate (liters/min)	Transfer	Misc	Recirc
NOV-2001									
Total	0	0	0.0		0.0		0	0	0
Maximum/Day									
Minimum/Day									
Average/Day				0.0		0.0			
DEC-2001									
Total	31264	0	0.0		0.0		0	0	0
Maximum/Day									
Minimum/Day									
Average/Day				0.0		0.0			
SUMMARY									
Total	408221	456666	30.817		22.6		350998	1022	0
Maximum/Month	121879	138918					146871	1022	0
Minimum/Month	212	85281					35022	1022	
Average/Month	34018	38056	2.568	246.98	1.883	82.14	29250	85	0

Appendix B.2
Analyses of Monthly Composite Radiological Samples, TA-21 RLWTF

TA21 RADIOISOTOPES

JUL-2001

	RAW nCi/L	RAW Total (Ci)
ALPHA	39.0	1.554e-3
Am-241	30.0	1.195e-3
BETA	4.6	183.255e-6
Cs-137	LDL*	
Pu-238	5.9	235.044e-6
Pu-239	10.0	398.38e-6
Sr-89	180.0e-3	7.171e-6
Sr-90	76.0e-3	3.028e-6
TOTAL PLUTONIUM	15.9	633.424e-6
U-234	310.0e-3	12.35e-6
U-235	LDL*	
U-238	LDL*	
Total Alpha		1.841e-3

Volume of Flow: Influent = 39,838.0 liters Transfered = 146,871.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA21 RADIOISOTOPES

JAN-2001

	RAW nCi/L	RAW Total (Ci)
ALPHA	7.3	366.482e-6
Am-241	5.7	286.157e-6
BETA	3.8	190.771e-6
Cs-137	LDL*	
Pu-238	1.5	75.305e-6
Pu-239	1.6	80.325e-6
Sr-89	250.0e-3	12.551e-6
Sr-90	170.0e-3	8.535e-6
TOTAL PLUTONIUM	3.1	155.629e-6
U-234	430.0e-3	21.587e-6
U-235	4.0e-3	200.812e-9
U-238	3.9e-3	195.792e-9
Total Alpha		463.575e-6

Volume of Flow: Influent = 50,203.0 liters Transfered = 40,664.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA21 RADIOISOTOPES

MAY-2001

	RAW nCi/L	RAW Total (Ci)
ALPHA	20.0	1.664e-3
Am-241	14.0	1.165e-3
BETA	4.8	399.456e-6
Cs-137	LDL*	
Pu-238	2.4	199.728e-6
Pu-239	7.5	624.15e-6
Sr-89	LDL*	
Sr-90	180.0e-3	14.98e-6
TOTAL PLUTONIUM	9.9	823.878e-6
U-234	280.0e-3	23.302e-6
U-235	10.0e-3	832.2e-9
U-238	8.0e-3	665.76e-9
Total Alpha		2.013e-3

Volume of Flow: Influent = 83,220.0 liters Transfered = 128,441.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

TA21 RADIOISOTOPES

JUN-2001

	RAW nCi/L	RAW Total (Ci)
ALPHA	3.6	438.84e-6
Am-241	3.1	377.89e-6
BETA	1.9	231.61e-6
Cs-137	LDL*	
Pu-238	1.5	182.85e-6
Pu-239	1.5	182.85e-6
Rb-83	LDL*	
Rb-84	LDL*	
TOTAL PLUTONIUM	3.0	365.7e-6
U-234	190.0e-3	23.161e-6
U-235	17.0e-3	2.072e-6
U-238	LDL*	
Total Alpha		768.823e-6

Volume of Flow: Influent = 121,879.0 liters Transfered = 35,022.0 liters

*LDL: Less than Detection Limit.

**The treatment process does not affect tritium; therefore, it is usually measured only once.

Appendix B.3
Analyses of Monthly Composite Mineral Samples, TA-21 RLWTF

TA21 MINERALS

JAN-2001

	RAW Concentration	Total (KG)
ALKALINITY-MO	151.0	7.581
ALKALINITY-P	57.0	2.862
ALUMINUM	1.1	0.055
AMMONIA-N	0.47	0.024
ANTIMONY	0.002	1.004e-4
ARSENIC	0.006	3.012e-4
BARIUM	0.05	0.003
BERYLLIUM	0.001	5.02e-5
BORON	0.068	0.003
CADMIUM	0.026	0.001
CALCIUM	104.0	5.221
CHLORIDE	25.1	1.26
COBALT	LDL*	
COD	70.0	3.514
CONDUCTIVITY	736.0	
COPPER	0.063	0.003
CYANIDE	LDL*	
FLUORIDE	1.24	0.062
HARDNESS	281.019	14.108
IRON	10.4	0.522
LEAD	LDL*	
MAGNESIUM	5.18	0.26
MERCURY	5.4e-4	2.711e-5
NICKEL	0.07	0.004
NITRATE-N	1.0	0.05
PHOSPHORUS	4.2	0.211
POTASSIUM	34.2	1.717
SELENIUM	LDL*	
SILICA DIOXIDE	37.0	1.858
SILICON	26.5	1.33
SILVER	LDL*	
SODIUM	87.3	4.383
SULFATE	238.0	11.948
TDS	694.0	34.841
THALLIUM	1.3e-4	6.526e-6
TOTAL CATIONS	8.82	
TOTAL CHROMIUM	0.035	0.002
TSS	66.0	3.313
URANIUM	0.022	0.001
VANADIUM	LDL*	
ZINC	0.12	0.006
pH	9.84	

Volume of Flow: Influent = 50,203.0 liters Transfered = 40,664.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA21 MINERALS

MAY-2001

	RAW Concentration	Total (KG)
ALKALINITY-MO	216.0	17.976
ALKALINITY-P	LDL*	
ALUMINUM	2.04	0.17
AMMONIA-N	0.17	0.014
ANTIMONY	0.003	2.497e-4
ARSENIC	0.014	0.001
BARIUM	0.101	0.008
BERYLLIUM	0.004	3.329e-4
BORON	0.112	0.009
CADMIUM	0.046	0.004
CALCIUM	118.0	9.82
CHLORIDE	21.5	1.789
COBALT	0.008	6.658e-4
COD	100.0	8.322
CONDUCTIVITY	820.0	
COPPER	0.182	0.015
CYANIDE	0.028	0.002
FLUORIDE	0.88	0.073
HARDNESS	339.532	28.256
IRON	23.5	1.956
LEAD	0.07	0.006
MAGNESIUM	10.9	0.907
MERCURY	1.2e-4	9.986e-6
NICKEL	0.139	0.012
NITRATE-N	0.07	0.006
PHOSPHORUS	11.2	0.932
POTASSIUM	69.8	5.809
SELENIUM	0.002	1.664e-4
SILICA DIOXIDE	68.0	5.659
SILICON	48.3	4.02
SILVER	LDL*	
SODIUM	79.5	6.616
SULFATE	223.0	18.558
TDS	830.0	69.073
THALLIUM	2.1e-4	1.748e-5
TOTAL CATIONS	8.84	
TOTAL CHROMIUM	0.08	0.007
TSS	149.0	12.4
URANIUM	0.032	0.003
VANADIUM	0.031	0.003
ZINC	0.366	0.03
pH	8.44	

Volume of Flow: Influent = 83,220.0 liters Transfered = 128,441.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA21 MINERALS

JUN-2001

	RAW Concentration	Total (KG)
ALKALINITY-MO	306.0	37.301
ALKALINITY-P	LDL*	
ALUMINUM	1.32	0.161
AMMONIA-N	0.46	0.056
ANTIMONY	9.0e-4	1.097e-4
ARSENIC	0.004	4.876e-4
BARIUM	0.051	0.006
BERYLLIUM	LDL*	
BORON	0.1	0.012
CADMIUM	0.013	0.002
CALCIUM	112.0	13.653
CHLORIDE	33.1	4.035
COBALT	0.01	0.001
COD	140.0	17.066
CONDUCTIVITY	651.0	
COPPER	0.046	0.006
CYANIDE	0.008	9.752e-4
FLUORIDE	0.88	0.107
HARDNESS	324.962	39.613
IRON	5.75	0.701
LEAD	LDL*	
MAGNESIUM	11.0	1.341
MERCURY	7.6e-4	9.264e-5
NICKEL	0.029	0.004
PHOSPHORUS	12.9	1.573
POTASSIUM	85.6	10.435
SELENIUM	0.005	6.095e-4
SILICA DIOXIDE	79.5	9.691
SILICON	44.4	5.412
SILVER	LDL*	
SODIUM	94.4	11.507
TDS	936.0	114.098
THALLIUM	3.0e-5	3.657e-6
TOTAL CHROMIUM	0.026	0.003
TSS	79.0	9.63
URANIUM	0.011	0.001
VANADIUM	0.043	0.005
ZINC	0.076	0.009
pH	9.71	

Volume of Flow: Influent = 121,879.0 liters Transfered = 35,022.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

TA21 MINERALS

JUL-2001

	RAW Concentration	Total (KG)
ALKALINITY-MO	484.0	19.282
ALKALINITY-P	451.0	17.967
ANTIMONY	0.002	7.968e-5
ARSENIC	0.006	2.39e-4
CONDUCTIVITY	2160.0	
FLUORIDE	1.23	0.049
PERCHLORATE	0.056	0.002
SELENIUM	0.002	7.968e-5
TDS	886.0	35.296
THALLIUM	1.0e-4	3.984e-6
TSS	89.0	3.546
URANIUM	0.015	5.976e-4
pH	11.8	

Volume of Flow: Influent = 39,838.0 liters Transfered = 146,871.0 liters

*Alkalinities and hardness as mg CaC03/l. *Conductivity as uS/cm. *Total Cations as meq/l. Otherwise: mg/l

*LDL: Less than Detection Limit.

Appendix C
Historical Perspective for the TA-50 RLWTF

Appendix C
Historical Perspective for the TA-50 RLWTF

There are many indicators of RLWTF performance. This chapter presents some indicators for operations performance during the past twelve years, 1990-2001, so that some perspective is added to the information presented in Volume 1 for the year 2001.

C.1 Flows

Figures C-1, C-2, and C-3 present recent flows for the TA-50, TA-21, and TA-53 facilities, respectively. As can be seen, flows during 2001 were the lowest over the last twelve years for the TA-50 RLWTF. The decrease for 2001 was the direct result of re-routing cleanup waters from the TA-48 boiler, which are non-radioactive, to the TA-46 sewage plant. RLW volumes at the TA-21 and TA-53 facilities are in similar decline.

Figure C-1

TA-50 RLWTF FLOWS

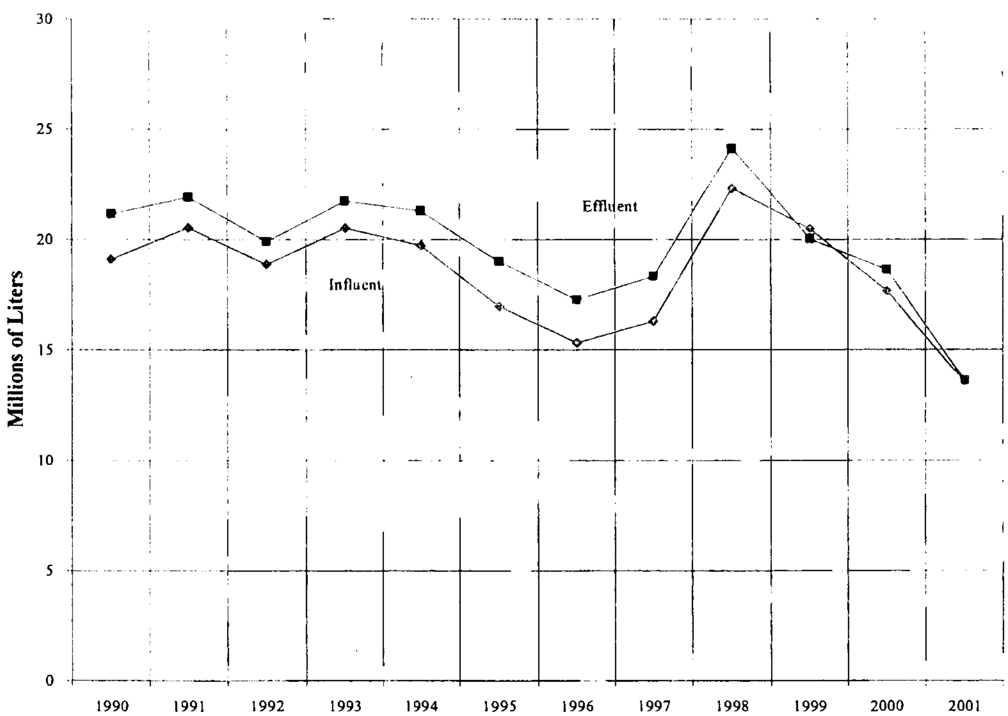


Figure C-2

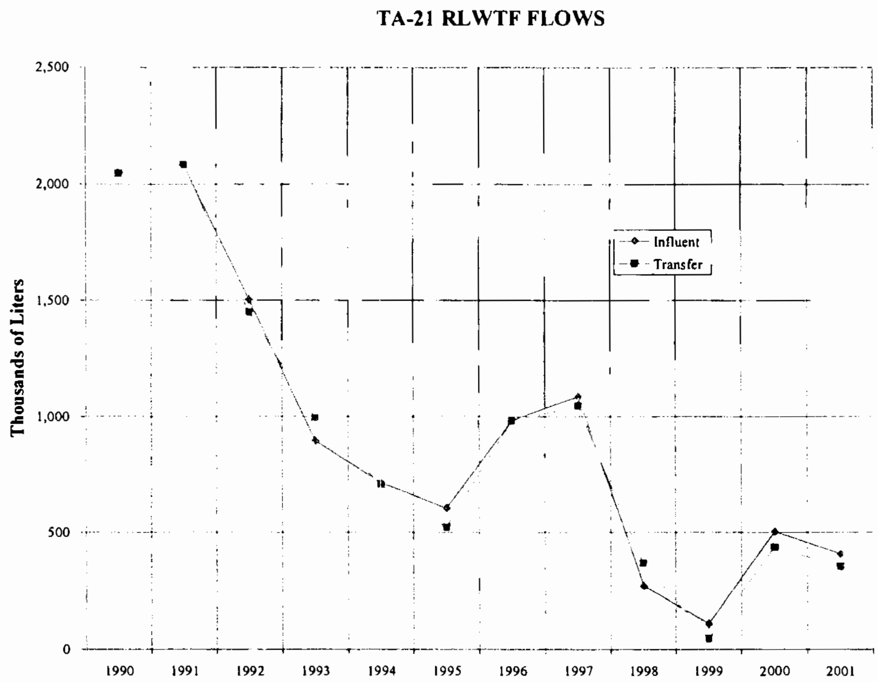
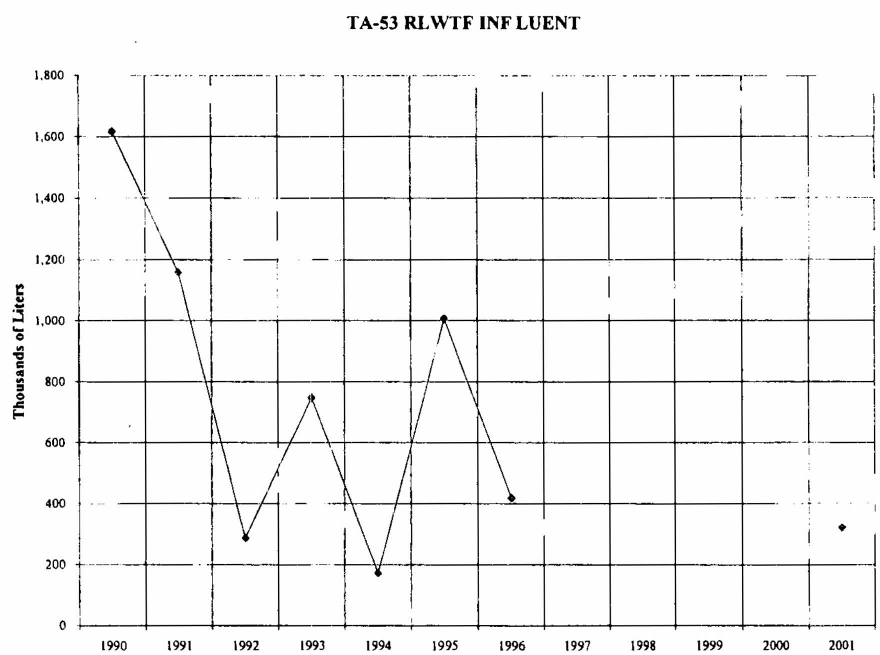


Figure C-3



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C.2 Effluent Quality

The TA-50 RLWTF discharges treated waters to Mortandad Canyon through Outfall #051. Treated waters must meet standards imposed by the DOE and the EPA. The NMED has proposed, but not imposed, additional standards. The TA-21 and TA-53 facilities have no discharges.

EPA Discharge Standards: Table C-1 lists the number of violations for Outfall #051 for the past eleven years. For added perspective, data is also included for the entire Laboratory. This information is compiled by ESH-18, and is reported in the annual Environmental Surveillance Reports.

Table C-1
NPDES Violations 1991-2001

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

* More than 20 parameters (discharge standards) per sample

DOE Discharge Standards: DOE Order 5400.5 publishes 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 is divided by the discharge standard for that isotope), and then the summation of ratios for all isotopes. Table C-2 indicates that RLWTF discharges met this standard during 2000 and 2001.

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 C-3 shows discharge data for the past three years.

Table C-2
Radioactive Discharges 1991-2001

	Sum of Ratios*	Isotopes > DCG
1991	9.60	^{241}Am, ^{239}Pu, ^{137}Cs, ^{90}Sr
1992	16.02	^{241}Am
1993	19.21	^{241}Am
1994	9.40	^{241}Am, ^{238}Pu
1995	8.94	^{241}Am, ^{238}Pu, ^{239}Pu
1996	8.32	^{241}Am, ^{238}Pu
1997	8.52	^{241}Am, ^{238}Pu, ^{239}Pu
1998	7.84	^{241}Am, ^{238}Pu, ^{239}Pu
1999	7.30	^{241}Am, ^{238}Pu, ^{239}Pu
2000	0.32	None
2001	0.40	None

* Discharge standard = 1.00

Table C-3
Discharges vs. Proposed NMED Standards

Year	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	0.3	0.7	2.5	7.5	306	578
2001	0.7	1.1	3.9	6.6	410	576

C.3 Wastes

Table C-4 shows waste generation at the TA-50 RLWTF for the past 12 years. Quantities of LLW, Mixed LLW and transuranic waste are about the same as they have been since 1996. Quantities of chemical waste were the highest they have been over the past 12 years. All but 0.2% of the chemical wastes, however, came from four dump trucks of soil and asphalt that were generated by the installation of a new security gate.

Table C-4
Wastes Generated at the TA-50 RLWTF

	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	68,792	158	2.6	0.4	4.4

C.4 Radioactive Parameters

Since 10 December 1999, no discharges from the TA-50 RLWTF have been above DOE discharge standards. The improvement resulted from installation of the membrane processes in March 1999, following resolution of startup problems. Discharges of total radioactivity, alpha radioactivity, and tritium are presented in Figures C-4, C-5, and C-6.

Figure C-4

RADIOACTIVITY (GROSS ALPHA) IN TA-50 RLWTF EFFLUENT

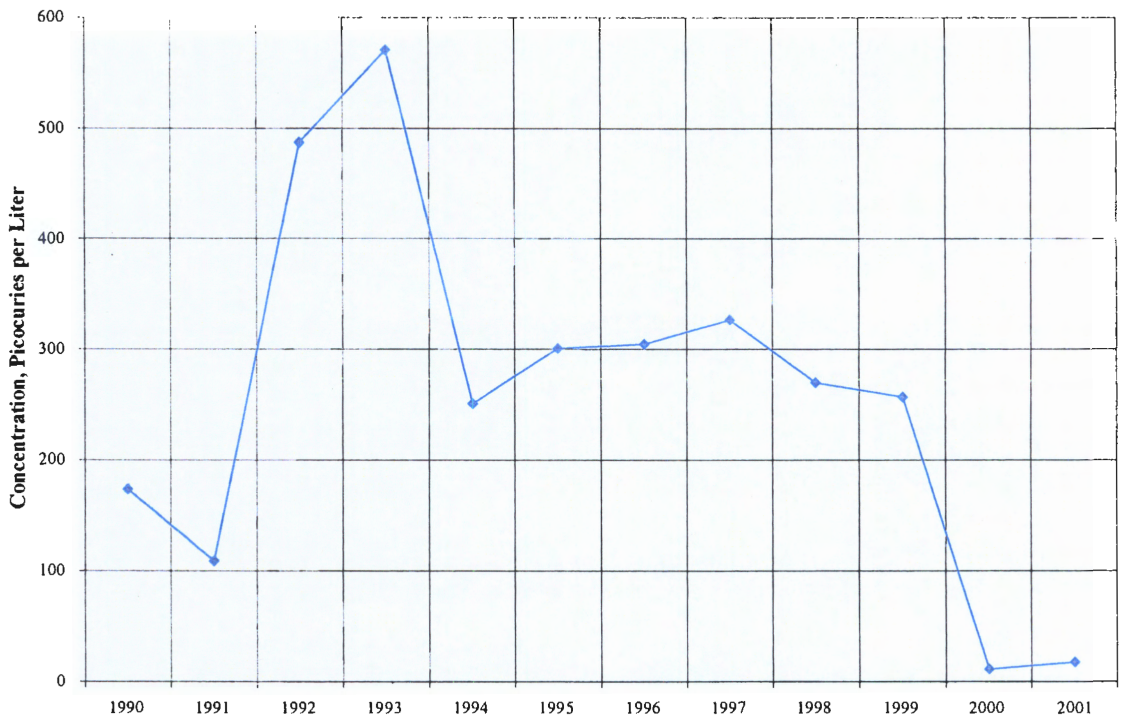


Figure C-5

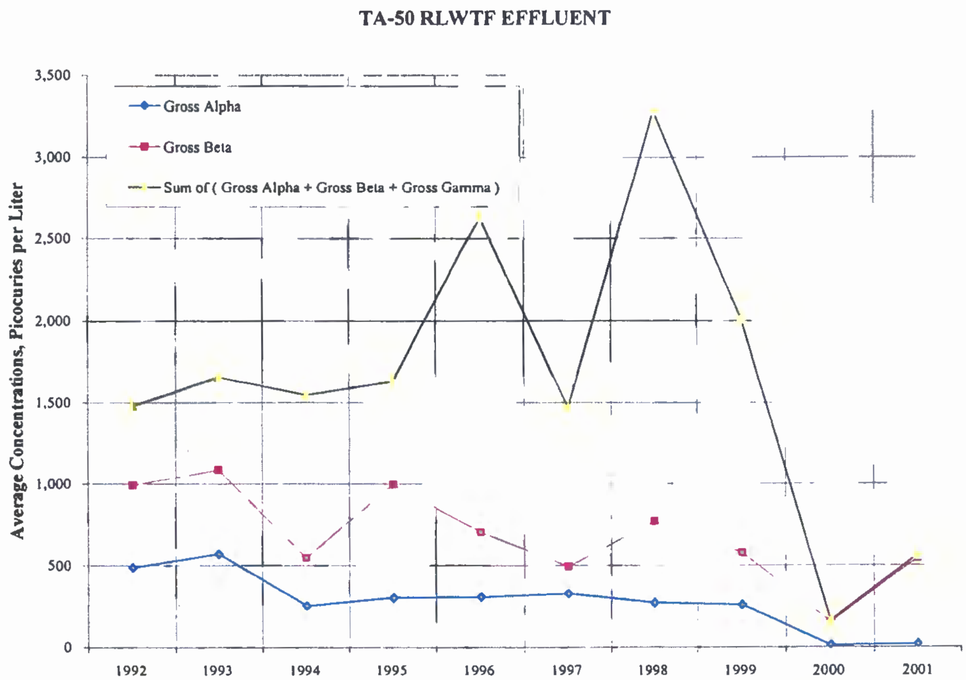
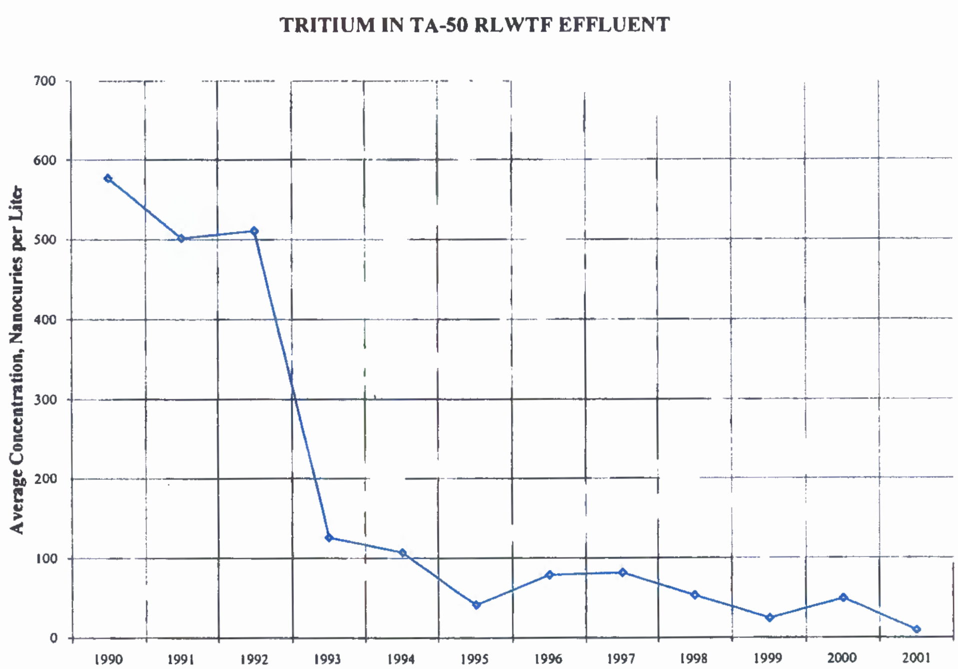


Figure C-6



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C.5 Non-Radioactive Parameters

Figures C-7, C-8, and C-9 graph quantities of cations, anions, and total dissolved solids in TA-50 influent and effluent for the years 1992-2001. The graphs illustrate that effluent quantities exceeded influent quantities nearly every year. This is due to the addition of chemicals to the clarifier.

Figure C-7

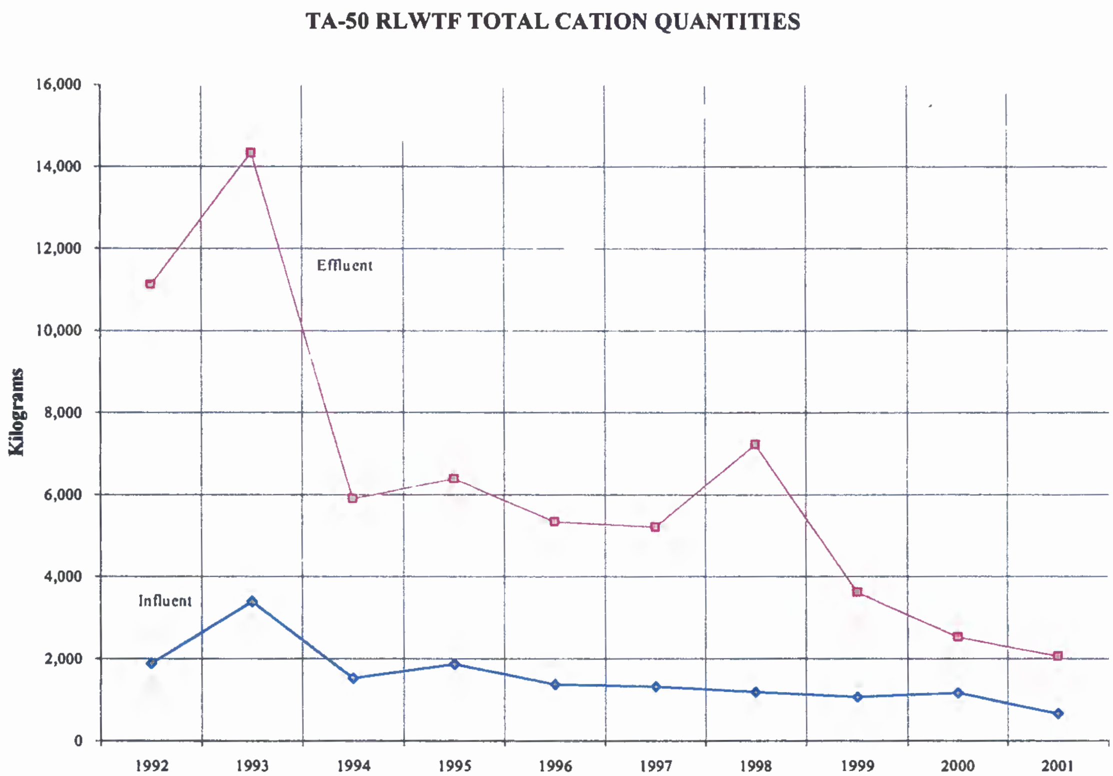

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Figure C-8

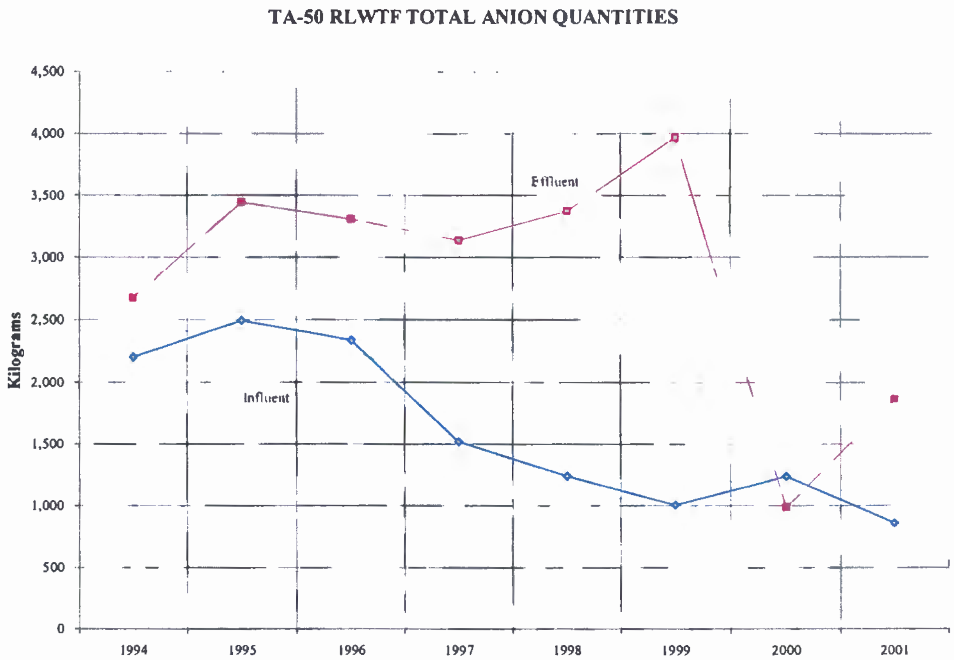

Figure C-9

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C.6 Facility and Process Modifications

C.6.1 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 C-5 below, and a brief description of each appears in the text that follows.

Table C-5
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
Current	240^+	11. Remediation of generator collection vaults (20 of 75 to date)

* 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 drained and capped. Transfers of treated RLW from TA-21 to the TA-50 RLWTF will henceforth be accomplished by truck.

11. Generator collection vaults: This project resulted from the accumulation of maintenance issues. Repairs included surface preparation and sealing of walls and floors, installing OSHA-compliant ladders, and installing balusters to protect manways from snow plows and other traffic. Not yet completed.

C.6.2 Process Modifications

Discharge standards become more stringent each year. 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. Primarily because of these two factors, process modifications are made each year. A list of recent process modification projects is summarized in Table C-6 below, and a brief description of each appears in the text that follows.

Table C-6
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

* 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 $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.

Appendix D

VOC and SVOC Analytical Data

This appendix contains analytical data for volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC). Such samples are taken to demonstrate that hazardous wastes, as defined in the Resource Conservation and Recovery Act of 1976 (RCRA) do not exist in waters at the TA-21 and TA-50 Radioactive Liquid Waste Treatment Facilities. The appendix is divided into four sections:

Appendix D.1: VOC and SVOC Results for TA-50 Plant Sludge (4 pages)

Appendix D.2: VOC and SVOC Results by Species for TA-50 Plant Feed (6 pages)

Appendix D.3: VOC and SVOC Results by Sample for TA-50 Plant Feed (6 pages)

Appendix D.4: VOC and SVOC Results for TA-21 Plant (4 pages)

Appendix D.1

VOC and SVOC Results for TA-50 Plant Sludge

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by species for TA50 Plant Sludge
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
14-JUN-2001	50S0601.14	1,2,4-TRIMETHYLBENZENE		0.009	8.8e-4
29-AUG-2001	50S0801.29	1,2,4-TRIMETHYLBENZENE		0.013	0.001
03-DEC-2001	50S1201.03	1,2,4-TRIMETHYLBENZENE		0.004	3.8e-4
06-NOV-2001	50S1101.06	ACETONE		0.017	0.002
03-DEC-2001	50S1201.03	ACETONE		0.14	0.014
03-DEC-2001	50S1201.03	BROMOMETHANE		0.003	2.7e-4
03-DEC-2001	50S1201.03	CHLOROFORM		0.008	8.4e-4
12-APR-2001	50S0401.12	METHYLENE CHLORIDE		0.042	0.004
01-MAY-2001	50S0501.01	METHYLENE CHLORIDE		0.073	0.007
06-NOV-2001	50S1101.06	METHYLENE CHLORIDE		0.004	3.7e-4
03-DEC-2001	50S1201.03	METHYLENE CHLORIDE		0.098	0.01
29-AUG-2001	50S0801.29	TOLUENE		0.004	3.8e-4
03-DEC-2001	50S1201.03	TOLUENE		0.009	8.8e-4

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by sample for TA50 Plant Sludge
01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
12-APR-2001	50S0401.12	METHYLENE CHLORIDE		0.042	0.004
01-MAY-2001	50S0501.01	METHYLENE CHLORIDE		0.073	0.007
14-JUN-2001	50S0601.14	1,2,4-TRIMETHYLBENZENE		0.009	8.8e-4
29-AUG-2001	50S0801.29	1,2,4-TRIMETHYLBENZENE		0.013	0.001
29-AUG-2001	50S0801.29	TOLUENE		0.004	3.8e-4
06-NOV-2001	50S1101.06	ACETONE		0.017	0.002
06-NOV-2001	50S1101.06	METHYLENE CHLORIDE		0.004	3.7e-4
03-DEC-2001	50S1201.03	1,2,4-TRIMETHYLBENZENE		0.004	3.8e-4
03-DEC-2001	50S1201.03	ACETONE		0.14	0.014
03-DEC-2001	50S1201.03	BROMOMETHANE		0.003	2.7e-4
03-DEC-2001	50S1201.03	CHLOROFORM		0.008	8.4e-4
03-DEC-2001	50S1201.03	METHYLENE CHLORIDE		0.098	0.01
03-DEC-2001	50S1201.03	TOLUENE		0.009	8.8e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by species for TA50 Plant Sludge
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
06-NOV-2001	50S1101.06	BIS(2-ETHYLHEXYL)PHTHALATE		10.0	1.0
03-DEC-2001	50S1201.03	BIS(2-ETHYLHEXYL)PHTHALATE		4.5	0.45
12-APR-2001	50S0401.12	DI-N-OCTYL PHTHALATE		0.41	0.041
01-MAY-2001	50S0501.01	DI-N-OCTYL PHTHALATE		0.23	0.023
29-AUG-2001	50S0801.29	DI-N-OCTYL PHTHALATE		0.5	0.05
29-AUG-2001	50S0801.29	PHENOL		0.31	0.031

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by sample for TA50 Plant Sludge
01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
12-APR-2001	50S0401.12	DI-N-OCTYL PHTHALATE		0.41	0.041
01-MAY-2001	50S0501.01	DI-N-OCTYL PHTHALATE		0.23	0.023
29-AUG-2001	50S0801.29	DI-N-OCTYL PHTHALATE		0.5	0.05
29-AUG-2001	50S0801.29	PHENOL		0.31	0.031
06-NOV-2001	50S1101.06	BIS(2-ETHYLHEXYL)PHTHALATE		10.0	1.0
03-DEC-2001	50S1201.03	BIS(2-ETHYLHEXYL)PHTHALATE		4.5	0.45

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Appendix D.2

VOC and SVOC Results by Species for TA-50 Plant Feed

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by species for TA50 Plant Feed
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
29-JAN-2001	P0101.29	1,2,4-TRIMETHYLBENZENE		0.002	2.4e-4
20-FEB-2001	P0201.20	1,2,4-TRIMETHYLBENZENE		0.002	1.5e-4
20-MAR-2001	P0301.20	1,2,4-TRIMETHYLBENZENE		0.005	4.6e-4
26-MAR-2001	P0301.26	1,2,4-TRIMETHYLBENZENE		0.002	1.8e-4
01-MAY-2001	P0501.01	1,2,4-TRIMETHYLBENZENE		0.002	2.0e-4
17-SEP-2001	P0901.17	1,2,4-TRIMETHYLBENZENE		0.001	1.0e-4
15-OCT-2001	P1001.15	1,2,4-TRIMETHYLBENZENE		0.002	1.8e-4
05-NOV-2001	P1101.05	1,2,4-TRIMETHYLBENZENE		8.2e-4	8.2e-5
13-NOV-2001	P1101.13	1,2,4-TRIMETHYLBENZENE		8.4e-4	8.4e-5
05-DEC-2001	P1201.05	1,2,4-TRIMETHYLBENZENE		3.8e-4	3.8e-5
23-JUL-2001	P0701.23	1,2-DICHLOROETHANE		0.001	1.4e-4
29-JAN-2001	P0101.29	2-BUTANONE		0.006	6.1e-4
05-FEB-2001	P0201.05	2-BUTANONE		0.005	5.3e-4
28-FEB-2001	P0201.28	2-BUTANONE		0.007	6.7e-4
05-MAR-2001	P0301.05	2-BUTANONE		0.009	9.2e-4
25-APR-2001	P0401.25	2-BUTANONE		0.016	0.002
07-MAY-2001	P0501.07	2-BUTANONE		0.007	7.0e-4
14-MAY-2001	P0501.14	2-BUTANONE		0.009	9.2e-4
18-JUN-2001	P0601.18	2-BUTANONE		0.009	8.8e-4
26-JUN-2001	P0601.26	2-BUTANONE		0.01	0.001
17-JUL-2001	P0701.17	2-BUTANONE		0.008	8.3e-4
23-JUL-2001	P0701.23	2-BUTANONE		0.006	5.7e-4
01-AUG-2001	P0801.01	2-BUTANONE		0.008	8.1e-4
08-AUG-2001	P0801.08	2-BUTANONE		0.008	8.3e-4
14-AUG-2001	P0801.14	2-BUTANONE		0.007	6.9e-4
22-AUG-2001	P0801.22	2-BUTANONE		0.007	6.9e-4
28-AUG-2001	P0801.28	2-BUTANONE		0.009	9.0e-4
04-SEP-2001	P0901.04	2-BUTANONE		0.006	5.6e-4
17-SEP-2001	P0901.17	2-BUTANONE		0.007	6.9e-4
24-SEP-2001	P0901.24	2-BUTANONE		0.016	0.002
23-OCT-2001	P1001.23	2-BUTANONE		0.011	0.001
19-NOV-2001	P1101.19	2-BUTANONE		0.004	4.4e-4
27-NOV-2001	P1101.27	2-BUTANONE		0.006	5.8e-4
29-JAN-2001	P0101.29	4-METHYL-2-PENTANONE		0.007	7.1e-4
14-MAY-2001	P0501.14	4-METHYL-2-PENTANONE		0.005	4.5e-4
03-JUL-2001	P0701.03	4-METHYL-2-PENTANONE		0.005	5.3e-4
17-JUL-2001	P0701.17	4-METHYL-2-PENTANONE		0.005	4.7e-4
01-AUG-2001	P0801.01	4-METHYL-2-PENTANONE		0.008	8.3e-4
22-AUG-2001	P0801.22	4-METHYL-2-PENTANONE		0.008	7.7e-4
10-SEP-2001	P0901.10	4-METHYL-2-PENTANONE		0.008	8.5e-4
29-OCT-2001	P1001.29	4-METHYL-2-PENTANONE		0.002	2.3e-4
05-NOV-2001	P1101.05	4-METHYL-2-PENTANONE		0.001	1.0e-4
27-NOV-2001	P1101.27	4-METHYL-2-PENTANONE		0.006	5.5e-4
05-DEC-2001	P1201.05	4-METHYL-2-PENTANONE		0.002	1.6e-4
10-DEC-2001	P1201.10	4-METHYL-2-PENTANONE		0.03	0.003
05-FEB-2001	P0201.05	ACETONE		0.6	0.06
01-AUG-2001	P0801.01	ACETONE		1.7	0.17
04-OCT-2001	P1001.04	ACETONE		3.0	0.3
29-OCT-2001	P1001.29	ACETONE		0.28	0.028
05-NOV-2001	P1101.05	ACETONE		0.2	0.02

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RADIOACTIVE LIQUID WASTE
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VOC results by species for TA50 Plant Feed
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
13-NOV-2001	P1101.13	ACETONE		0.16	0.016
19-NOV-2001	P1101.19	ACETONE		0.31	0.031
27-NOV-2001	P1101.27	ACETONE		0.19	0.019
05-DEC-2001	P1201.05	ACETONE		0.18	0.018
10-DEC-2001	P1201.10	ACETONE		0.12	0.012
05-DEC-2001	P1201.05	BENZENE		6.1e-4	6.1e-5
05-DEC-2001	P1201.05	BROMODICHLOROMETHANE		2.4e-4	2.4e-5
28-AUG-2001	P0801.28	BROMOFORM		8.9e-4	8.9e-5
05-DEC-2001	P1201.05	BROMOFORM		5.2e-4	5.2e-5
01-AUG-2001	P0801.01	BROMOMETHANE		0.002	2.1e-4
05-NOV-2001	P1101.05	BROMOMETHANE		0.001	1.0e-4
14-MAY-2001	P0501.14	CARBON DISULFIDE		0.001	1.0e-4
05-DEC-2001	P1201.05	CHLORODIBROMOMETHANE		2.2e-4	2.2e-5
16-JAN-2001	P0101.16	CHLOROFORM		8.6e-4	8.6e-5
23-JAN-2001	P0101.23	CHLOROFORM		7.0e-4	7.0e-5
05-FEB-2001	P0201.05	CHLOROFORM		6.7e-4	6.7e-5
13-FEB-2001	P0201.13	CHLOROFORM		6.5e-4	6.5e-5
03-APR-2001	P0401.03	CHLOROFORM		0.001	1.4e-4
09-APR-2001	P0401.09	CHLOROFORM		0.002	1.8e-4
01-MAY-2001	P0501.01	CHLOROFORM		8.5e-4	8.5e-5
14-MAY-2001	P0501.14	CHLOROFORM		0.003	3.2e-4
23-MAY-2001	P0501.23	CHLOROFORM		0.001	1.1e-4
29-MAY-2001	P0501.29	CHLOROFORM		7.6e-4	7.6e-5
04-JUN-2001	P0601.04	CHLOROFORM		8.5e-4	8.5e-5
13-JUN-2001	P0601.13	CHLOROFORM		0.001	1.4e-4
26-JUN-2001	P0601.26	CHLOROFORM		9.7e-4	9.7e-5
03-JUL-2001	P0701.03	CHLOROFORM		7.9e-4	7.9e-5
17-JUL-2001	P0701.17	CHLOROFORM		7.8e-4	7.8e-5
08-AUG-2001	P0801.08	CHLOROFORM		0.002	1.8e-4
28-AUG-2001	P0801.28	CHLOROFORM		0.001	1.3e-4
24-SEP-2001	P0901.24	CHLOROFORM		0.002	1.9e-4
04-OCT-2001	P1001.04	CHLOROFORM		0.002	2.1e-4
10-OCT-2001	P1001.10	CHLOROFORM		0.002	2.4e-4
15-OCT-2001	P1001.15	CHLOROFORM		8.6e-4	8.6e-5
23-OCT-2001	P1001.23	CHLOROFORM		0.001	1.4e-4
27-NOV-2001	P1101.27	CHLOROFORM		0.002	1.6e-4
05-DEC-2001	P1201.05	CHLOROFORM		0.002	1.7e-4
10-DEC-2001	P1201.10	CHLOROFORM		0.001	1.4e-4
18-JUN-2001	P0601.18	CHLOROMETHANE		0.001	1.0e-4
17-JUL-2001	P0701.17	CHLOROMETHANE		7.8e-4	7.8e-5
10-SEP-2001	P0901.10	CHLOROMETHANE		0.001	1.2e-4
23-OCT-2001	P1001.23	CHLOROMETHANE		0.003	2.6e-4
05-NOV-2001	P1101.05	CHLOROMETHANE		0.001	1.3e-4
19-NOV-2001	P1101.19	CHLOROMETHANE		2.9e-4	2.9e-5
27-NOV-2001	P1101.27	CHLOROMETHANE		4.5e-4	4.5e-5
10-DEC-2001	P1201.10	CHLOROMETHANE		7.8e-4	7.8e-5
27-NOV-2001	P1101.27	IODOMETHANE		0.001	1.4e-4
02-JAN-2001	P0101.02	METHYLENE CHLORIDE		0.002	1.5e-4
23-JAN-2001	P0101.23	METHYLENE CHLORIDE		0.002	2.2e-4
29-JAN-2001	P0101.29	METHYLENE CHLORIDE		0.002	2.5e-4

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

VOC results by species for TA50 Plant Feed

01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
05-FEB-2001	P0201.05	METHYLENE CHLORIDE		0.001	1.1e-4
20-FEB-2001	P0201.20	METHYLENE CHLORIDE		0.002	1.9e-4
[illegible]-FEB-2001	P0201.28	METHYLENE CHLORIDE		0.002	1.7e-4
20-MAR-2001	P0301.20	METHYLENE CHLORIDE		0.006	5.6e-4
26-MAR-2001	P0301.26	METHYLENE CHLORIDE		0.003	2.9e-4
03-APR-2001	P0401.03	METHYLENE CHLORIDE		0.002	1.9e-4
09-APR-2001	P0401.09	METHYLENE CHLORIDE		0.002	1.8e-4
01-MAY-2001	P0501.01	METHYLENE CHLORIDE		0.007	7.1e-4
07-MAY-2001	P0501.07	METHYLENE CHLORIDE		0.015	0.002
14-MAY-2001	P0501.14	METHYLENE CHLORIDE		0.004	3.6e-4
29-MAY-2001	P0501.29	METHYLENE CHLORIDE		0.005	5.1e-4
09-JUL-2001	P0701.09	METHYLENE CHLORIDE		0.014	0.001
23-JUL-2001	P0701.23	METHYLENE CHLORIDE		0.005	5.0e-4
01-AUG-2001	P0801.01	METHYLENE CHLORIDE		0.001	1.4e-4
08-AUG-2001	P0801.08	METHYLENE CHLORIDE		0.004	3.5e-4
14-AUG-2001	P0801.14	METHYLENE CHLORIDE		0.005	4.8e-4
10-SEP-2001	P0901.10	METHYLENE CHLORIDE		0.031	0.003
13-NOV-2001	P1101.13	METHYLENE CHLORIDE		7.2e-4	7.2e-5
05-DEC-2001	P1201.05	METHYLENE CHLORIDE		3.4e-4	3.4e-5
29-JAN-2001	P0101.29	TOLUENE		0.004	4.4e-4
25-APR-2001	P0401.25	TOLUENE		0.002	2.1e-4
22-AUG-2001	P0801.22	TOLUENE		5.2e-4	5.2e-5
24-SEP-2001	P0901.24	TOLUENE		5.1e-4	5.1e-5
29-OCT-2001	P1001.29	TOLUENE		3.1e-4	3.1e-5
05-NOV-2001	P1101.05	TOLUENE		3.1e-4	3.1e-5
19-NOV-2001	P1101.19	TOLUENE		3.7e-4	3.7e-5
27-NOV-2001	P1101.27	TOLUENE		2.6e-4	2.6e-5
05-DEC-2001	P1201.05	TOLUENE		2.7e-4	2.7e-5
29-OCT-2001	P1001.29	XYLENES (TOTAL)		8.1e-4	8.1e-5

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by species for TA50 Plant Feed
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
09-JAN-2001	P0101.09	2-CHLOROPHENOL		0.006	5.7e-4
05-FEB-2001	P0201.05	2-CHLOROPHENOL		0.009	9.1e-4
20-MAR-2001	P0301.20	2-CHLOROPHENOL		0.004	3.9e-4
26-MAR-2001	P0301.26	2-CHLOROPHENOL		0.007	6.6e-4
17-APR-2001	P0401.17	2-CHLOROPHENOL		0.009	9.0e-4
23-JAN-2001	P0101.23	2-NITROPHENOL		0.004	3.6e-4
01-AUG-2001	P0801.01	2-NITROPHENOL		0.007	7.2e-4
08-AUG-2001	P0801.08	2-NITROPHENOL		0.004	4.1e-4
14-AUG-2001	P0801.14	2-NITROPHENOL		0.002	1.9e-4
04-OCT-2001	P1001.04	2-NITROPHENOL		0.007	6.6e-4
10-OCT-2001	P1001.10	2-NITROPHENOL		0.004	4.0e-4
15-OCT-2001	P1001.15	2-NITROPHENOL		0.003	3.0e-4
10-DEC-2001	P1201.10	4-CHLOROANILINE		0.002	2.5e-4
23-JAN-2001	P0101.23	4-NITROPHENOL		0.005	4.9e-4
13-JUN-2001	P0601.13	4-NITROPHENOL		0.003	3.2e-4
01-AUG-2001	P0801.01	4-NITROPHENOL		0.009	9.3e-4
04-OCT-2001	P1001.04	4-NITROPHENOL		0.006	6.2e-4
23-JAN-2001	P0101.23	BENZOIC ACID		0.005	4.6e-4
20-MAR-2001	P0301.20	BENZOIC ACID		0.002	2.5e-4
25-APR-2001	P0401.25	BENZOIC ACID		0.02	0.002
01-MAY-2001	P0501.01	BENZOIC ACID		0.015	0.002
13-JUN-2001	P0601.13	BENZOIC ACID		0.033	0.003
18-JUN-2001	P0601.18	BENZOIC ACID		0.018	0.002
26-JUN-2001	P0601.26	BENZOIC ACID		0.047	0.005
03-JUL-2001	P0701.03	BENZOIC ACID		0.023	0.002
09-JUL-2001	P0701.09	BENZOIC ACID		0.024	0.002
17-JUL-2001	P0701.17	BENZOIC ACID		0.033	0.003
23-JUL-2001	P0701.23	BENZOIC ACID		0.011	0.001
08-AUG-2001	P0801.08	BENZOIC ACID		0.057	0.006
28-AUG-2001	P0801.28	BENZOIC ACID		0.022	0.002
04-SEP-2001	P0901.04	BENZOIC ACID		0.012	0.001
10-SEP-2001	P0901.10	BENZOIC ACID		0.022	0.002
29-OCT-2001	P1001.29	BENZOIC ACID		0.004	3.7e-4
05-NOV-2001	P1101.05	BENZOIC ACID		0.003	3.2e-4
13-NOV-2001	P1101.13	BENZOIC ACID		0.014	0.001
19-NOV-2001	P1101.19	BENZOIC ACID		0.039	0.004
27-NOV-2001	P1101.27	BENZOIC ACID		0.016	0.002
10-DEC-2001	P1201.10	BENZOIC ACID		0.01	9.5e-4
13-JUN-2001	P0601.13	BENZYL ALCOHOL		0.006	6.4e-4
18-JUN-2001	P0601.18	BENZYL ALCOHOL		0.002	2.3e-4
26-JUN-2001	P0601.26	BENZYL ALCOHOL		0.005	4.5e-4
03-JUL-2001	P0701.03	BENZYL ALCOHOL		0.003	3.0e-4
08-AUG-2001	P0801.08	BENZYL ALCOHOL		0.006	5.6e-4
14-AUG-2001	P0801.14	BENZYL ALCOHOL		0.003	2.7e-4
10-SEP-2001	P0901.10	BENZYL ALCOHOL		0.001	1.4e-4
17-SEP-2001	P0901.17	BENZYL ALCOHOL		0.001	1.3e-4
10-OCT-2001	P1001.10	BENZYL ALCOHOL		0.002	2.2e-4
02-JAN-2001	P0101.02	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.6e-4
09-JAN-2001	P0101.09	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.6e-4
23-JAN-2001	P0101.23	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.1e-4

SVOC results by species for TA50 Plant Feed
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
29-JAN-2001	P0101.29	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.7e-4
05-FEB-2001	P0201.05	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.0e-4
20-FEB-2001	P0201.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	2.8e-4
13-MAR-2001	P0301.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.0e-4
20-MAR-2001	P0301.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.009	8.6e-4
03-APR-2001	P0401.03	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	7.1e-4
09-APR-2001	P0401.09	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	5.9e-4
17-APR-2001	P0401.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.1e-4
01-MAY-2001	P0501.01	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.5e-4
14-MAY-2001	P0501.14	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.1e-4
29-MAY-2001	P0501.29	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.6e-4
13-JUN-2001	P0601.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.009	9.1e-4
26-JUN-2001	P0601.26	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.0e-4
17-JUL-2001	P0701.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.3e-4
08-AUG-2001	P0801.08	BIS(2-ETHYLHEXYL)PHTHALATE		0.016	0.002
14-AUG-2001	P0801.14	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.8e-4
22-AUG-2001	P0801.22	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	3.2e-4
28-AUG-2001	P0801.28	BIS(2-ETHYLHEXYL)PHTHALATE		0.004	3.7e-4
24-SEP-2001	P0901.24	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.0e-4
04-OCT-2001	P1001.04	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	5.9e-4
10-OCT-2001	P1001.10	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.1e-4
13-NOV-2001	P1101.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.017	0.002
19-NOV-2001	P1101.19	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.0e-4
27-NOV-2001	P1101.27	BIS(2-ETHYLHEXYL)PHTHALATE		0.018	0.002
10-DEC-2001	P1201.10	BIS(2-ETHYLHEXYL)PHTHALATE		0.036	0.004
28-FEB-2001	P0201.28	DI-N-OCTYL PHTHALATE		0.002	1.6e-4
05-MAR-2001	P0301.05	DI-N-OCTYL PHTHALATE		0.002	1.7e-4
15-OCT-2001	P1001.15	DI-N-OCTYL PHTHALATE		0.001	1.2e-4
23-OCT-2001	P1001.23	DI-N-OCTYL PHTHALATE		0.002	2.1e-4
13-FEB-2001	P0201.13	DIETHYL PHTHALATE		0.002	2.0e-4
17-APR-2001	P0401.17	DIETHYL PHTHALATE		0.002	2.2e-4
01-MAY-2001	P0501.01	DIETHYL PHTHALATE		0.001	1.2e-4
04-JUN-2001	P0601.04	DIETHYL PHTHALATE		0.003	2.6e-4
13-JUN-2001	P0601.13	DIETHYL PHTHALATE		0.005	5.0e-4
18-JUN-2001	P0601.18	DIETHYL PHTHALATE		0.001	1.3e-4
26-JUN-2001	P0601.26	DIETHYL PHTHALATE		0.003	2.6e-4
17-JUL-2001	P0701.17	DIETHYL PHTHALATE		0.003	2.7e-4
01-AUG-2001	P0801.01	DIETHYL PHTHALATE		0.003	2.8e-4
08-AUG-2001	P0801.08	DIETHYL PHTHALATE		0.003	2.9e-4
14-AUG-2001	P0801.14	DIETHYL PHTHALATE		0.003	3.3e-4
22-AUG-2001	P0801.22	DIETHYL PHTHALATE		0.002	2.5e-4
28-AUG-2001	P0801.28	DIETHYL PHTHALATE		0.002	1.9e-4
10-SEP-2001	P0901.10	DIETHYL PHTHALATE		0.002	1.8e-4
04-OCT-2001	P1001.04	DIETHYL PHTHALATE		0.002	2.3e-4
15-OCT-2001	P1001.15	DIETHYL PHTHALATE		0.002	1.7e-4
29-OCT-2001	P1001.29	DIETHYL PHTHALATE		0.003	2.6e-4
13-NOV-2001	P1101.13	DIETHYL PHTHALATE		0.002	2.5e-4
29-MAY-2001	P0501.29	N-NITROSODIMETHYLAMINE		0.003	3.1e-4
09-JAN-2001	P0101.09	PHENOL		0.005	4.9e-4
16-JAN-2001	P0101.16	PHENOL		0.006	5.6e-4

RADIOACTIVE LIQUID WASTE
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SVOC results by species for TA50 Plant Feed
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
05-FEB-2001	P0201.05	PHENOL		0.003	3.4e-4
13-FEB-2001	P0201.13	PHENOL		0.004	4.4e-4
28-FEB-2001	P0201.28	PHENOL		0.007	6.5e-4
05-MAR-2001	P0301.05	PHENOL		0.006	5.5e-4
20-MAR-2001	P0301.20	PHENOL		0.003	2.7e-4
26-MAR-2001	P0301.26	PHENOL		0.008	8.1e-4
13-JUN-2001	P0601.13	PHENOL		0.004	4.4e-4
01-AUG-2001	P0801.01	PHENOL		0.002	1.9e-4
04-SEP-2001	P0901.04	PHENOL		0.001	1.3e-4
10-SEP-2001	P0901.10	PHENOL		0.002	2.3e-4
24-SEP-2001	P0901.24	PHENOL		0.01	0.001
10-OCT-2001	P1001.10	PHENOL		0.002	1.9e-4
15-OCT-2001	P1001.15	PHENOL		0.008	7.5e-4
23-OCT-2001	P1001.23	PHENOL		0.019	0.002
13-MAR-2001	P0301.13	PYRIDINE		0.007	6.8e-4
09-APR-2001	P0401.09	PYRIDINE		0.008	8.2e-4
10-SEP-2001	P0901.10	PYRIDINE		0.008	7.9e-4
17-SEP-2001	P0901.17	PYRIDINE		0.007	6.9e-4
15-OCT-2001	P1001.15	PYRIDINE		0.001	1.3e-4

Appendix D.3

VOC and SVOC Results by Sample for TA-50 Plant Feed

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by sample for TA50 Plant Feed
01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species	Concentration (mg/l)	Uncertainty (mg/l)
05-NOV-2001	P1101.05	TOLUENE	3.1e-4	3.1e-5
13-NOV-2001	P1101.13	1,2,4-TRIMETHYLBENZENE	8.4e-4	8.4e-5
13-NOV-2001	P1101.13	ACETONE	0.16	0.016
13-NOV-2001	P1101.13	METHYLENE CHLORIDE	7.2e-4	7.2e-5
19-NOV-2001	P1101.19	2-BUTANONE	0.004	4.4e-4
19-NOV-2001	P1101.19	ACETONE	0.31	0.031
19-NOV-2001	P1101.19	CHLOROMETHANE	2.9e-4	2.9e-5
19-NOV-2001	P1101.19	TOLUENE	3.7e-4	3.7e-5
27-NOV-2001	P1101.27	2-BUTANONE	0.006	5.8e-4
27-NOV-2001	P1101.27	4-METHYL-2-PENTANONE	0.006	5.5e-4
27-NOV-2001	P1101.27	ACETONE	0.19	0.019
27-NOV-2001	P1101.27	CHLOROFORM	0.002	1.6e-4
27-NOV-2001	P1101.27	CHLOROMETHANE	4.5e-4	4.5e-5
27-NOV-2001	P1101.27	IODOMETHANE	0.001	1.4e-4
27-NOV-2001	P1101.27	TOLUENE	2.6e-4	2.6e-5
05-DEC-2001	P1201.05	1,2,4-TRIMETHYLBENZENE	3.8e-4	3.8e-5
05-DEC-2001	P1201.05	4-METHYL-2-PENTANONE	0.002	1.6e-4
05-DEC-2001	P1201.05	ACETONE	0.18	0.018
05-DEC-2001	P1201.05	BENZENE	6.1e-4	6.1e-5
05-DEC-2001	P1201.05	BROMODICHLOROMETHANE	2.4e-4	2.4e-5
05-DEC-2001	P1201.05	BROMOFORM	5.2e-4	5.2e-5
05-DEC-2001	P1201.05	CHLORODIBROMOMETHANE	2.2e-4	2.2e-5
05-DEC-2001	P1201.05	CHLOROFORM	0.002	1.7e-4
05-DEC-2001	P1201.05	METHYLENE CHLORIDE	3.4e-4	3.4e-5
05-DEC-2001	P1201.05	TOLUENE	2.7e-4	2.7e-5
10-DEC-2001	P1201.10	4-METHYL-2-PENTANONE	0.03	0.003
10-DEC-2001	P1201.10	ACETONE	0.12	0.012
10-DEC-2001	P1201.10	CHLOROFORM	0.001	1.4e-4
10-DEC-2001	P1201.10	CHLOROMETHANE	7.8e-4	7.8e-5

RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

SVOC results by sample for TA50 Plant Feed

01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
02-JAN-2001	P0101.02	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.6e-4
09-JAN-2001	P0101.09	2-CHLOROPHENOL		0.006	5.7e-4
09-JAN-2001	P0101.09	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.6e-4
09-JAN-2001	P0101.09	PHENOL		0.005	4.9e-4
16-JAN-2001	P0101.16	PHENOL		0.006	5.6e-4
23-JAN-2001	P0101.23	2-NITROPHENOL		0.004	3.6e-4
23-JAN-2001	P0101.23	4-NITROPHENOL		0.005	4.9e-4
23-JAN-2001	P0101.23	BENZOIC ACID		0.005	4.6e-4
23-JAN-2001	P0101.23	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.1e-4
29-JAN-2001	P0101.29	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.7e-4
05-FEB-2001	P0201.05	2-CHLOROPHENOL		0.009	9.1e-4
05-FEB-2001	P0201.05	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.0e-4
05-FEB-2001	P0201.05	PHENOL		0.003	3.4e-4
13-FEB-2001	P0201.13	DIETHYL PHTHALATE		0.002	2.0e-4
13-FEB-2001	P0201.13	PHENOL		0.004	4.4e-4
20-FEB-2001	P0201.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	2.8e-4
28-FEB-2001	P0201.28	DI-N-OCTYL PHTHALATE		0.002	1.6e-4
28-FEB-2001	P0201.28	PHENOL		0.007	6.5e-4
05-MAR-2001	P0301.05	DI-N-OCTYL PHTHALATE		0.002	1.7e-4
05-MAR-2001	P0301.05	PHENOL		0.006	5.5e-4
13-MAR-2001	P0301.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.0e-4
13-MAR-2001	P0301.13	PYRIDINE		0.007	6.8e-4
20-MAR-2001	P0301.20	2-CHLOROPHENOL		0.004	3.9e-4
20-MAR-2001	P0301.20	BENZOIC ACID		0.002	2.5e-4
20-MAR-2001	P0301.20	BIS(2-ETHYLHEXYL)PHTHALATE		0.009	8.6e-4
20-MAR-2001	P0301.20	PHENOL		0.003	2.7e-4
26-MAR-2001	P0301.26	2-CHLOROPHENOL		0.007	6.6e-4
26-MAR-2001	P0301.26	PHENOL		0.008	8.1e-4
03-APR-2001	P0401.03	BIS(2-ETHYLHEXYL)PHTHALATE		0.007	7.1e-4
09-APR-2001	P0401.09	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	5.9e-4
09-APR-2001	P0401.09	PYRIDINE		0.008	8.2e-4
17-APR-2001	P0401.17	2-CHLOROPHENOL		0.009	9.0e-4
17-APR-2001	P0401.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	5.1e-4
17-APR-2001	P0401.17	DIETHYL PHTHALATE		0.002	2.2e-4
25-APR-2001	P0401.25	BENZOIC ACID		0.02	0.002
01-MAY-2001	P0501.01	BENZOIC ACID		0.015	0.002
01-MAY-2001	P0501.01	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.5e-4
01-MAY-2001	P0501.01	DIETHYL PHTHALATE		0.001	1.2e-4
14-MAY-2001	P0501.14	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.1e-4
29-MAY-2001	P0501.29	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.6e-4
29-MAY-2001	P0501.29	N-NITROSODIMETHYLAMINE		0.003	3.1e-4
04-JUN-2001	P0601.04	DIETHYL PHTHALATE		0.003	2.6e-4
13-JUN-2001	P0601.13	4-NITROPHENOL		0.003	3.2e-4
13-JUN-2001	P0601.13	BENZOIC ACID		0.033	0.003
13-JUN-2001	P0601.13	BENZYL ALCOHOL		0.006	6.4e-4
13-JUN-2001	P0601.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.009	9.1e-4
13-JUN-2001	P0601.13	DIETHYL PHTHALATE		0.005	5.0e-4
13-JUN-2001	P0601.13	PHENOL		0.004	4.4e-4
18-JUN-2001	P0601.18	BENZOIC ACID		0.018	0.002
18-JUN-2001	P0601.18	BENZYL ALCOHOL		0.002	2.3e-4

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by sample for TA50 Plant Feed
01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
18-JUN-2001	P0601.18	DIETHYL PHTHALATE		0.001	1.3e-4
26-JUN-2001	P0601.26	BENZOIC ACID		0.047	0.005
26-JUN-2001	P0601.26	BENZYL ALCOHOL		0.005	4.5e-4
26-JUN-2001	P0601.26	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.0e-4
26-JUN-2001	P0601.26	DIETHYL PHTHALATE		0.003	2.6e-4
03-JUL-2001	P0701.03	BENZOIC ACID		0.023	0.002
03-JUL-2001	P0701.03	BENZYL ALCOHOL		0.003	3.0e-4
09-JUL-2001	P0701.09	BENZOIC ACID		0.024	0.002
17-JUL-2001	P0701.17	BENZOIC ACID		0.033	0.003
17-JUL-2001	P0701.17	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.3e-4
17-JUL-2001	P0701.17	DIETHYL PHTHALATE		0.003	2.7e-4
23-JUL-2001	P0701.23	BENZOIC ACID		0.011	0.001
01-AUG-2001	P0801.01	2-NITROPHENOL		0.007	7.2e-4
01-AUG-2001	P0801.01	4-NITROPHENOL		0.009	9.3e-4
01-AUG-2001	P0801.01	DIETHYL PHTHALATE		0.003	2.8e-4
01-AUG-2001	P0801.01	PHENOL		0.002	1.9e-4
08-AUG-2001	P0801.08	2-NITROPHENOL		0.004	4.1e-4
08-AUG-2001	P0801.08	BENZOIC ACID		0.057	0.006
08-AUG-2001	P0801.08	BENZYL ALCOHOL		0.006	5.6e-4
08-AUG-2001	P0801.08	BIS(2-ETHYLHEXYL)PHTHALATE		0.016	0.002
08-AUG-2001	P0801.08	DIETHYL PHTHALATE		0.003	2.9e-4
14-AUG-2001	P0801.14	2-NITROPHENOL		0.002	1.9e-4
14-AUG-2001	P0801.14	BENZYL ALCOHOL		0.003	2.7e-4
14-AUG-2001	P0801.14	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	7.8e-4
14-AUG-2001	P0801.14	DIETHYL PHTHALATE		0.003	3.3e-4
22-AUG-2001	P0801.22	BIS(2-ETHYLHEXYL)PHTHALATE		0.003	3.2e-4
22-AUG-2001	P0801.22	DIETHYL PHTHALATE		0.002	2.5e-4
28-AUG-2001	P0801.28	BENZOIC ACID		0.022	0.002
28-AUG-2001	P0801.28	BIS(2-ETHYLHEXYL)PHTHALATE		0.004	3.7e-4
28-AUG-2001	P0801.28	DIETHYL PHTHALATE		0.002	1.9e-4
04-SEP-2001	P0901.04	BENZOIC ACID		0.012	0.001
04-SEP-2001	P0901.04	PHENOL		0.001	1.3e-4
10-SEP-2001	P0901.10	BENZOIC ACID		0.022	0.002
10-SEP-2001	P0901.10	BENZYL ALCOHOL		0.001	1.4e-4
10-SEP-2001	P0901.10	DIETHYL PHTHALATE		0.002	1.8e-4
10-SEP-2001	P0901.10	PHENOL		0.002	2.3e-4
10-SEP-2001	P0901.10	PYRIDINE		0.008	7.9e-4
17-SEP-2001	P0901.17	BENZYL ALCOHOL		0.001	1.3e-4
17-SEP-2001	P0901.17	PYRIDINE		0.007	6.9e-4
24-SEP-2001	P0901.24	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.0e-4
24-SEP-2001	P0901.24	PHENOL		0.01	0.001
04-OCT-2001	P1001.04	2-NITROPHENOL		0.007	6.6e-4
04-OCT-2001	P1001.04	4-NITROPHENOL		0.006	6.2e-4
04-OCT-2001	P1001.04	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	5.9e-4
04-OCT-2001	P1001.04	DIETHYL PHTHALATE		0.002	2.3e-4
10-OCT-2001	P1001.10	2-NITROPHENOL		0.004	4.0e-4
10-OCT-2001	P1001.10	BENZYL ALCOHOL		0.002	2.2e-4
10-OCT-2001	P1001.10	BIS(2-ETHYLHEXYL)PHTHALATE		0.006	6.1e-4
10-OCT-2001	P1001.10	PHENOL		0.002	1.9e-4
15-OCT-2001	P1001.15	2-NITROPHENOL		0.003	3.0e-4

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by sample for TA50 Plant Feed
01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
15-OCT-2001	P1001.15	DI-N-OCTYL PHTHALATE		0.001	1.2e-4
15-OCT-2001	P1001.15	DIETHYL PHTHALATE		0.002	1.7e-4
15-OCT-2001	P1001.15	PHENOL		0.008	7.5e-4
15-OCT-2001	P1001.15	PYRIDINE		0.001	1.3e-4
23-OCT-2001	P1001.23	DI-N-OCTYL PHTHALATE		0.002	2.1e-4
23-OCT-2001	P1001.23	PHENOL		0.019	0.002
29-OCT-2001	P1001.29	BENZOIC ACID		0.004	3.7e-4
29-OCT-2001	P1001.29	DIETHYL PHTHALATE		0.003	2.6e-4
05-NOV-2001	P1101.05	BENZOIC ACID		0.003	3.2e-4
13-NOV-2001	P1101.13	BENZOIC ACID		0.014	0.001
13-NOV-2001	P1101.13	BIS(2-ETHYLHEXYL)PHTHALATE		0.017	0.002
13-NOV-2001	P1101.13	DIETHYL PHTHALATE		0.002	2.5e-4
19-NOV-2001	P1101.19	BENZOIC ACID		0.039	0.004
19-NOV-2001	P1101.19	BIS(2-ETHYLHEXYL)PHTHALATE		0.008	8.0e-4
27-NOV-2001	P1101.27	BENZOIC ACID		0.016	0.002
27-NOV-2001	P1101.27	BIS(2-ETHYLHEXYL)PHTHALATE		0.018	0.002
10-DEC-2001	P1201.10	4-CHLOROANILINE		0.002	2.5e-4
10-DEC-2001	P1201.10	BENZOIC ACID		0.01	9.5e-4
10-DEC-2001	P1201.10	BIS(2-ETHYLHEXYL)PHTHALATE		0.036	0.004

Appendix D.4

VOC and SVOC Results for TA-21 Plant

RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by species for TA21
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
03-JUL-2001	DP0701.03	1,2,4-TRIMETHYLBENZENE		0.002	1.8e-4
04-JAN-2001	DP0101.04	2-BUTANONE		0.01	0.001
16-MAY-2001	DP0501.16	METHYLENE CHLORIDE		0.005	5.0e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by species for TA21
01-JAN-2001 through 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
03-JUL-2001	DP0701.03	BENZOIC ACID		0.003	2.8e-4
04-JAN-2001	DP0101.04	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.6e-4
03-JUL-2001	DP0701.03	BIS(2-ETHYLHEXYL)PHTHALATE		0.009	9.2e-4
03-JUL-2001	DP0701.03	FLUORANTHENE		0.001	1.3e-4
03-JUL-2001	DP0701.03	PHENOL		0.003	3.1e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

VOC results by sample for TA21
01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2001	DP0101.04	2-BUTANONE		0.01	0.001
16-MAY-2001	DP0501.16	METHYLENE CHLORIDE		0.005	5.0e-4
03-JUL-2001	DP0701.03	1,2,4-TRIMETHYLBENZENE		0.002	1.8e-4

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RADIOACTIVE LIQUID WASTE
TREATMENT FACILITY

SVOC results by sample for TA21
01-JAN-2001 - 31-DEC-2001

Sample Date	Sample Number	Species		Concentration (mg/l)	Uncertainty (mg/l)
04-JAN-2001	DP0101.04	BIS(2-ETHYLHEXYL)PHTHALATE		0.005	4.6e-4
03-JUL-2001	DP0701.03	BENZOIC ACID		0.003	2.8e-4
03-JUL-2001	DP0701.03	BIS(2-ETHYLHEXYL)PHTHALATE		0.009	9.2e-4
03-JUL-2001	DP0701.03	FLUORANTHENE		0.001	1.3e-4
03-JUL-2001	DP0701.03	PHENOL		0.003	3.1e-4

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Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Water Quality & Hydrology Group (RRES-WQH)
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
(505) 667-7969/Fax: (505) 665-9344

Date: April 24, 2002
Refer to: RRES-WQH: 02-159

Mr. Curt Frischkorn
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, FIRST QUARTER 2002

Dear Mr. Frischkorn:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period January 1 through March 31, 2002. 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.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate/nitrite (NO3/NO2-N), fluoride (F), and total dissolved solids (TDS). No samples were collected from alluvial well MCO-4B; there was not sufficient water in MCO-4B to prepare a sample (i.e., the well was dry). During March 2002, the Laboratory installed new bladder pumps in alluvial monitoring wells MCO-3, MCO-4B, MCO-6, and MCO-7. Problems were encountered during pump installation at MCO-6 that delayed sampling until the first week of April 2002.

In January 2002, you asked the Laboratory to add perchlorate (ClO_4) monitoring to the quarterly sampling conducted at Mortandad Canyon alluvial wells MCO-3, MCO-4B, MCO-6, and MCO-7 (letter, Curt Frischkorn, NMED, to Bob Beers, LANL, January 16, 2002). Samples were collected per your request with the exception of MCO-4B (dry well). Perchlorate (ClO_4) concentrations at MCO-3, MCO-6, and MCO-7 were 78.4 ppb, 83.2 ppb, and 128 ppb, respectively. These results have also been summarized in Attachment 1.0, Table 1.0.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the first quarter were below NM WQCC Regulation 3103 standards for nitrate/nitrite (NO3/NO2-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrate/nitrite (NO3/NO2-N) in the RLWTF's effluent was 3.23 mg/L. General Engineering Laboratories, Charleston, SC, performed all analyses.

In addition to weekly composite sampling, the RLWTF also conducts operational screening for nitrates (NO3-N) in each batch of effluent. All first quarter samples were analyzed by ion chromatography (IC); the HACH™ test kit previously used was replaced by the IC method in November 2001. No screening samples were collected in February 2002 due to a plug in the sample collection line. Operational screening of effluent samples collected during January and March 2002 produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 3.5 mg/L, 0.2 mg/L, and 1.11 mg/L.

On March 26, 2002, the RLWTF began operating the Ion Exchange (IX) columns for perchlorate removal. On that day, approximately 2,000 gallons of treated water was processed through the IX columns; the concentration of perchlorate in was 230 ppb and the concentration of perchlorate out was <4 ppb (Method Detection Limit=1 ppb, Reporting Limit=4 ppb). Perchlorate concentrations in the RLWTF's effluent will be reported to your agency each month by copy of the Laboratory's DCG (Derived Concentration Guides) Report submitted to the Department of Energy.

Please contact me at 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/tml

Attachments: a/s

Cy: W. Strickley, USEPA, Region 6, Dallas, Texas, w/att.
J. Bearzi, NMED-HRMB, Santa Fe, New Mexico, w/att.
J. Davis, NMED-SWQB, Santa Fe, New Mexico, w/att.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
J. Vozella, DOE/OLASO, w/att., MS A316
G. Turner, DOE/OLASO, w/att., MS A316
J. Holt, ADO, w/att., MS A104
B. Stine, ADO, w/att., MS A104

Cy (continued):
T. Stanford, FWO-DO, w/att., MS K492
D. Mclain, FWO-WFM, w/att., MS J593
R. Alexander, FWO-WFM, w/att., MS E518
D. Moss, FWO-WFM, w/att., MS E518
P. Worland, FWO-WFM, w/att., MS E518
B. Ramsey, RRES-DO, w/att., MS J591
K. Hargis, RRES-DO, w/att., MS J591
D. Stavert, RRES-DO, w/att., MS J978
S. Rae, RRES-WQH, w/att., MS K497
D. Rogers, RRES-WQH, w/att., MS K497
M. Saladen, RRES-WQH, w/att., MS K497
RRES-WQH File, w/att., MS K497
IM-5, w/att., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Wells Analytical Results, 1st Quarter, 2002.

Sampling Location	Sample Date	Perchlorate (ug/L)	NO3/NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	3/28/02	78.4	7.70	0.390	<0.0235	417	0.612
MCO-4B	NS	NS	NS	NS	NS	NS	NS
MCO-6	4/8/02[1]	83.2	2.78	0.310	<0.0235	346	1.31
MCO-7	3/27/02	128	4.90	0.240	<0.0235	337	1.34
NM WQCC 3103. Ground Water Standards (mg/L)			*10.0*			*1000*	*1.6*

Notes:
[1]Problems during the installation of a new bladder pump at this well delayed sampling into the 2nd quarter.
NS means that no sample was collected at this well because there was not sufficient water in the well.
All analyses by General Engineering Laboratories, Charleston, SC.

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 1st Quarter, 2002.

Monitoring Period	Sample Date	RLWTF Weekly Effluent Monitoring Analytical Results (mg/L)		
		NO3/NO2 (as-N)	Fluoride	TDS
JANUARY	1/2/02	1.28	0.44	146
	1/9/02	1.77	0.85	392
	1/14/02	2.71	1.22	768
	1/22/02	4.20	1.17	751
	1/29/02	7.95	1.07	784
FEBRUARY	2/5/02	4.20	0.98	716
	2/12/02	2.39	0.48	359
	2/19/02	1.84	0.42	243
	2/26/02	3.45	0.60	322
MARCH	3/6/02	2.95	0.61	313
	3/12/02	2.56	0.558	292
	3/18/02	3.51	0.434	270
	3/29/02	pending[1]	pending[1]	pending[1]
1st Quarter Averages (mg/L)		**3.23**	**0.74**	**446**
NM WQCC 3103. Ground Water Standards (mg/L)		*10.0*	*1.6*	*1000*

Notes:
[1]Results for these analyses are pending and will be reported in the 2nd Quarter DP-1132 Report.

Los Alamos
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Date: July 25, 2002
Refer to: RRES-WQH: 02-279

Mr. Curt Frischkorn
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132), QUARTERLY REPORT, SECOND QUARTER 2002

Dear Mr. Frischkorn:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period April 1 through June 30, 2002. 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.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells. All of the analytical results from MCO-3, MCO-5, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate/nitrite (NO3/NO2-N), fluoride (F), and total dissolved solids (TDS). Alluvial well MCO-5 was substituted for well MCO-4B during this quarter because MCO-4B has not had sufficient water for sampling since May 2001. MCO-4B will be sampled next quarter if sufficient water is present. MCO-5 is adjacent to TW-8 and approximately 1500 feet down gradient from MCO-4B.

In January 2002, you asked the Laboratory to add perchlorate (ClO_4) monitoring to the quarterly sampling conducted at Mortandad Canyon alluvial wells MCO-3, MCO-4B, MCO-6, and MCO-7 (letter, Curt Frischkorn, NMED, to Bob Beers, LANL, January 16, 2002). Per your request, perchlorate (ClO_4) results from sampling conducted at MCO-3, MCO-5 (substituted this quarter for MCO-4B), MCO-6, and MCO-7 are 36.9 ppb, 99.8 ppb, 96.2 ppb, and 137 ppb, respectively. These results have also been summarized in Attachment 1.0, Table 1.0.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the first quarter were below NM WQCC Regulation 3103 standards for nitrate/nitrite (NO3/NO2-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrate/nitrite in the RLWTF's effluent was 1.32 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening for nitrates (NO3-N) in each batch of effluent. All samples were analyzed by ion chromatography (IC). Operational screening of effluent samples collected during April, May, and June 2002, produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 1.9 mg/L, 0.08 mg/L, and 0.16 mg/L.

Please contact me at 667-7969 if you would like additional information regarding this quarterly report.

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/am

Attachments: a/s

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G. Turner, DOE/OLASO, w/att., MS A316
B. Stine, ADO, w/att., MS A104
T. Stanford, FWO-DO, w/att., MS K492
D. Mclain, FWO-WFM, w/att., MS J593
R. Alexander, FWO-WFM, w/att., MS E518
D. Moss, FWO-WFM, w/att., MS E518
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M. Saladen, RRES-WQH, w/att., MS K497
RRES-WQH File, w/att., MS K497
IM-5, w/att., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Wells Analytical Results, 2nd Quarter, 2002.

Sampling Location	Sample Date	Perchlorate (ug/L)	NO3/NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	5/1/02	36.9	4.75	<0.06	<0.0235	331	0.71
MCO-5[1]	5/30/02	99.8[2]	3.69	NA	NA	356	0.934
MCO-6	5/29/02	96.2	3.72	0.330	<0.024	356	1.09
MCO-7	6/6/02	137	5.90	0.450	<0.024	333	1.28
NM WQCC 3103. Ground Water Standards (mg/L)			*10.0*			*1000*	*1.6*

Notes:
[1]MCO-5 was substitiuted for MCO-4B during this quarter because MCO-4B has not had sufficient water for sampling since May 2001.
[2]Unfiltered sample.
NA means that result is available for this analyte.
All analyses by General Engineering Laboratories, Charleston, SC.
All samples filtered unless otherwise noted.

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 2nd Quarter, 2002.

Monitoring Period	Sample Date	RLWTF Weekly Effluent Monitoring Analytical Results (mg/L)		
		NO3/NO2 (as-N)	Fluoride	TDS
MARCH	3/26/02	4.47	0.41	292
APRIL	4/2/02	4.15	0.43	293
	4/9/02	0.32	0.09	49
	4/17/02	0.41	0.45	42
	4/22/02	2.93	0.36	185
MAY	5/1/02	0.93	0.09	77
	5/7/02	0.22	0.10	86
	5/15/02	0.04	0.09	52
	5/22/02	<0.01	0.11	118
	5/29/02	0.96	0.18	153
JUNE	6/4/02	<0.01	0.49	298
	6/10/02	0.03	0.26	138
	6/10/02-dupe[2]	0.02	0.26	144
	6/17/02	results pending	results pending	results pending
	6/24/02	results pending	results pending	results pending
2nd Quarter Averages (mg/L)		**1.32**	**0.26**	**148**
NM WQCC 3103. Ground Water Standards (mg/L)		*10.0*	*1.6*	*1000*

Notes:

[1]Results for these analyses are pending.

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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

Executive Summary

In May 2000 a wildfire burned through the Los Alamos National Laboratory (LANL) and the adjacent town site of Los Alamos, New Mexico. Twenty thousand people were evacuated from the county and the Laboratory was closed for two weeks. During this shutdown, operations at the Laboratory's Radioactive Liquid Waste Treatment Facility (RLWTF) continued. Radioactive wastewater continued to reach the RLWTF via the radioactive liquid waste collection system. These radioactive waters were from equipment in radiological facilities, chiefly cooling tower and chiller system blow downs, sump pump downs, and seal water systems.

Vulnerability of the RLWTF operations due to failure of critical water treatment processes became apparent during this emergency. One of these processes is a tubular ultrafilter (TUF). There is no redundancy to this particular process at the RLWTF. If the TUF were to become non-operational both the quantity of water treated and the quality of the RLWTF effluent would be dramatically reduced. In the effort to provide backup capability for this critical unit operation, funds were allocated to obtain and "pilot" test other microfiltration and ultrafiltration technologies in competition with the TUF on actual radioactive liquid waste. If a particular technology proved to be superior to the TUF in permeate quality and/or in operational considerations then a full-scale unit employing that technology would be purchased.

This paper documents these efforts, which took place at LANL's RLWTF during May and June 2002, to determine the optimal membrane filtration technology to give the RLWTF redundant filtration capability for the TUF. Four (4) "pilot" membrane filtration technologies were tested:

- tubular microfiltration
- hollow-fiber microfiltration
- vacuum driven hollow-fiber ultrafiltration
- pressure driven hollow-fiber ultrafiltration

As a result of this "pilot" testing effort, RLWTF management decided to attain the redundancy of a second filtration unit not by installing a second unit but rather by having on hand all critical spare parts for the TUF. A complete rebuild of the TUF can be accomplished in three (3) working days. Less major repairs can be accomplished in one (1) working day. This decision was made on the basis that no "pilot" filtration technology was capable of producing permeate of as high a quality as the TUF. It is true, however, that other filtration technologies were operationally and mechanically less complex than the TUF. This advantage of some of the "pilot" technologies was counter balanced by the RLWTF's two and a half years of operational experience with the TUF which includes numerous treatment optimizing design modifications.

Some additional treatment capability will be added to the RLWTF process by keeping the 10 gpm Memcor® pilot unit installed at the RLWTF. Though permeate quality from the four (4) pilot units was essentially identical during testing, the Memcor unit was chosen to remain due to its larger treatment capacity than the other pilot units, its ease of operation, and its small space requirements.

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Acknowledgements

The authors acknowledge the efforts of Dennis McLain, Group Leader and Facility Manager of FWO-WFM, and Rick Alexander, Team Leader of the Radioactive Liquid Waste Treatment Facility, for their efforts to secure funding for this effort and to ensure that this testing was performed in a safe manner.

Paula Diepolder and Darren Meadows are recognized for their labors to make sure that this subproject of the Cerro Grande Rehabilitation Project was performed, in a timely manner and under budget.

Matt Filer is recognized for his analytical efforts in determining the radiological nature of the feed and permeate waters in a timely manner. These timely results often determined the plan for the following days operational decisions.

The U.S. Department of Energy is acknowledged for funding this work that was performed as part of the Waste Management Risk Mitigation Task of the Cerro Grande Rehabilitation Project.

Lastly, we recognize the efforts of the taxpayers of the United States of America. The fruits of their labors funded these efforts.

Acronyms and Abbreviations

ALARA	as low as reasonably achievable
BW	backwash
^{0}C	degree Celsius
CGRP	Cerro Grande Rehabilitation Project
DOE	US Department of Energy
ft^2	square foot
FTE	full time equivalent (40 hours per week)
FWO	Facility and Waste Operations Division
GFD	gallons per square foot per day
gpm	gallons per minute
gross α	gross alpha (a form of ionizing radiation ejected from the nucleus of a radioactive material)
HF	hollow-fiber
inch Hg	inch of mercury
KF	feed water to the Koch pilot unit membrane
KP	permeate from the Koch pilot unit
LANL	Los Alamos National Laboratory
MF	microfilter
mg/l	milligram per liter (synonymous with ppm)
min	minute
MKF	feed water to the Memtek pilot unit membrane
MKP	permeate from the Memtek pilot unit
mm	millimeter
MRP	permeate from the Memcor pilot unit
μm	micron or micrometer (10^{-6} meter)
PAN	polyacrylonitrile
pCi/L	picoCurie per liter (10^{-12} Curie per liter)
PF	primary feed to the units from the gravity filter
psig	pounds per square inch (gage)
PVC	polyvinyl chloride
PVDF	polyvinylidine fluoride
RLWTF	Radioactive Liquid Waste Treatment Facility
RO	reverse osmosis
sec	second
TF	feed water to the tubular ultrafilter membrane
TP	tubular ultrafilter permeate
TMP	transmembrane pressure
TUF	tubular ultrafilter
UF	ultrafilter
WFM	Waste Facilities Management
WMRM	Waste Management Risk Mitigation
ZF	feed water to the Zenon pilot unit membrane
ZP	permeate from the Zenon pilot unit

1. Background and Purpose

The Cerro Grande Rehabilitation Project (CGRP) was initiated in the year 2000 to ensure that facilities at Los Alamos National Laboratory (LANL) would provide safe, secure, long-term stewardship of nuclear materials, worker health and safety, and the environment while protecting the public. The project addressed LANL concerns resulting from the May 2000 Cerro Grande Wildfire that burned through the Laboratory and the town of Los Alamos, New Mexico. One of the CGRP subprojects is the Waste Management Risk Mitigation (WMRM) project. The purpose of the WMRM subproject is to mitigate potential damage to waste management operations and facilities that may occur in the event of a future fire or fire related natural disaster.

A subproject of the WMRM effort is entitled the "Technical Area (TA)–50 Membrane Unit." The goal of this subproject is to enhance the reliability of the RLWTF during a wildfire by providing membrane filtration treatment redundancy or backup. A subtask of the TA-50 Membrane Unit subproject was to evaluate current membrane filtration technologies that could best provide redundancy. The selection of membrane filtration technologies is best accomplished by collecting operational data from pilot-scale units on the actual feed stream to be treated. Funding was received from the U.S. Department of Energy for the purchase, installation and testing of four (4) pilot-scale membrane filtration technologies to treat radioactive liquid waste at the RLWTF. Simultaneously, this wastewater was treated by the full-scale tubular ultrafilter unit that is presently used at the RLWTF. This report presents the results of the pilot-scale membrane filtration testing that occurred at the LANL RLWTF during May and June 2002.

The functional and operational requirements and design criteria for a backup membrane unit of improved design were defined in May 2001 (HNR, 2001). An alternative filtration technology analysis was completed in June 2001 recommending which filtration technologies to pilot test at the RLWTF (ARES, 2001). Following the recommendations given in the ARES, 2001 report, the RLWTF purchased three (3) pilot filtration units and built a fourth pilot-scale unit. These four (4) membrane filtration technologies were operated in competition with the full-scale RLWTF tubular ultrafilter. The five (5) membrane filtration technologies investigated were:

- Memtek® tubular microfiltration (purchased pilot-scale unit),
- Memcor® hollow-fiber microfiltration (purchased pilot-scale unit),
- Zenon® hollow-fiber ultrafiltration (purchased pilot-scale unit),
- Koch® hollow-fiber ultrafiltration (RLWTF fabricated pilot-scale unit), and
- Koch® tubular ultrafiltration (full-scale unit presently in use at the RLWTF)

The feed to the membrane filtration units, referred to as primary feed (PF) in this report, was radioactive wastewater that had received preliminary treatment by four (4) RLWTF treatment processes: permanganate addition to influent holding tank; clarification by ferric sulfate, lime and polymer additions; gravity sand filtration; and filtration by a 10 micron (μm) rated bag filter. The performance of the pilot units and the full-scale RLWTF tubular ultrafilter was chiefly quantified by monitoring the removal of gross alpha (α) radioactivity from the PF water to the individual units. Optimization of each filtration technology, as measured by gross α removal, was attempted by varying three operational parameters:

- Permeate flux rate – the goal was to determine the maximum filtration rate through the filter that did not negatively affect gross α removal.
- Overall permeate water recovery – the goal was to determine the minimum volume of concentrate waters that each particular technology would generate without affecting gross α removal.
- Backwash frequency and duration – the goal was to determine the minimum membrane backwash duration and maximum membrane backwash interval that did not negatively affect gross α removal.

Other considerations, besides the removal of gross α radioactivity from the feed water, were also used to compare the performance of the different filtration technologies:

- Operability
- Secondary waste generation
- Cost
- Process reliability
- Equipment reliability

1.1. Membrane Filtration Terminology

Removal of coarse sized particulate material from water can be accomplished by gravity settling. Smaller particles down to 10 μm, which don't readily settle by gravity, can be removed by filtration through a sand grain sized media filter. For comparison, the smallest particle visible to a human eye is 30-50 μm in diameter.

The development of synthetic membranes in the 1960's started a new filtration technology capable of filtering smaller particulate material and even dissolved material from water. Membrane filtration consists of four distinct technologies as shown in Table 1. Microfiltration is capable of filtering particles from water that are as small as 0.1 μm in diameter (100 times smaller than a sand sized media filter is capable of removing). Ultrafiltration can remove particles that are as small as 0.01 μm. Nanofiltration is capable of removing material from water that is 0.001 μm in size (this is one nanometer in size, thus the name nanofiltration). Hyperfiltration (commonly termed "reverse osmosis") is able to remove dissolved material from water down to 0.0001 μm (1 Angstrom) in size. Membrane filtration is accomplished by filtering water through a thin sheet of man-made organic polymer material. These polymeric materials consist of polysulfone, polyvinylidine fluoride, polyamide, and other materials.

Membrane filtration, therefore, enables the removal of colloidal and dissolved materials that are two to five orders of magnitude smaller than those removed by a typical sand media filter.

Table 1 Particle Size Removal Capability of Membrane Filtration Technologies

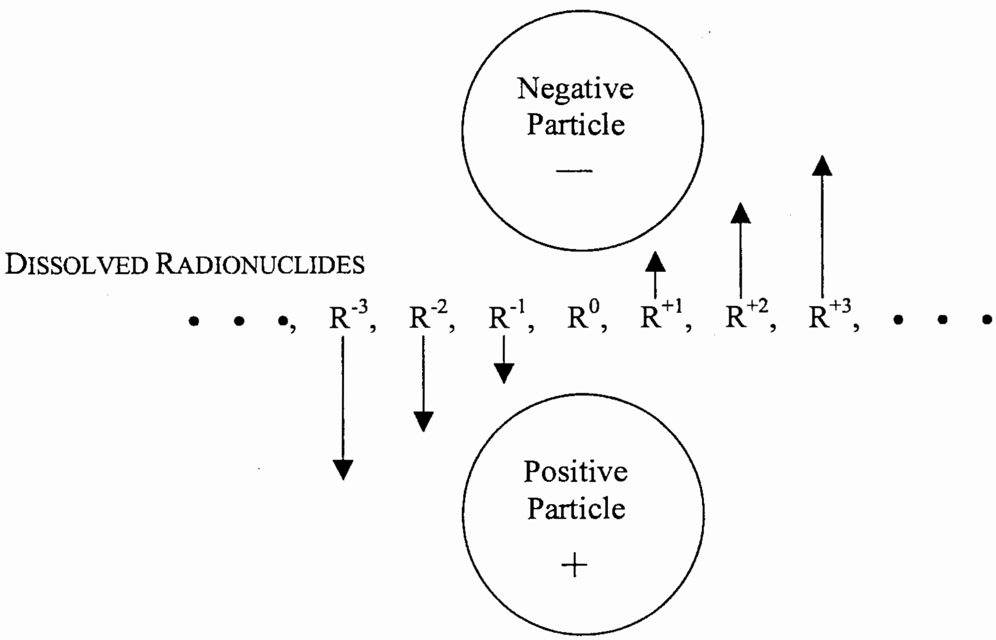
<table>
<tr><td colspan="2">Dissolved Contaminants</td><td colspan="4">Suspended Contaminants</td></tr>
<tr><td colspan="2" rowspan="2">< 0.01 µm</td><td colspan="4">> 0.01 µm</td></tr>
<tr><td colspan="2">Colloids
0.01 – 1 µm</td><td colspan="2">Particulate
> 1 µm</td></tr>
<tr><td>< 0.001 µm</td><td>0.001 – 0.01 µm</td><td>0.01 – 0.1 µm</td><td>0.1 – 1 µm</td><td>Fine
1-10 µm</td><td>Coarse
> 10 µm</td></tr>
<tr><td></td><td></td><td></td><td colspan="3">MICROFILTRATION</td></tr>
<tr><td></td><td></td><td colspan="4">ULTRAFILTRATION</td></tr>
<tr><td></td><td colspan="5">NANOFILTRATION</td></tr>
<tr><td colspan="6">REVERSE OSMOSIS</td></tr>
</table>

Table Reference (Paul, 2002)

1.2. Conceptual Description of Radioactive Liquid Waste and Filtration Mechanisms

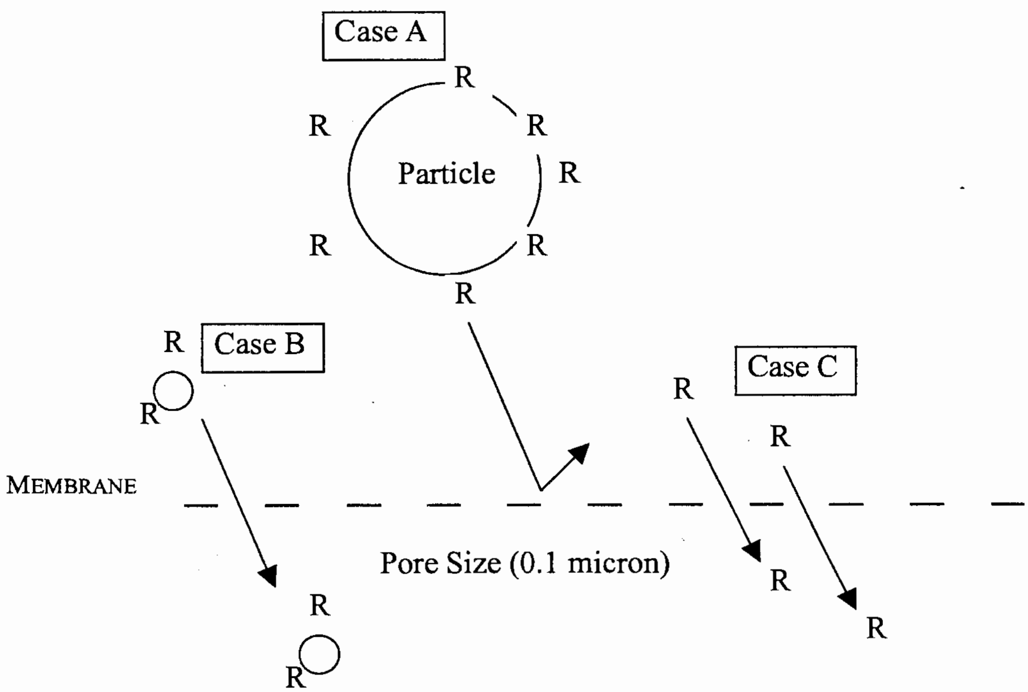
Radioactive material in the LANL RLWTF wastewater consists of dissolved radionuclides, suspended particles of radioactive material and also particles of non-radioactive material with radionuclides attached to the material. The dissolved radionuclides may be electrically neutral in charge, R^0, or electrically negative in charge, R^{-1}, or electrically positive in charge, R^{+1}. Additionally, dissolved radionuclide complexes may have multiple electronic charges, for example R^{-2}, R^{-3} or R^{+2}, R^{+3}. The electrical charge of the radionuclide in solution is determined by its oxidation state, the solution pH, and by complexation with other dissolved species in solution. Particles in solution are of various sizes and typically have electrically charged surfaces. Thus, if a particle is negatively charged, then positively charged dissolved species would be attracted to that surface. Also, dissolved species that are more highly charged will have a greater affinity to adsorb onto an oppositely charged particle surface. These concepts are pictured in Figure 1. The magnitude of the arrow qualitatively indicates the strength of the attractive/repulsive force between the radionuclide and the particle.

Figure 1 Adsorptive Tendencies of Dissolved Radioactive Materials



Removal of radionuclides from the RLWTF water is accomplished by removal of particulate material having adsorbed radionuclides and by removal of particulate radioactive material (clarification, sand filtration, bag filtration and by the membrane processes of microfiltration and/or ultrafiltration) or by removal of dissolved radionuclides by ion exchange and reverse osmosis. Figure 2 conceptually demonstrates the filtration properties of a microfiltration membrane. Large particles (greater than 0.1 μm in diameter) either radioactive or with adsorbed radionuclides are rejected by the membrane (Case A). Smaller particles and associated radioactive material pass through the membrane (Case B). Also, dissolved radioactive material permeates through the membrane (Case C). It can be imagined, as the pore size of the membrane decreases, that the membrane will reject smaller particles. Ultimately, as with reverse osmosis, the pores are so small that even dissolved radionuclides will be rejected by the membrane.

Figure 2 Conceptual Filtration Properties of a Microfiltration Membrane



Based upon plant tests at the RLWTF (Del Signore et al., 2000 and Del Signore, 2001), roughly 99% of all radioactivity is removed by the first three treatment operations at the facility: clarification, sand filtration and bag filtration (particulate size range greater than 10 μm). An additional 0.8% is removed by the tubular ultrafiltration treatment step (particulate size range between 0.08 to 10 μm). Lastly, reverse osmosis is capable of removing a further 0.2% (dissolved material less than 0.08 µm in size). Figure 3 displays this information in a tabular and schematic way.

Figure 3 Nature of Radioactive Material and Removal by RLWTF Processes

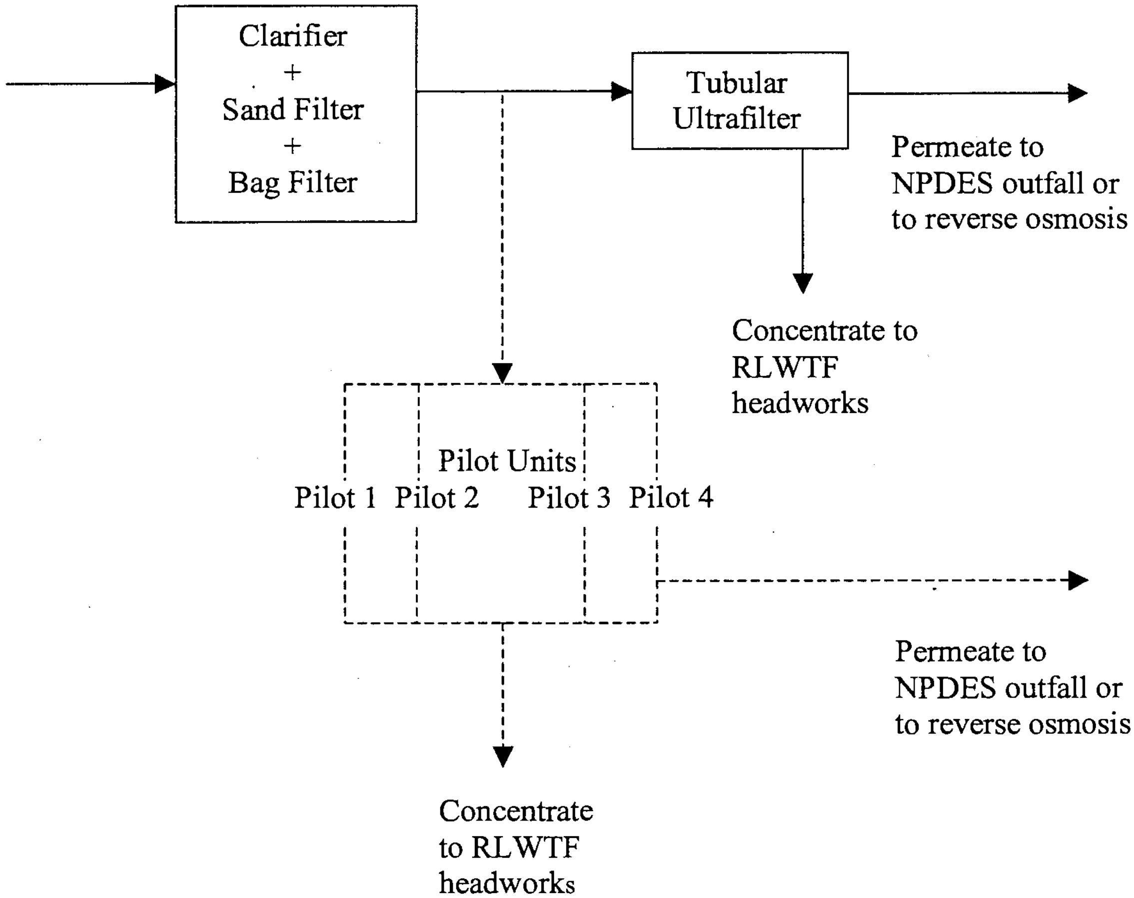
Radioactivity (pCi/L)	Unit Operations	Overall Percent Removal	% and Nature of Remaining Radioactivity
33,239 Influent	↓	None	100 Particulate Colloidal Dissolved
	Clarifier Sand Filter Bag Filter		
303 ultrafilter feed	↓	99.08	0.92 Fine particulate Colloidal Dissolved
	Tubular Ultrafilter		
64 RO feed	↓	99.81	0.19 Dissolved
	Reverse Osmosis		
2 RO permeate	↓	99.99	0.01 Dissolved

1.3. Flow Regime for the Competitive Membrane Filtration Testing at the RLWTF

Radioactive wastewater entering the RLWTF is first processed by coagulation, flocculation and sedimentation in a clarifier. Clarified water is then filtered by a gravity sand filter. The sand filter effluent is then filtered by a 10 micron bag filter. The effluent from the bag filter is the feed water to the RLWTF full-scale tubular ultrafilter (TUF). This same bag filter effluent was also the feed water to the pilot-scale filtration units.

Figure 4 demonstrates how water from the bag filter was sent to the tubular ultrafilter and/or to the pilot units.

Figure 4 Flow Regime for the Competitive Membrane Filtration Test



2. Competitive Membrane Filtration Tests

2.1. Description of the Filtration Technologies

Five (5) different membrane filtration technologies were tested: the full-scale tubular ultrafiltration unit presently in use at the RLWTF and four (4) other ultrafilter (UF) and microfilter (MF) technologies. These additional UF and MF technologies were chosen to be operated in competition with the TUF: a tubular microfilter (Memtek®), a hollow-fiber microfilter (Memcor®), a vacuum driven hollow-fiber ultrafilter (Zenon®) and a pressure driven hollow-fiber ultrafilter (Koch®). Neither spiral wound ultrafilter nor microfilter membranes were tested due to the relatively high concentration of suspended solids (up to 15 mg/L) in the feed water to the units. Table 2 demonstrates that a broad sampling of membrane technology was tested in this effort to determine the best redundant unit for the TUF.

Table 2 Ultrafiltration and Microfiltration Technology Matrix

Filtration Technology	**Ultrafilter 0.01 – 0.1 µm**	**Microfilter > 0.1 µm**
Tubular	Present full-scale unit installed and operational at the RLWTF using Koch® membranes	Memtek® (US Filter Corporation) pilot unit
Hollow-fiber	Zenon® pilot unit AND RLWTF built pilot unit using Koch Romicon® membranes	Memcor® (US Filter Corporation) pilot unit
Spiral wound	not selected due to high suspended solids in feed water	not selected due to high suspended solids in feed water

The quality of the radioactive water treated by the membrane units in this competitive testing program was very similar to that which was projected by the functional and operational requirements and design criteria document (HNR, 2001) Table 3 displays these water quality parameters. Several parameters of the feed water are especially important to note. The water pH is relatively high (pH 9-11); temperature of the water can vary dramatically (18^0 - 40^0 C); suspended solids can be relatively abundant up to 15 mg/L; COD can be as great as 125 mg/L; and lastly the water is radioactive (up to 500 pCi/L gross α).

Table 3 Typical Quality of the Feed Water to the Membrane Filtration Units

Parameter	Concentrations in mg/L
pH	9.0 –11.0 s.u.
Temperature	18^0 - 40^0 C
TSS	< 15
Turbidity	< 5 ntu
TDS	600 - 900
Total Silica	60 - 100
Total Alkalinity	200 - 400 (as $CaCO_3$)
COD	40 - 125
TOC	< 50
TKN	< 10
Ca	30 -100
Fe	< 1
Na	150 - 300
Al	< 1
Mg	0 - 4
SO_4	150 - 400
Cl	< 100
NO_3-N	< 20
Radioactivity	100 –500 pCi/L gross α

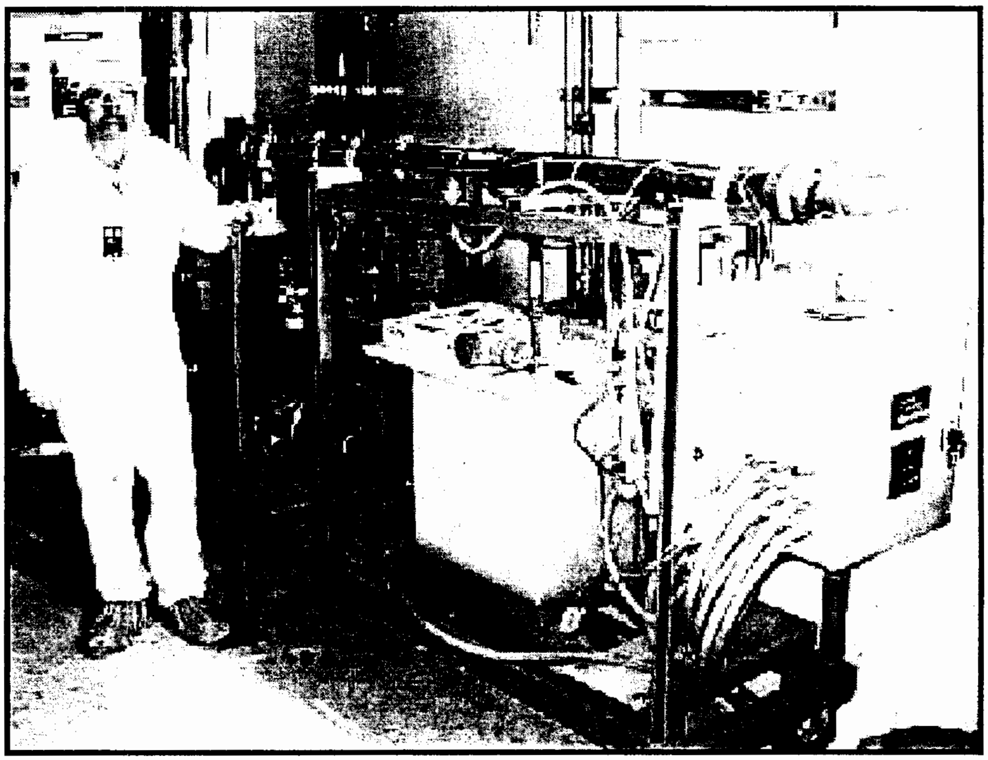
2.1.1. Pilot-Scale Filtration Technologies

2.1.1.1. Memtek® Tubular Microfilter

A one (1) gpm Memtek® tubular microfilter pilot unit was purchased from Industrial Wastewater Systems (a US Filter company). This unit employs cross-flow filtration similar to the TUF. Feed water is recycled through the inside of two (2), one (1) inch diameter tubular membranes that are hydraulically in series. Each membrane is six (6) feet in length. Total membrane surface area is three (3) square feet. Permeate is forced through the membrane and collected in the annular space between the outside of the membrane and the PVC pipe housing the membranes. Material rejected by the membrane is recycled to the feed/concentration tank. The feed/concentrate tank may be totally or partially pumped to the plant headworks on an occasional basis. The membrane flux is maintained by regularly backpulsing permeate in a reverse direction through the membrane. The membrane has a nominal pore size of 0.1 micron and is composed of PVDF. The membrane is bleach resistant. Figure 5 shows the Memtek® Tubular Microfilter pilot unit installed at the RLWTF.

Feed and permeate flows to and from the Memtek® unit were measured by flow rate and flow totalizing meters. This unit has an internal recycle stream much like the TUF to keep flow velocity through the membrane high enough to clean the tubular membrane. Permeate is used to backflush the membranes. Also, permeate is used for cleaning the membrane.

Figure 5 Memtek® Tubular Microfilter Pilot Unit Installed at the RLWTF



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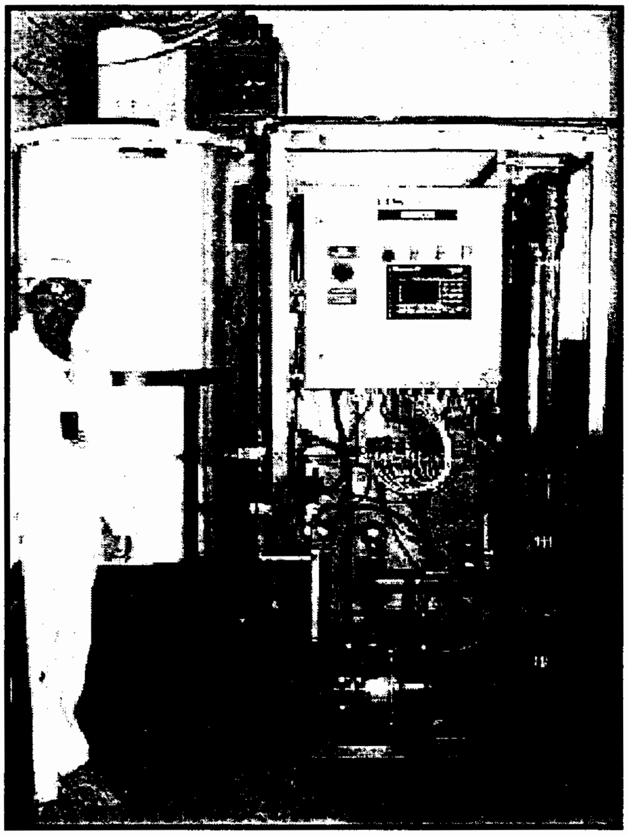
2.1.1.2. Memcor® Hollow-Fiber Microfilter

A ten (10) gpm Memcor® hollow-fiber microfilter pilot unit was obtained from WTC Inc. (a US Filter company). The hollow-fiber membranes used in the unit have an outer diameter of 0.5 mm. The lumen within the fiber is about 0.25 mm in diameter. The nominal pore size of this membrane material is 0.1 microns. The membrane is composed of PVDF and it is chlorine compatible. Each one (1) meter long filtration module contains approximately 20,000 individual hollow-fibers. Each filtration module contains about one hundred and sixty one (161) square feet of membrane surface area. The pilot unit has three (3) filtration modules. This unit incorporates a direct flow filtration method in which all the feed water is forced through the membrane from outside the hollow fiber into the lumen inside the hollow fiber. Flux through the membrane is maintained by an air backwash which forces air from inside the lumen through the membrane. Material dislodged from the hollow-fibers is then flushed from the filtration module by a fast feed water flush. This backwash water is the concentrate from the filtration process. Figure 6 shows the Memcor® Hollow-Fiber Microfilter pilot unit installed at the RLWTF. Feed and permeate flows were measured by flow rate and flow totalizing meters.

Figure 6 Memcor® Hollow-Fiber Microfilter Pilot Unit Installed at the RLWTF

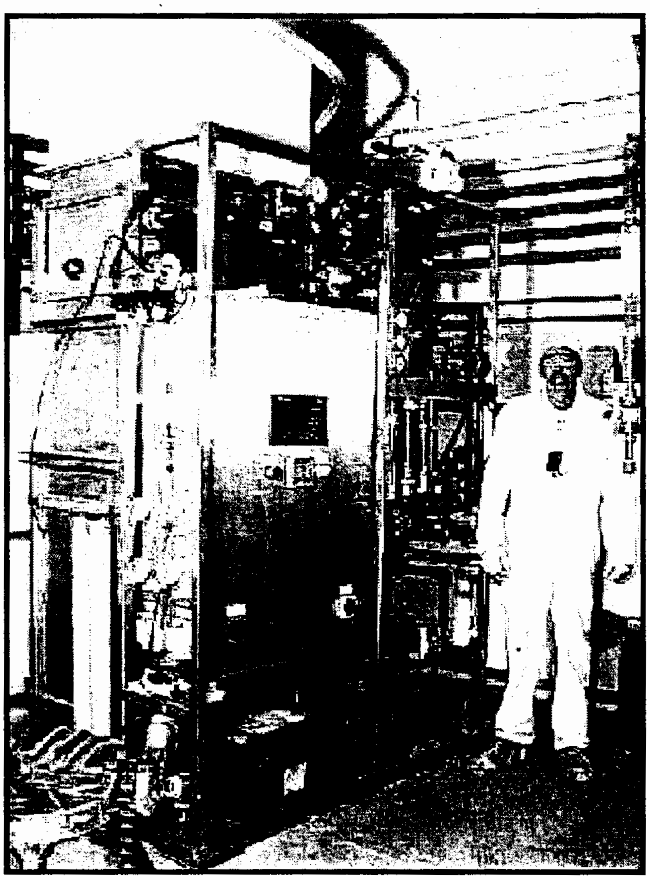


2.1.1.3. Zenon® Hollow-Fiber Ultrafilter

A seven (7) gpm hollow-fiber ultrafilter pilot unit manufactured by Zenon Environmental was also purchased. This unit draws water by vacuum from outside the 0.2 cm hollow-fiber membranes into the lumens by employing a direct flow filtration method. When pressure loss through the membrane exceeds a certain value the system is backwashed by reverse flows of permeate through the hollow-fiber membrane. The membranes are placed directly into the feed/concentrate tank. Solids concentration in the tank is controlled by either a continuous bleed of concentrate from the tank or by a purging of part or all of the concentrate tank volume on a regular basis. The pilot unit membrane module, a ZeeWeed 500B®, has about 620 square feet of membrane surface area. The module is composed of about

5,000 hollow fiber strands that are about 2 millimeters in diameter. Each strand has about 0.05 ft^2 of membrane surface area. The hollow fibers are composed of a woven polyester core material covered with a PVDF membrane that is chlorine resistant. The nominal pore size of the hollow-fiber membrane is 0.04 micron. The membrane provides an absolute 0.06 micron barrier. Figure 7 shows the Zenon® Hollow-Fiber Ultrafilter pilot unit installed at the RLWTF. Feed and permeate flows were measured by flow rate and flow totalizing meters.

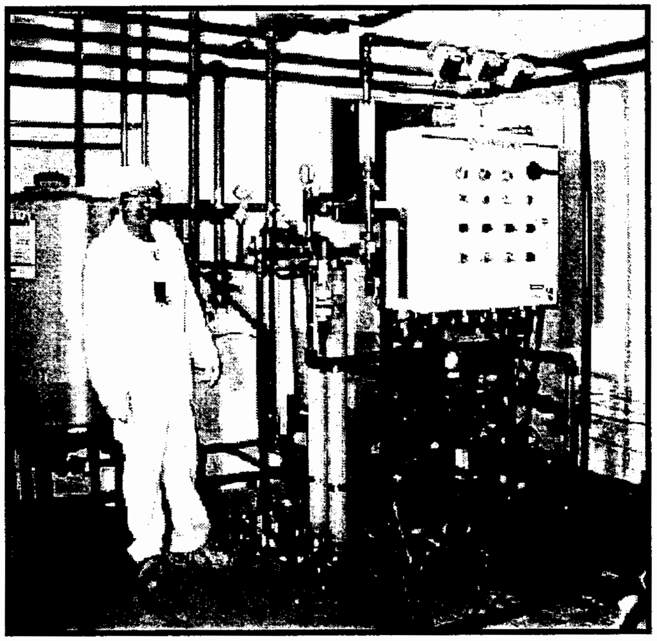
Figure 7 Zenon® Hollow-Fiber Ultrafilter Pilot Unit Installed at the RLWTF



2.1.1.4. Koch Hollow-Fiber Ultrafilter

A second ultrafiltration membrane unit employing hollow-fiber technology was constructed for pilot testing. This one (1) gpm pilot unit used Koch® Romicon hollow-fiber membranes. In this configuration feed water recycles through the inside of the small lumens of the hollow fibers. Permeate is forced through the hollow-fiber membranes. Material rejected by the membrane is recycled to the feed/concentration tank. A portion of the material in the feed/concentrate tank was gravity drained to the plant headworks on a regular basis. Membrane flux is maintained by backflushing permeate in a reverse direction through the membrane. One (1), three foot long by three inch diameter membrane cartridge will be used on the pilot. The cartridge has 26.5 square feet of membrane surface area. The lumens are 45 mils in diameter. Nominal pore size of the membrane is 50,000 Daltons. The membrane is a XM50P which is composed of polyacrylonitrile (PAN) and it is chlorine resistant. Feed and permeate flows were measured by flow rate and flow totalizing meters. Figure 8 shows the Koch hollow-fiber ultrafilter pilot unit installed at the RLWTF.

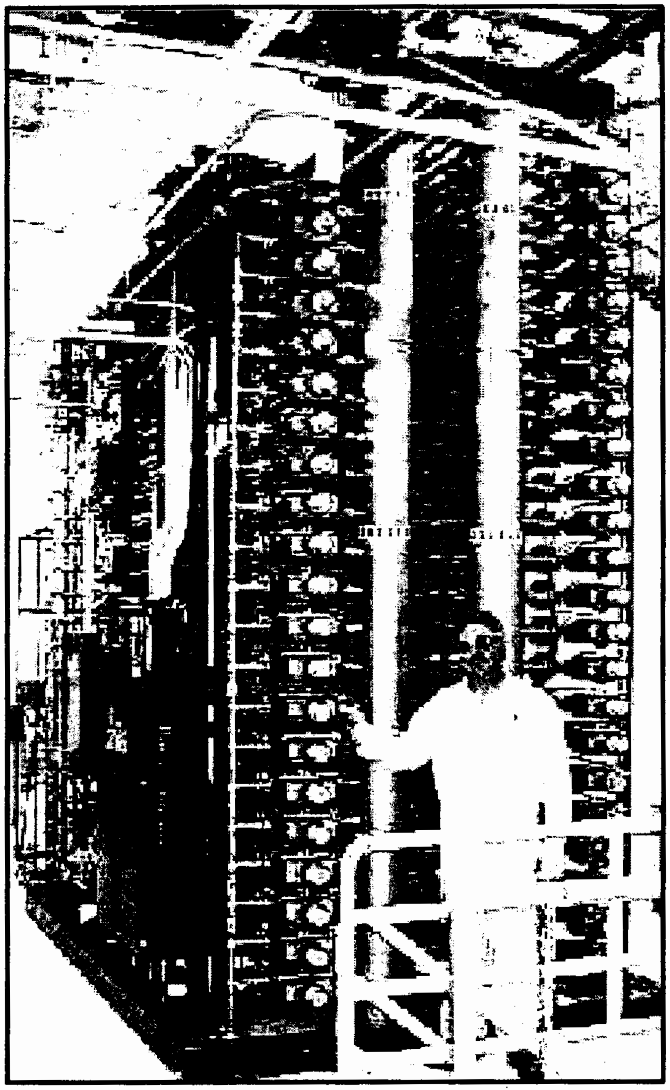
Figure 8 Koch Hollow-Fiber Ultrafilter Pilot Unit Installed at the RLWTF



2.1.2. Full-Scale RLWTF Tubular Ultrafilter

The RLWTF presently removes very fine particulate material from sand filter effluent by using a tubular ultrafiltration (TUF) membrane unit. This unit consists of 350 tubular membranes, each of which is ten (10) feet in length and one (1) inch in diameter. The membranes are manufactured by Koch Membrane Systems and have a nominal molecular weight cutoff of 100,000 Daltons. The membranes are made of PVDF. The TUF produces about seventy-five (75) gallons per minute of permeate. Flux of permeate through the tubular filters is maintained by forcing "spongeballs" of slightly larger diameter than the tubes through the tubes on a regular basis. This unit employs cross-flow filtration, in which the feed water to the unit flows at a high velocity parallel to the membrane while permeate waters pass perpendicularly through the membrane wall. An internal recycle pump maintains the high flow velocity through the 350 tubes. Rejected solids are accumulated in a two-tank combination (18,000 gallons total volume) that functions as a feed/concentration unit for the TUF. The full-scale system operates in batch mode, being started and stopped on a daily basis. Solids accumulated in the feed/concentration tanks are pumped to the headworks on a regular basis. Additionally, flush waters and occasional cleaning waters are also pumped to the plant headworks. Figure 9 shows the existing RLWTF full-scale tubular ultrafilter.

Figure 9 Existing RLWTF Full-Scale Tubular Ultrafilter



2.2. Testing Results from the Competitive Membrane Filtration Testing Program

2.2.1. Description of the Testing Period

Radioactive water began to be treated by the four (4) pilot units on May 1, 2002. The competitive testing period ended on June 26, 2002. During this time period, the pilot units treated radioactive liquid waste on thirty-one (31) days. The pilot units operated in a "batch" mode, which meant that on a typical operational day the units were started in the morning and shut down in the afternoon. A normal operational day of pilot testing lasted between four (4) and six (6) hours. For the first three (3) weeks of the testing period, only the four (4) pilot units were operated. The RLWTF tubular ultrafilter (TUF) was undergoing repairs and receiving a new set of membranes. The TUF began to operate in competition with the pilot units on May 21, 2002. All five (5) membrane technologies treated the same water, simultaneously, from then until the testing ended on June 26, 2002.

Each filtration technology was started at what was believed to be a medium flux rate through each particular membrane. The water recovery of each unit was started at 85%. Backwash and spongeball frequencies and durations were set according to vendor recommendations and RLWTF operational experience.

2.2.1.1. Primary Feed Quality During Testing Period

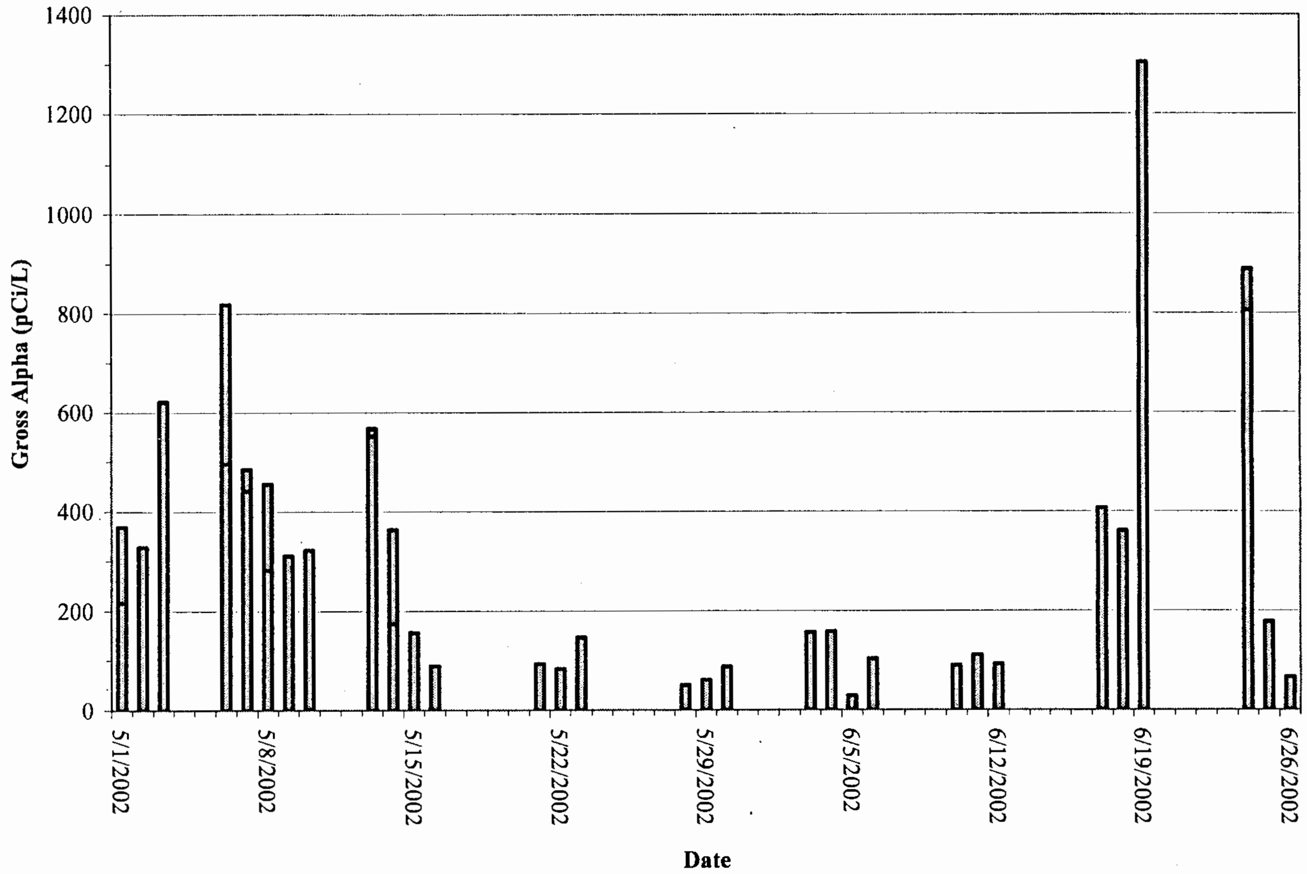
Radioactive liquid waste entering the RLWTF passed through several treatment steps, as previously described, before being treated by the pilot units and the TUF. This process water is defined as Primary Feed (PF) to the membrane units. The PF is different from the wastewater that the membranes in four (4) of the technologies actually treated. Each of these four (4) membrane technologies (Memtek®, Zenon®, Koch® HF, and the TUF) are a "feed and bleed" type of filtration scheme. In this filtration scheme, primary feed (PF) to the unit is sent to a tank from which it is pumped to the membrane. Permeate water is sent out of the system and the remaining water and rejected particulate material is returned (recycled) to the tank.

As filtration continues, the concentration of gross α in the tank increases. A manageable gross α concentration is maintained by continuously or incrementally "bleeding" some of this concentrated water from the tank. In these technologies the membranes do not actually treat PF. Rather they filter a more concentrated stream defined as Memtek® Feed (MKF), Zenon® Feed (ZF), Koch® HF Feed (KF) and TUF Feed (TF).

In the Memcor® technology the primary feed (PF) is identical to the Memcor® Feed (MRF). This technology employs "direct" or "dead head" filtration. In "direct" filtration all the feed water is forced through the membrane. Filtered radioactive material is captured on the membrane surface until a cleaning cycle is initiated.

The radiological nature of the primary feed (PF) water to the pilot units and the TUF during the testing period is shown in Figure 10. The gross α concentration of the PF is shown for the thirty-one (31) days operational testing. On most days only one sample of PF was collected and analyzed for gross α. Occasionally, two samples were taken, as seen on May 8, 2002. Two PF samples were taken that day. One was 281 pCi/L gross α and the other was 454 pCi/L gross α. Figure 10 demonstrates that the PF does not have a consistent gross α concentration. This variation in concentration is partly due to the type and concentration of radionuclides in the RLWTF influent (for example: Pu-238, Pu-239 or Am-241). The oxidation state of a particular radionuclide will affect its removal (for example, Pu^{+4} is more insoluble than Pu^{+3}). Additionally, basic water chemistry parameters, like pH, will greatly affect the removal of some radionuclides from the RLWTF influent. Also, the removal performance of the clarifier and the sand filter at the head of the RLWTF treatment process affects the amount of gross α in the PF.

Figure 10 Gross α Concentration of the Primary Feed (PF) During Filtration Testing (5/1/02 – 6/26/02)



2.2.1.2. Definition of Terms

This section defines terms to facilitate understanding of Figures 11 through 20, Table 4 and Appendix Tables A1 through A5. These figures and tables summarize thousands of operational and analytical data.

Primary Feed (PF) – defined in Section 2.2.1.1

Membrane Feed (MKF, ZF, KF, TF) – defined in Section 2.2.1.1

Permeate (MKP, MRP, ZP, KP, TP) – the water sample taken after the water had passed through the membrane of a particular filtration technology

Operational Day – a calendar day during which a particular filtration unit was operated

Sampling Event – A sampling event was a set of data that was not affected by upstream RLWTF processes. These data consisted of radiological analyses of PF, membrane feed, and permeate waters that were in addition to operational data from the filtration units and were not affected by upstream RLWTF processes. Examples of upstream RLWTF processes that affected the filtration study were occasional low pH excursions in the clarifier and also addition of other process streams to the membrane feed water to the TUF. A particular operational day of a membrane unit may have one or two sampling events from that operational day. Or if upstream RLWTF processes affected the filtration units there may be no sampling event included from a particular operational day.

PF % Rad Removal – The percentage of gross α radioactivity removed from the primary feed water by a particular filtration technology. This parameter is calculated by subtracting the permeate gross α from the primary feed gross α concentration, dividing that quantity by the primary feed gross α concentration, and then multiplying by 100.

GFD – The gallons of permeate water produced through one square foot of membrane surface per twenty-four (24) hours of continuous operation. GFD is the abbreviation of gallons per square foot per day. GFD is synonymous with the term flux rate.

% Water Recovery (WR) – Percent water recovery is the ratio (expressed as a percentage) of the amount of permeate water produced from a given filtration unit divided by the amount of feed water to the unit.

BW Frequency (BW Freq) – The time (in minutes) between backwash episodes. Backwashing is performed to maintain the flux rate of the permeate through the membrane by removing particulate material from the membrane surface.

BW Duration (BW Dur) – The time (in seconds) that a backwash episode lasts.

Transmembrane Pressure (TMP) – This is the average water pressure pushing water through the membrane. TMP is calculated by determining the average feed pressure to the membrane. This is accomplished by subtracting the pressure as the feed water leaves the membrane from the pressure as the feed water enters the membrane. This quantity is then divided by 2. From this value the permeate pressure is subtracted. The resulting number is the average TMP.

2.2.2. Test Results from Individual Filtration Units

2.2.2.1. Memtek® Tubular Microfiltration Pilot Unit

Radiological and operational data for the Memtek® pilot unit is seen in Figures 11 and 12. There were twenty-seven (27) sampling events for the Memtek® pilot unit during the testing period.

Figure 11 shows the radiological nature of the primary feed and the membrane feed streams to the unit, and the permeate stream from the Memtek® unit. It is noted that the gross α concentration of the primary feed is always less than the gross α concentration of the membrane feed and greater than the gross α concentration of the permeate stream. Of major interest in this work was attaining the lowest gross α concentration possible in the permeate water. It is clearly seen that the sampling events with the lowest gross α concentrations in the permeate were also the sampling events when the primary feed gross α concentrations were low (sampling events 12 through 22).

Figure 12 shows operational data (GFD, % WR, BW Freq and BW Dur) in relation to PF % Rad Removal as functions of sampling events of the Memtek® pilot unit. The region where the PF % Rad Removal curve consistently has its greatest value should indicate the optimal operational parameters for the unit. For the Memtek® unit this region covers sampling events 21 through 27. The data used to develop Figure 11 and 12 are found in the Appendix, Table A1.

Figure 11 Memtek® Pilot Unit Gross Alpha Feed and Permeate Concentrations

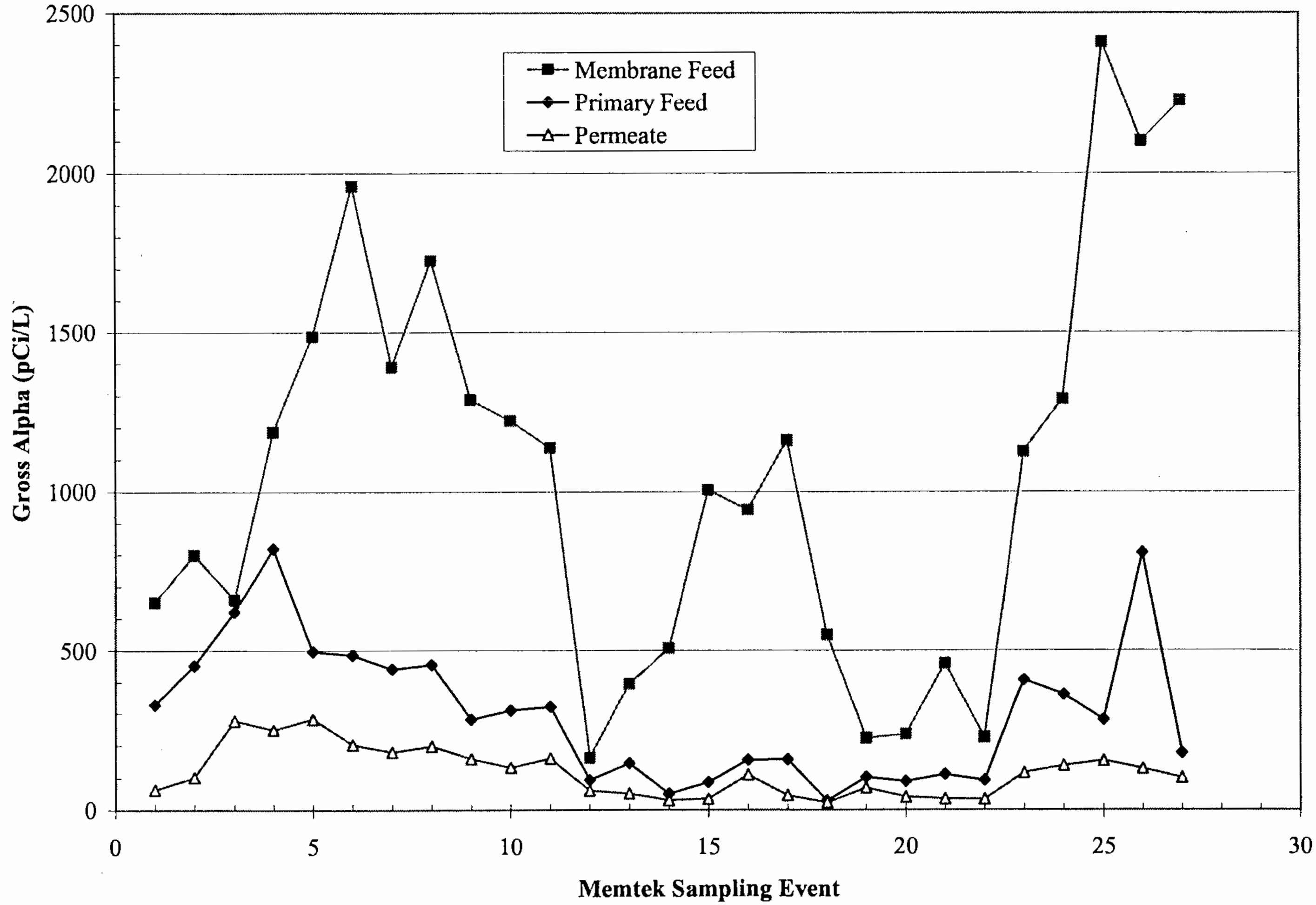
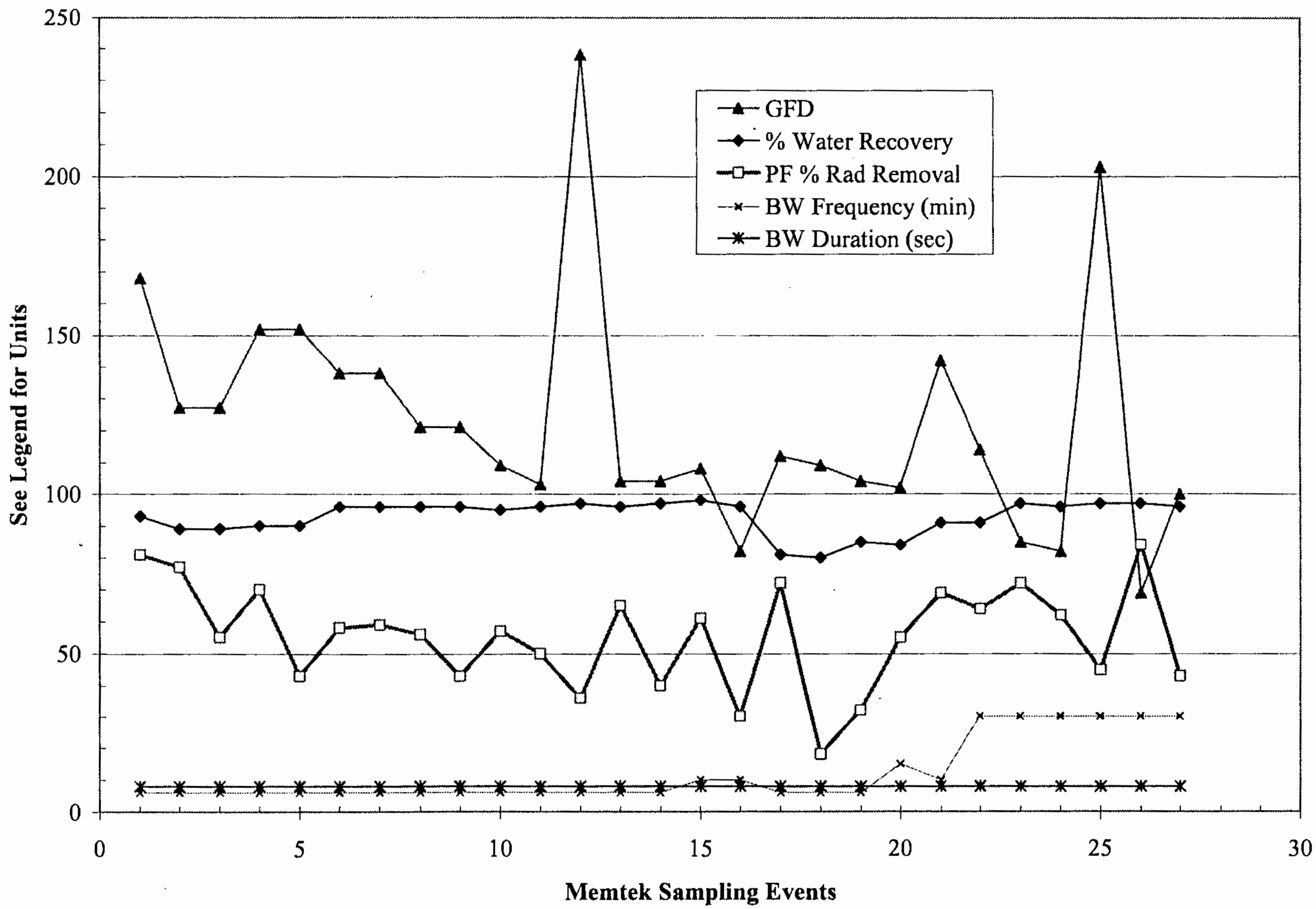


Figure 12 Memtek® Pilot Unit Operational Parameters and Radioactive Removal from the Primary Feed



2.2.2.2. Memcor® Hollow-Fiber Microfiltration Pilot Unit

Radiological and operational data for the Memcor® pilot unit is seen in Figures 13 and 14. There were thirty-two (32) sampling events for the Memcor® pilot unit during the testing period.

Figure 13 shows the radiological nature of the primary feed and the membrane feed streams to the unit, and the permeate stream from the Memcor® unit. For the Memcor® unit these are identical. It is noted that the gross α concentration of the primary feed is always greater than the gross α concentration of the permeate stream. Of major interest in this work was attaining the lowest gross α concentration possible in the permeate water. It is clearly seen that the sampling events with the lowest gross α concentrations in the permeate were also the sampling events when the primary feed gross α concentrations were low (sampling events 14 through 26).

Figure 14 shows operational data (GFD, % WR and BW Freq) in relation to PF % Rad Removal as functions of sampling events of the Memcor® pilot unit. The region where the PF % Rad Removal curve consistently has its greatest value should indicate the optimal operational parameters for the unit. For the Memcor® unit this region covers sampling events 25 through 32. The data used to develop Figure 13 and 14 are found in the Appendix, Table A2.

Figure 13 Memcor® Pilot Unit Gross Alpha Feed and Permeate Concentrations

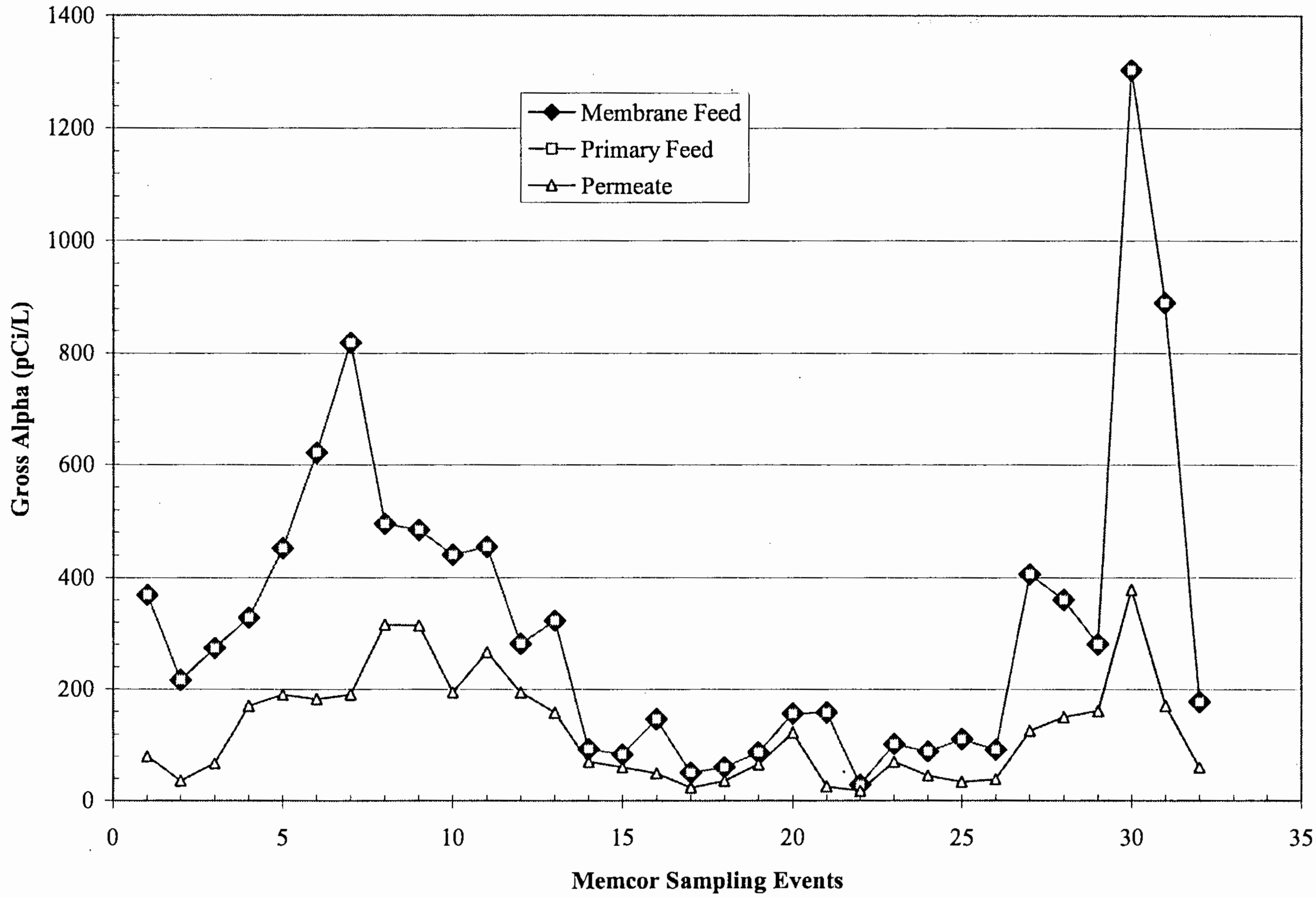
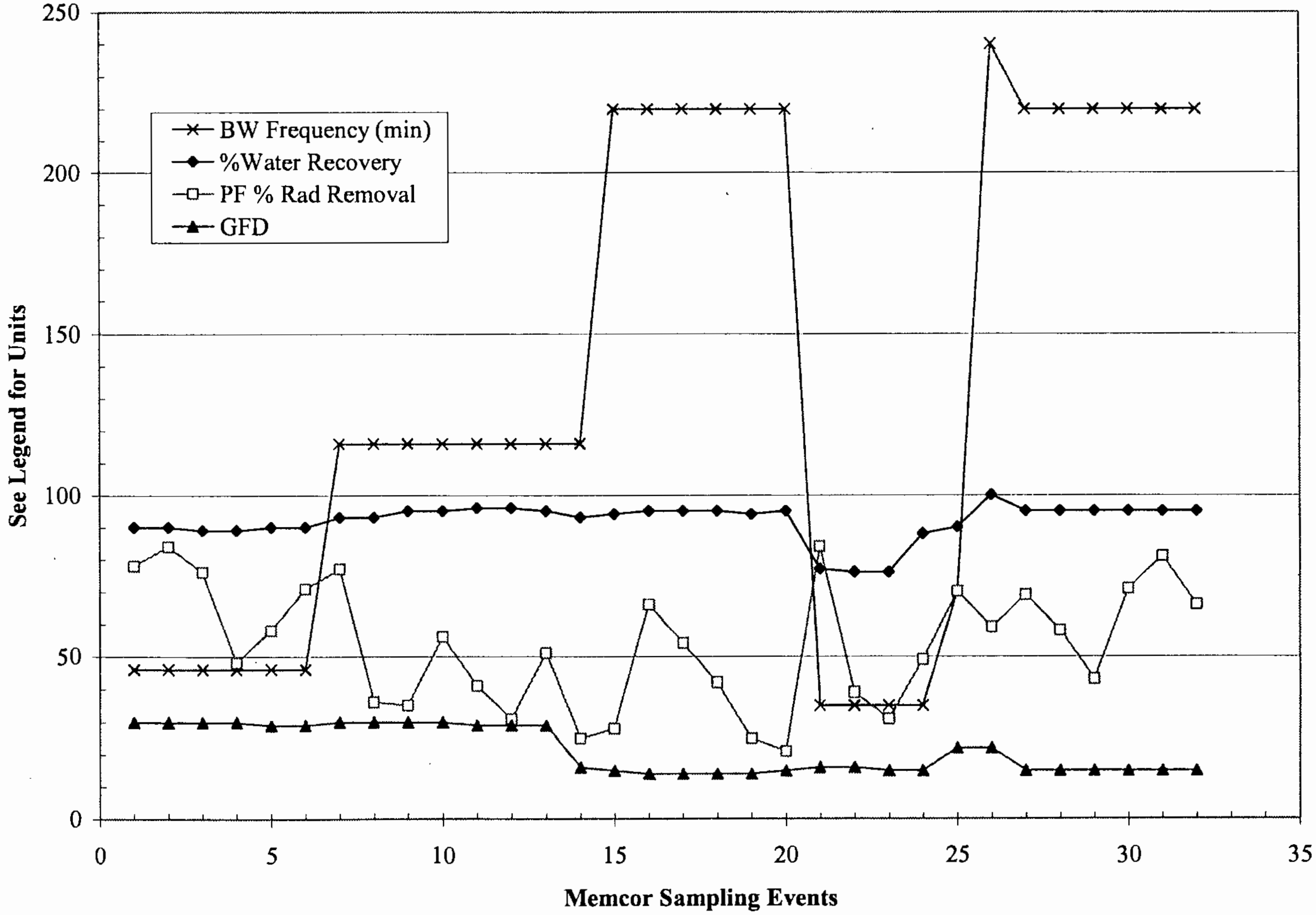


Figure 14 Memcor® Pilot Unit Operational Parameters and Radioactive Removal from the Primary Feed



2.2.2.3. Zenon® Hollow-Fiber Ultrafiltration Pilot Unit

Radiological and operational data for the Zenon® pilot unit is seen in Figures 15 and 16. There were thirty (30) sampling events for the Zenon® pilot unit during the testing period.

Figure 15 shows the radiological nature of the primary feed and the membrane feed streams to the unit, and the permeate stream from the Zenon® unit. It is noted that the gross α concentration of the primary feed is always less than the gross α concentration of the membrane feed and greater than the gross α concentration of the permeate stream. Of major interest in this work was attaining the lowest gross α concentration possible in the permeate water. It is clearly seen that the sampling events with the lowest gross α concentrations in the permeate were also the sampling events when the primary feed gross α concentrations were low (sampling events 16 through 26).

Figure 16 shows operational data (GFD, % WR, BW Freq and BW Dur) in relation to PF % Rad Removal as functions of sampling events of the Zenon® pilot unit. The region where the PF % Rad Removal curve consistently has its greatest value should indicate the optimal operational parameters for the unit. For the Zenon® unit this region covers sampling events 25 through 30. The data used to develop Figure 15 and 16 are found in the Appendix, Table A3.

Figure 15 Zenon® Pilot Unit Gross Alpha Feed and Permeate Concentrations

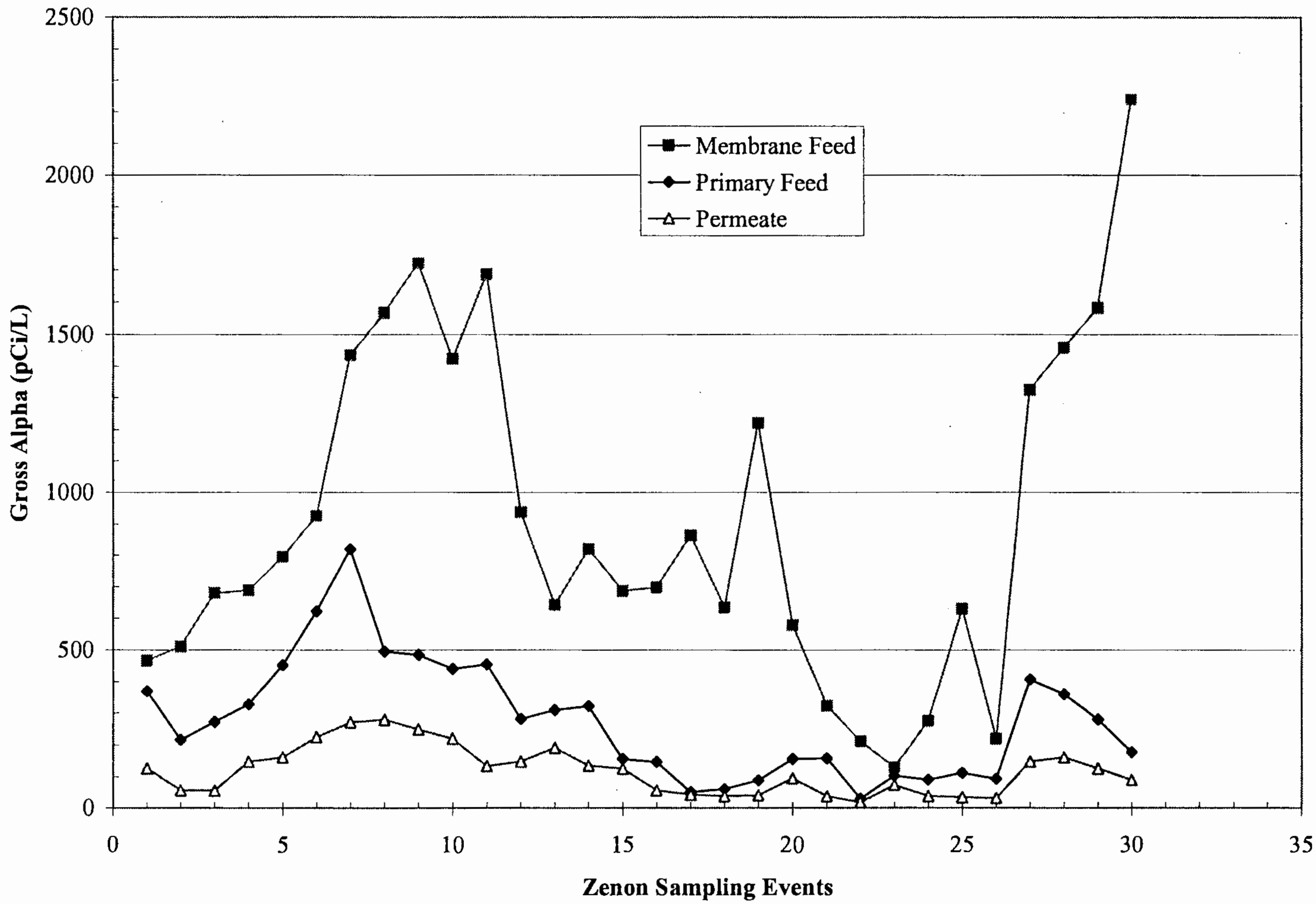
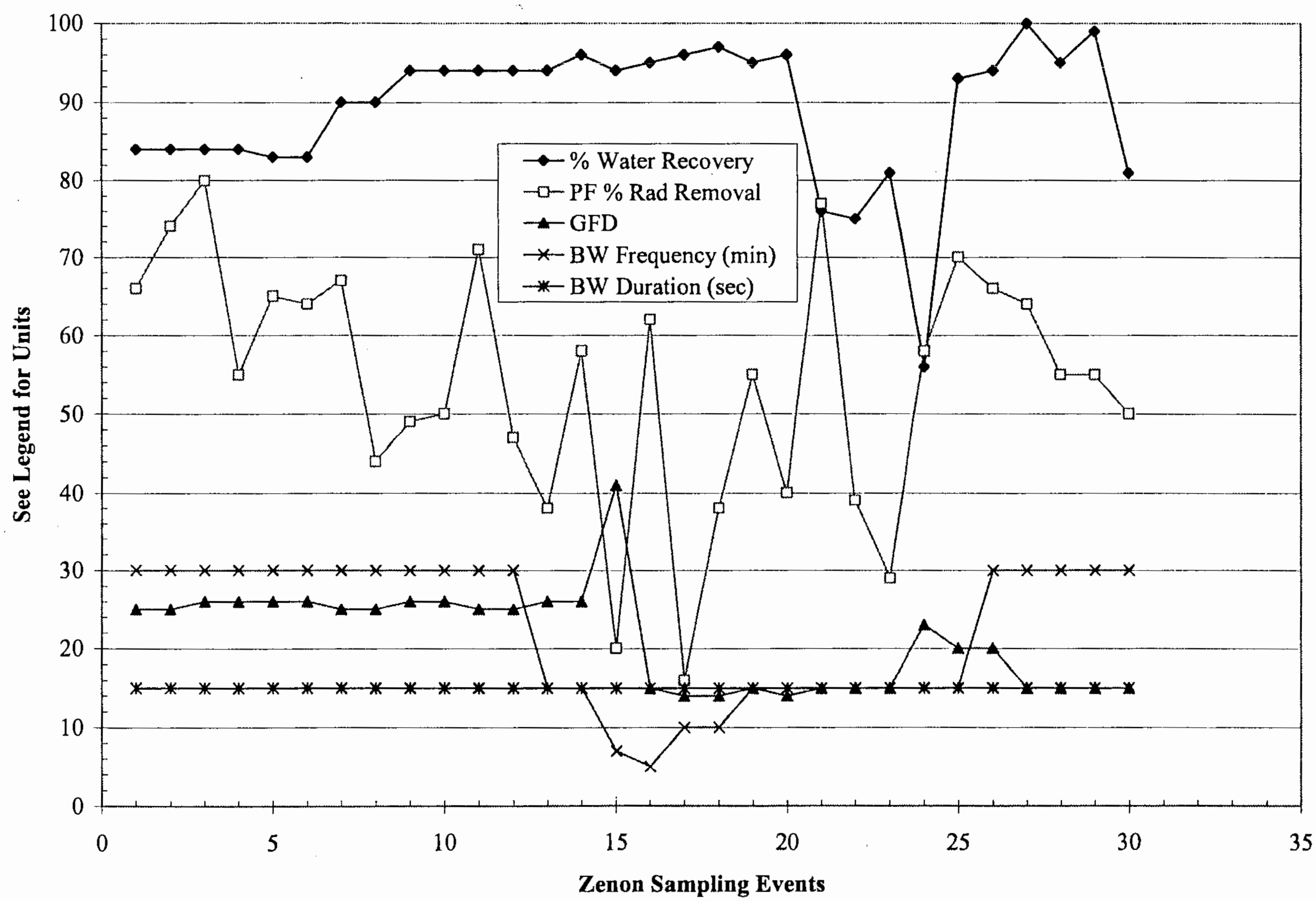


Figure 16 Zenon® Pilot Unit Operational Parameters and Gross α Removal from the Primary Feed



2.2.2.4. Koch® Hollow-Fiber Ultrafiltration Unit

Radiological and operational data for the Koch® hollow-fiber pilot unit is seen in Figures 17 and 18. There were thirty-four (34) sampling events for the Koch® hollow-fiber pilot unit during the testing period.

Figure 17 shows the radiological nature of the primary feed and the membrane feed streams to the unit, and the permeate stream from the Koch® hollow-fiber unit. It is noted that the gross α concentration of the primary feed is always less than the gross α concentration of the membrane feed and greater than the gross α concentration of the permeate stream. Of major interest in this work was attaining the lowest gross α concentration possible in the permeate water. It is clearly seen that the sampling events with the lowest gross α concentrations in the permeate were also the sampling events when the primary feed gross α concentrations were low (sampling events 16 through 29).

Figure 18 shows operational data (GFD, % WR, BW Freq and BW Dur) in relation to PF % Rad Removal as functions of sampling events of the Koch® pilot unit. The region where the PF % Rad Removal curve consistently has its greatest value should indicate the optimal operational parameters for the unit. For the Koch® hollow-fiber unit this region covers sampling events 28 through 34. The data used to develop Figure 17 and 18 are found in the Appendix, Table A4.

Figure 17 Koch® HF Pilot Unit Gross Alpha Feed and Permeate Concentrations

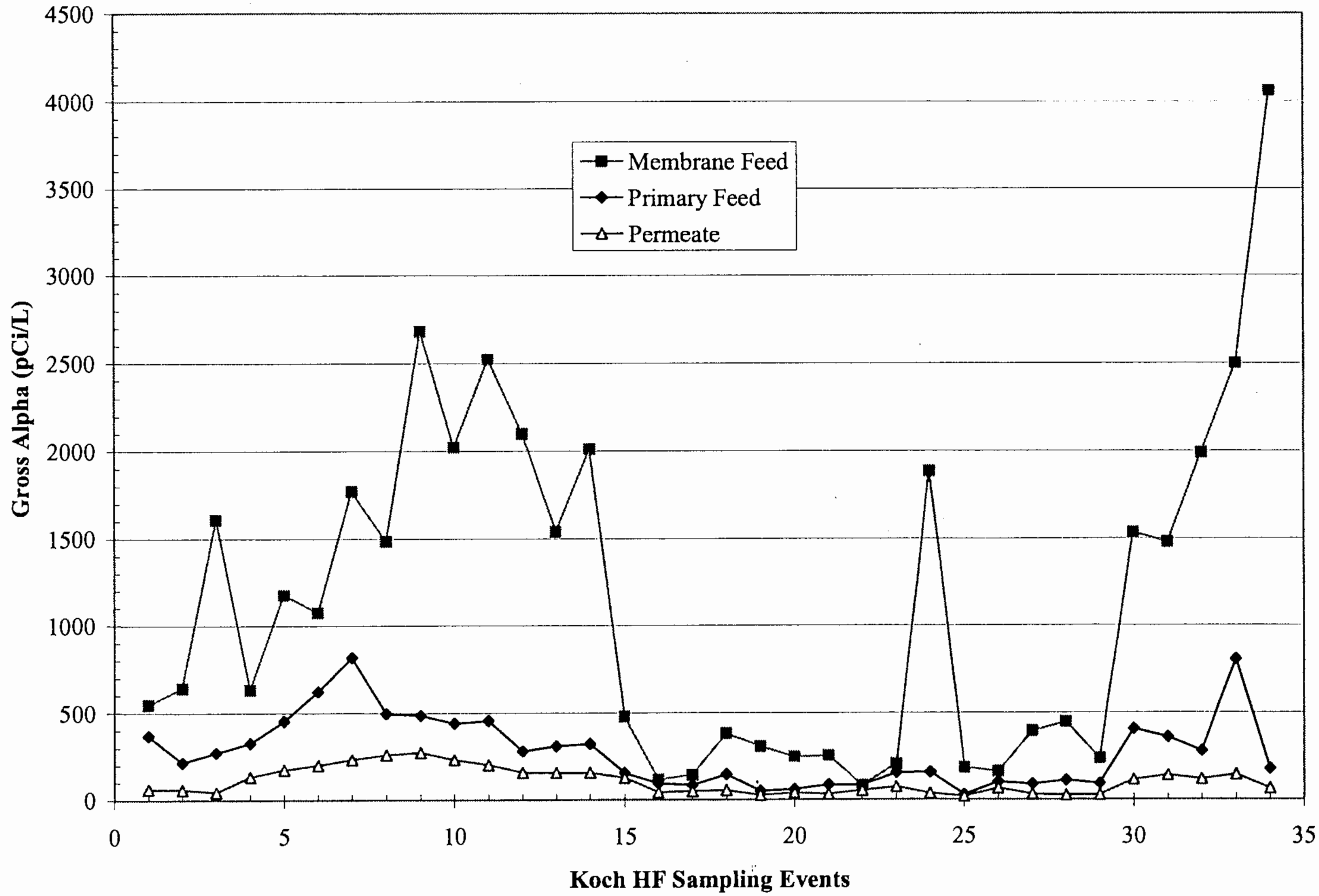
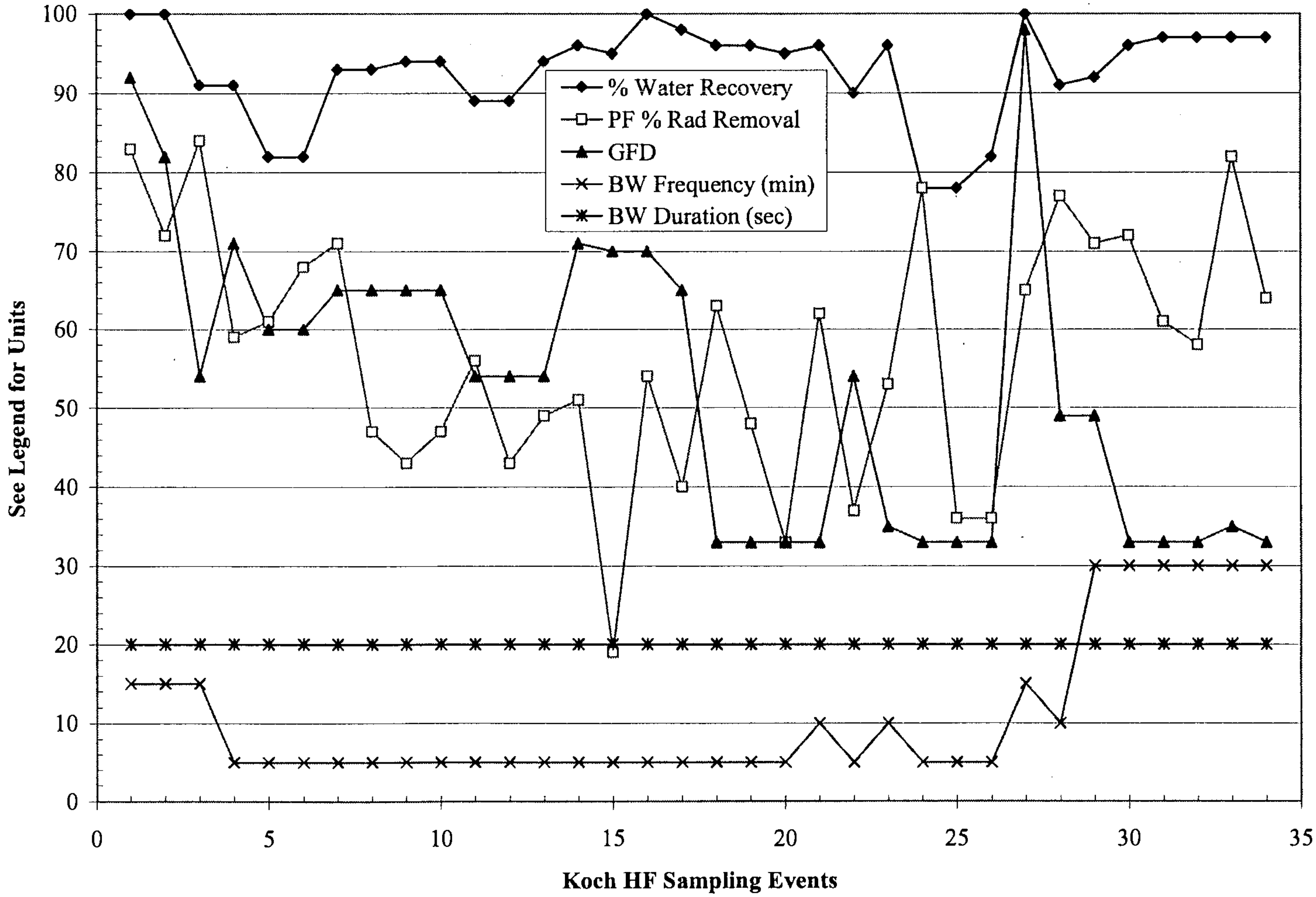


Figure 18 Koch® HF Pilot Unit Operational Parameters and Gross α Removal from the Primary Feed



2.2.2.5. RLWTF Tubular Ultrafilter Full-Scale Unit

Radiological and operational data for the RLWTF full-scale tubular ultrafilter (TUF) unit is seen in Figures 19 and 20. There were eleven (11) sampling events for the TUF unit during the testing period.

Figure 19 shows the radiological nature of the primary feed and the membrane feed streams to the unit, and the permeate stream from the TUF unit. It is noted that the gross α concentration of the primary feed is always less than the gross α concentration of the membrane feed and greater than the gross α concentration of the permeate stream. Of major interest in this work was attaining the lowest gross α concentration possible in the permeate water.

Figure 12 shows operational data (GFD, % WR and spongeball frequency) in relation to PF % Rad Removal as functions of sampling events of the TUF unit. The region where the PF % Rad Removal curve consistently has its greatest value should indicate the optimal operational parameters for the unit. For the Memtek® unit this region covers sampling events 9 through 11. The data used to develop Figure 19 and 20 are found in the Appendix, Table A5.

Figure 19 RLWTF Tubular Ultrafilter Gross Alpha Feed and Permeate Concentrations

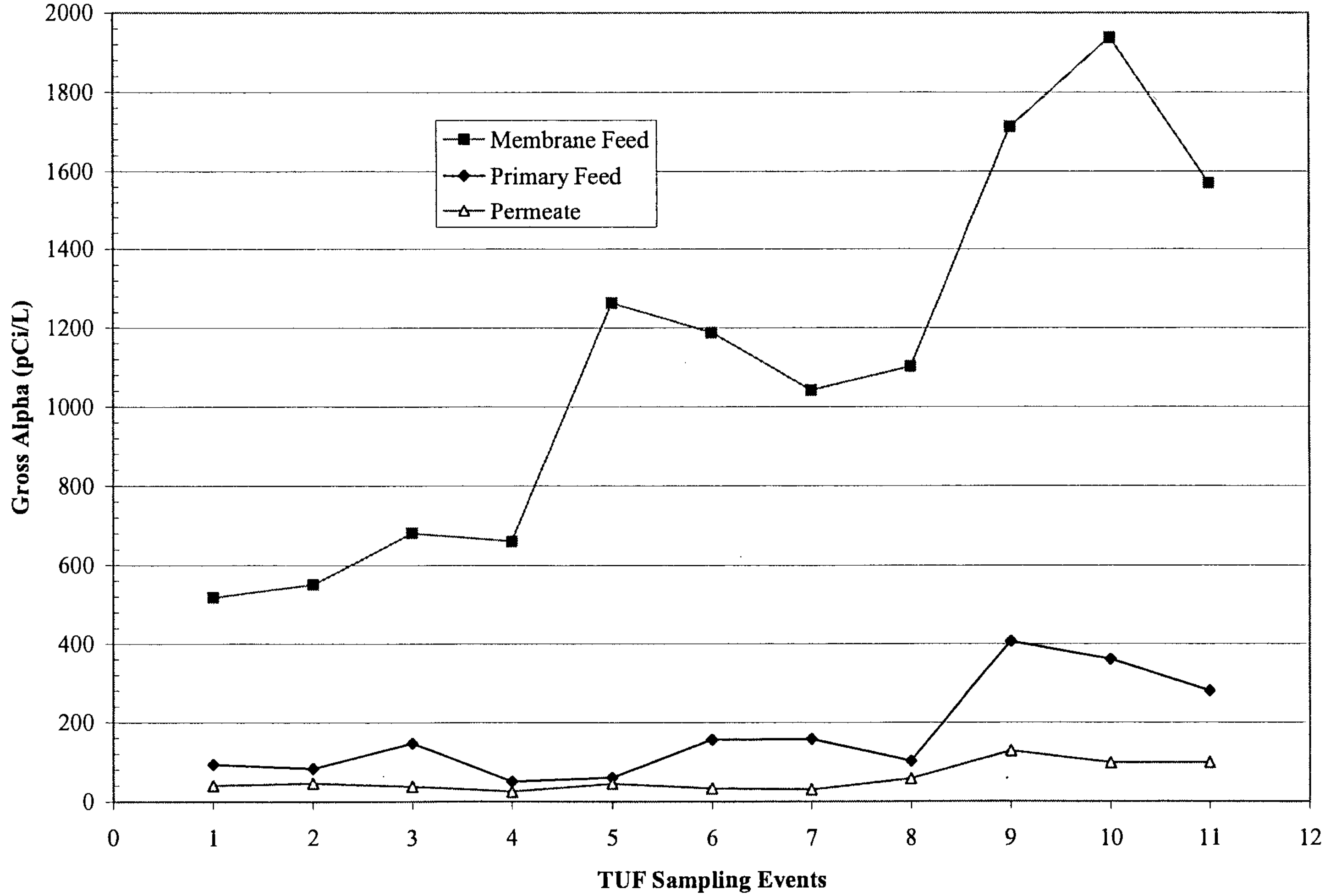
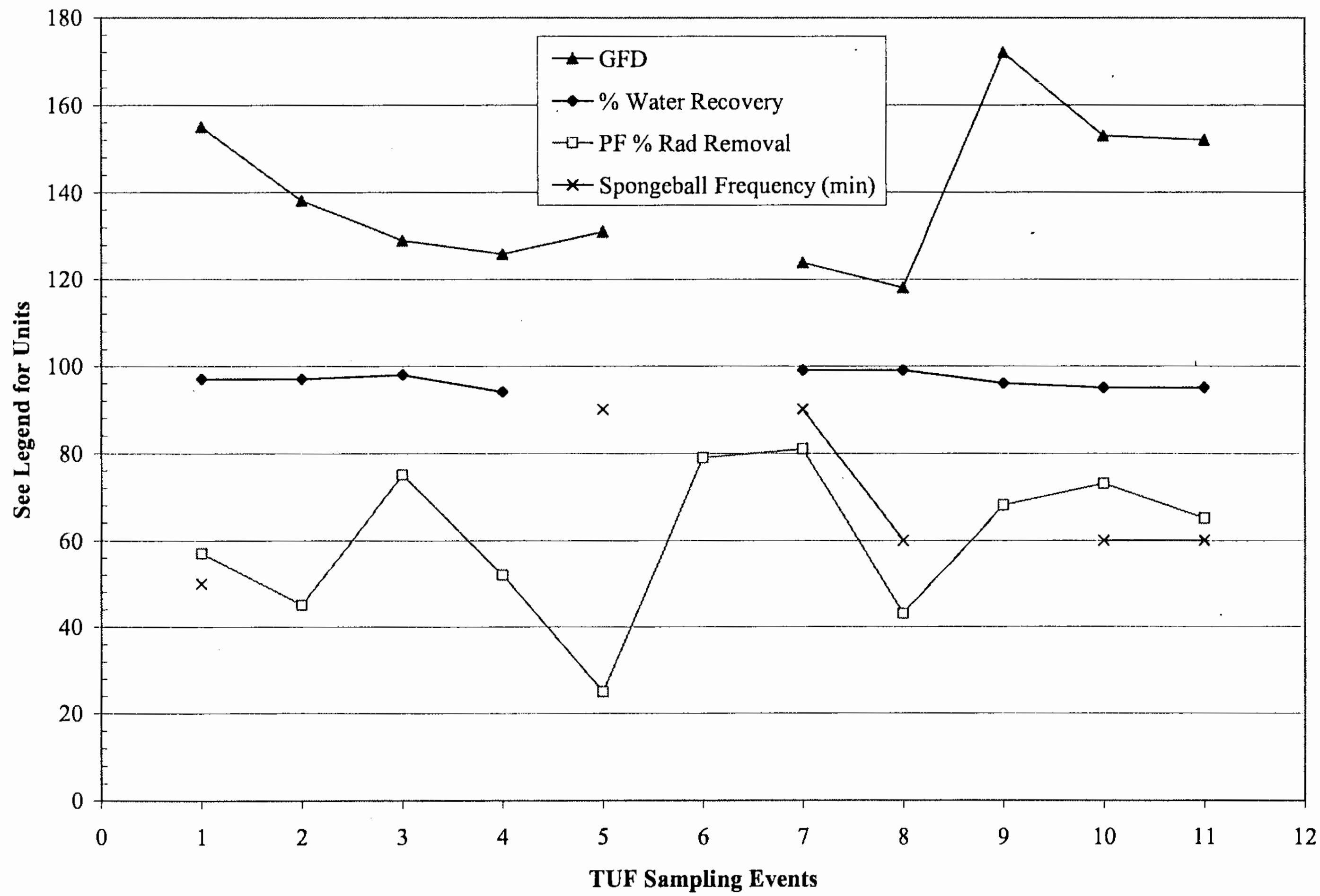


Figure 20 RLWTF Tubular Ultrafilter Operational Parameters and Gross α Removal from the Primary Feed



Based upon the radiological and operational data obtained during the competitive membrane filtration testing period the following operational parameters would be recommended for initial start up of each filtration technology.

Table 4 Recommended Operational Parameters (Based on Pilot Testing) for the Five Membrane Filtration Units when Treating Gravity Filter Effluent at the RLWTF

Memtek® tubular microfilter	90 GFD (average TMP should be less than 10 psig) 95% water recovery 20 gpm recycle rate (tube flow rate = 8.25 fps) 30 minute BW interval 8 second BW duration at 915 GFD with permeate
Memcor® hollow-fiber microfilter	30 GFD (average TMP should be less than 2 psig) 95% water recovery 110 minute BW interval with feed water
Zenon® hollow-fiber ultrafilter	15 GFD (vacuum should be less than 2.0 inches of Hg) 95% water recovery 30 minute BW interval 15 second BW duration at 22 GFD with permeate
Koch® hollow-fiber ultrafilter	35 GFD (average TMP should be less than 6 psig) 95% water recovery 8 gpm recycle rate/26.5 ft^2 module (lumen flowrate = 2.3 fps) 30 minute BW interval 20 second BW duration at 104 GFD with permeate
RLWTF tubular ultrafilter	150 GFD (average TMP should be less than 42 psig) 95% water recovery 700 gpm recycle rate/770 ft^2 of membranes (individual tube flow rate = 11.5 fps) 60 minute spongeball interval

2.2.3. Performance Criteria Evaluation of Filtration Technologies

Six criteria were used to quantify the performance of each filtration technology. A description of each criterion follows. Also, the performance of each filtration technology is compared in a tabular nature as a function of each criterion.

2.2.3.1. Permeate Quality

It was the goal of the testing effort to find a membrane filtration technology that would produce a permeate stream which was in compliance with the U.S. Department of Energy Order 5400.5, "Radiation Protection of the Public and the Environment." To be in accordance with this order, the permeate from the filtration units needed to be equal to or less than 30 pCi/L of gross α.

Table 5 summarizes the removal of gross α from the primary feed and membrane feed streams for each of the filtration technologies. It is to be realized that the averages given in Table 5 are derived from raw data with uncertainties of up to ± 10%. The first row of Table 5 indicates, in terms of overall removal of gross α from the primary feed, that the units performed nearly the same (all removing an average of 54% to 60%).

Rows 2 and 3 of Table 5 indicate that the Memtek®, Zenon® and Koch® HF units tended to remove a slightly greater percentage of gross α from the membrane feed waters when a slower GFD was used. On the other hand, gross α removal appeared to improve in the Memcor® unit at a higher GFD. The TUF was operated within a small range of GFD values.

Row 4 indicates the number of permeate samples out of the total number of sampling events in which the gross α concentration in the permeate was equal to or less than 30 pCi/L for each filtration unit.

Table 5 Permeate Quality Performance Criteria Comparison

Memtek® MF	Memcor® MF	Zenon® HF	Koch® HF	RLWTF TUF
▪ Overall removal of gross α from the PF was 55%[1]	▪ Overall removal of gross α from the PF was 54%[2]	▪ Overall removal of gross α from the PF was 54%[3]	▪ Overall removal of gross α from the PF was 57%[4]	▪ Overall removal of gross α from the PF was 60%[5]
▪ At less than 123 GFD, 88% of rad removed from MKF[6]	▪ At 15 GFD, 50% of rad removed from PF[7]	▪ At 15 GFD, 88% of rad removed from ZF[8]	▪ At 35 GFD, 87% of rad removed from KF[9]	▪ At 130-150 GFD, 95% of rad removed from TF[10]
▪ At greater than 123 GFD, 82% rad removal from MKF[11]	▪ At 30 GFD, 57% rad removal from PF[12]	▪ At 30 GFD, 82% rad removal from ZF[13]	▪ At 65 GFD, 82% rad removal from KF[14]	
▪ Meets DOE Order 5400.5 two (2) out of twenty-seven (27) times[15] (7%)	▪ Meets DOE Order 5400.5 three (3) out of thirty-two (32) times[16] (9%)	▪ Meets DOE Order 5400.5 one (1) out of thirty (30) times[17] (3%)	▪ Meets DOE Order 5400.5 four (4) out of thirty-four (34) times[18] (12%)	▪ Meets DOE Order 5400.5 two (2) out of eleven (11) times[19] (18%)

1 average from 27 sampling events (see Figure 12)
2 average from 32 sampling events (see Figure 14)
3 average from 30 sampling events (see Figure 16)
4 average from 34 sampling events (see Figure 18)
5 average from 11 sampling events (see Figure 20)
6 average from 15 sampling events (see Table A1)
7 average from 17 sampling events (see Table A2)
8 average from 12 sampling events (see Table A3)
9 average from 13 sampling events (see Table A4)
10 average from 11 sampling events (see Table A5)
11 average of 10 sampling events (Table A1); not including 2 events with GFD > 200
12 average from 13 sampling events (see Table A2)
13 average from 14 sampling events (see Table A3)
14 average from 18 sampling events (see Table A4)
15 see Table A1
16 see Table A2
17 see Table A3
18 see Table A4
19 see Table A5

2.2.3.2. Operability

The RLWTF desires a membrane filtration unit that requires a minimal amount of operator intervention. This attention involves valving adjustment, regulation of flows and pressures, and manually initiated flushing and cleanings. This criterion includes routine maintenance. Experience gained in the pilot testing and also communication with clients using the various filtration technologies were used to evaluate each filtration technology according to this criteria.

Table 6 was developed to compare the operability of the five (5) treatment technologies. All five (5) technologies treated the primary feed water without difficulty and each could be scaled up to serve successfully in the RLWTF process.

Table 6 Operability Performance Criteria Comparison

<table>
<tr><th>Memtek® MF</th><th>Memcor® MF</th><th>Zenon® HF</th><th>Koch® HF</th><th>RLWTF TUF</th></tr>
<tr><td colspan="5">all membranes are chlorine resistant</td></tr>
<tr><td colspan="5">each system “batch” or “continuous”operation capable</td></tr>
<tr><td colspan="5">every two (2) month chemical cleaning frequency (estimated from testing period)</td></tr>
<tr><td colspan="2">pH adjustment not required</td><td>pH adjustment from 11.0 to 9.5 required</td><td colspan="2">pH adjustment not required</td></tr>
<tr><td>40% FTE[1] required</td><td>40% FTE[1] required</td><td>45% FTE[1] required</td><td>40% FTE[1] required</td><td>40% FTE[1] required</td></tr>
<tr><td>seal water system required</td><td colspan="2">seal water system not required</td><td>seal water system required</td><td>seal water system required</td></tr>
<tr><td>uses permeate for backwash</td><td>uses feed water for backwash</td><td colspan="2">uses permeate for backwash</td><td>spongeball cleaning system uses concentrate water</td></tr>
<tr><td>membrane feed is greater than primary feed to unit</td><td>membrane feed is not greater than primary feed to unit</td><td colspan="3">membrane feed is greater than primary feed to unit</td></tr>
<tr><td colspan="4">new technology for RLWTF operations</td><td>3+ years of operational experience at RLWTF</td></tr>
<tr><td colspan="4">interviews indicate smooth operation after startup</td><td>unit is “one of a kind”, much redesign has been required; smooth operation now standard</td></tr>
<tr><td>-----</td><td>-----</td><td>foaming issues in feed tank need to be addressed</td><td>-----</td><td>-----</td></tr>
</table>

[1] Full Time Equivalent. Estimate of one operator’s attention devoted to this technology if implemented full-scale at the RLWTF

2.2.3.3. Secondary Waste Generation

It was the goal of the RLWTF to obtain a filtration technology that yielded a 95% permeate water recovery. This means that for every 100 gallons of feed water to the unit, there will be 95 gallons of permeate produced and only 5 gallons of secondary waste. Secondary waste in a filtration system comes from a number of sources: membrane flushes, cleaning waters, and concentrate tank bleed or purge waters. Secondary waste from any filtration unit at the RLWTF requires retreatment. This retreatment involves additional operation time, operator attention and chemical addition. Thus, the need to minimize secondary waste retreatment.

Table 7 demonstrates that all five (5) filtration technologies were able to operate successfully at 95% water recovery and would attain the desired RLWTF goal.

Table 7 Secondary Waste Performance Criteria Comparison

Memtek® MF	**Memcor® MF**	**Zenon® HF**	**Koch® HF**	**RLWTF TUF**
95% permeate water recovery attainable				
continuous or incremental blowdown of concentrate	incremental blowdown of concentrate	continuous or incremental blowdown of concentrate		incremental blowdown of concentrate

2.2.3.4. Cost

The capital cost and operating costs associated with a particular membrane filtration technology were considered to estimate the life-cycle cost of implementing that technology. Capital costs included the cost of the unit itself, other ancillary equipment (for example, tanks, air compressors, seal water systems, etc.) and also facility modifications required for that particular technology (for example, ventilation issues, space needs, power requirements etc.). Operating costs included power for pumps, compressors, blowers, chemical costs, routine unit maintenance, and regular membrane replacement costs.

Table 8 compares the five (5) filtration technologies in the light of this performance criterion.

Table 8 Cost Performance Criteria Comparison

Memtek® MF	Memcor® MF	Zenon® HF	Koch® HF	RLWTF TUF
large facility footprint required	small facility footprint required		medium facility footprint required	
low initial capital cost for unit	medium initial capital cost for unit		medium to high initial capital cost for unit	high initial capital cost for unit
new membranes are medium to high in cost	new membranes are low in cost	new membranes are medium in cost	new membranes are low in cost	new membranes are high in cost
large recycle pump required	large recycle pump not required	permeate, blower and sprayer pumps required	large recycle pump required	
potential need for chiller on recirculation line (depending on size of feed / concentrate tank)	not applicable	not applicable	potential need for chiller on recirculation line (depending on size of feed/concentrate tank)	
not applicable	not applicable	height requirement an issue during membrane replacement	not applicable	not applicable
not applicable	potential ventilation issues in a radiological environment during backwash	potential ventilation issues in a radiological environment when blower in operation	not applicable	not applicable

2.2.3.5. Process Reliability

Process reliability addresses the ability of the process to accommodate a wide range of transient influent conditions. Of concern for this application at the RLWTF is the unit's ability to accommodate an increase in suspended solids in the feed to the filtration unit. This occasionally occurs due to solids breakthrough of the gravity sand filter and plugging of the bag filter. Table 9 addresses these concerns for the five (5) filtration technologies.

Table 9 Process Reliability Performance Criteria Comparison

<table>
<tr><th>Memtek® MF</th><th>Memcor® MF</th><th>Zenon® HF</th><th>Koch® HF</th><th>RLWTF TUF</th></tr>
<tr><td>tubular design will handle 200 µm sized particles in feed water</td><td colspan="2">hollow-fiber design with outside to inside flow path will handle 200 µm sized particles in feed water</td><td>requires most pretreatment of feed water due to inside to outside flow path of water through the hollow-fiber</td><td>tubular design will handle 200 µm sized particles in feed water</td></tr>
<tr><td>flux maintained by recycle flow through tube and permeate backpulse</td><td>flux maintained by air scour backpulse and fast feed water flush during backwash</td><td>flux maintained by air bubble abrasion and permeate backpulse</td><td>flux maintained by recycle flow through hollow-fibers and permeate backpulse</td><td>flux maintained by recycle flow through tube and spongeball system</td></tr>
</table>

2.2.3.6. Equipment Reliability

This factor relates to non-routine maintenance requirements and is typically gauged by frequency of maintenance attention on major pieces of equipment. Interviews (by telephone) of at least three (3) clients using each technology were performed. Special consideration was given to the following: amount of non-routine operator attention required for unit operation, unique advantages or disadvantages resulting from batch-mode operation, ALARA considerations pertaining to operation and maintenance in a radiological environment, and the amount of unit downtime on an annual basis. Figure 10 summarizes information on each of the five (5) filtration technologies pertaining to this performance criterion.

Table 10 Equipment Reliability Performance Criteria Comparison

<table>
<tr><th>Memtek® MF</th><th>Memcor® MF</th><th>Zenon® HF</th><th>Koch® HF</th><th>RLWTF TUF</th></tr>
<tr><td colspan="5">two (2) year expected membrane life</td></tr>
<tr><td colspan="4">client interviews: all would purchase another unit</td><td>greatly altered unit is serving well in RLWTF process</td></tr>
<tr><td>medium mechanical complexity</td><td>low mechanical complexity</td><td colspan="2">medium mechanical complexity</td><td>high mechanical complexity</td></tr>
</table>

3. Recommendation

Given the approximate equality of performance among the pilot units and the known performance of the existing full scale tubular ultrafilter unit, redundancy to TUF operation through identification and purchase of all critical spare TUF components is recommended for further consideration. These components should be stored at the RLWTF. Replacement and/or repair of any or all components could be accomplished within a maximum of three (3) calendar days.

4. References

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5. Appendix – Operational and Radiological Data from the Filtration Units

The operational and radiological data used to develop Figures 11 through 20 are displayed in Tables A1 through A5. The information in these tables was taken from the daily operational logs kept for each filtration unit and also includes the results of radiological analyses of the feed and permeate streams of each filtration unit.

Information displayed in each table includes:

Ops Day, Date and Sampling Event – Column 1 records each day that a particular filtration unit was operated. The Ops Day and Date are shaded if a particular sample was considered a sampling event (see definition of sampling event in Section 2.2.1.2).

Daily Ops (Hours) – The number of hours the unit treated radioactive liquid waste on a given day is recorded in Column 2.

Three columns (Columns 3, 4 and 5) display information pertaining to the removal of radioactive material from the feed waters to the filtration units. The gross α concentration in the primary feed (PF) and the membrane feed streams (MKF, ZF, KF, and TF) are given in a stacked configuration in Column 3. The permeate gross α analyses are displayed in Column 4. Column 5 is calculated from the information given in Columns 3 and 4. Column 5 is the gross α removal from the primary feed and the membrane feed. If a particular Ops Day has two rows of data, it indicates that that particular day had two samples.

Permeate flow or the calculated flux rate (GFD) through the membrane at the time of the sampling event is shown in Column 6.

The water recovery through a particular filtration unit for the entire Ops Day is shown in Column 7. This number was calculated from totalizing flow meters on the feed stream to the unit and by recording bleed and purge volumes from each unit for the day.

Total feed water (in gallons) to each unit per Ops Day is recorded in Column 8.

Column 9 displays operational parameters at the time that a particular sampling event occurred. Water temperature, average transmembrane pressure (TMP), backwash frequency and duration, recycle flow rates, etc. are given.

Table A1 Memtek® Pilot Unit Operational and Radiological Data

Ops Day Date	Daily Ops (Hours)	PF MKF (pCi/L)	MKP (pCi/L)	PF MKF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
1 5/1/02	1.2	70 -----	65	3 -----	0.35 (168)	90	31	20°C TMP = 22 psig BW freq/dur = 6 min/8sec (1 liter)
2 5/2/02	5.0	328 651	63	81 90	0.35 (168)	93	178	30°C TMP = 23 psig BW freq/dur = 6 min/8 sec (1 liter)
3 5/3/02	6.4	452 799 621 660	102 278	77 87 55 58	0.26 (127)	89	141	32°C TMP = 22.5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 25 gpm
4 5/6/02	7.8	818 1186 495 1486	249 283	70 79 43 81	0.32 (152)	90	182	33°C TMP = 12 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 33 gpm
5 5/7/02	8.2	484 1959 440 1390	203 180	58 90 59 87	0.29 (138)	96	157	33°C TMP = 12 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 32 gpm
6 5/8/02	7.3	454 1725 281 1287	198 159	56 89 43 88	0.25 (121)	96	135	35°C TMP = 12 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 31 gpm
7 5/9/02	6.2	310 1221	133	57 89	0.23 (109)	95	104	34°C TMP = 12.5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 30 gpm

Table A1, Memtek® continued

Ops Day Date	Daily Ops (Hours)	PF MKF (pCi/L)	MKP (pCi/L)	PF MKF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
8 5/10/02	2.9	322 1137	161	50 86	0.21 (103)	96	64	31^0C TMP = 12.5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 30 gpm
9 5/13/02	6.7	567 849	497	12 41	0.24 (117)	96	123	33^0C TMP = 12.5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 31 gpm
		550 888	522	5 41				
10 5/14/02	8.2	363 717	407	-12 43	0.24 (117)	95	131	35^0C TMP = 12 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 30 gpm
		174 874	227	-31 74				
11 5/15/02	7.6	156 301	151	3 50	0.26 (127)	93	116	33^0C TMP = 29 psig BW freq/dur = 30 min/8 sec (1 liter) Recycle = 17 gpm
12 5/16/02	8.5	88 570	116	-32 80	0.29 (138)	94	144	36^0C TMP = 12.5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 29 gpm
13 5/21/02	5.4	93 163	60	36 63	0.49 (238)	97	122	32^0C TMP = 12.5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 31 gpm
14 5/23/02	5.7	146 394	51	65 87	0.22 (104)	96	74	37^0C TMP = 5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 15 gpm
15 5/28/02	4.0	50 506	30	40 94	0.22 (104)	97	58	35^0C TMP = 5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 16 gpm

Table A1. Memtek® continued

Ops Day Date	Daily Ops (Hours)	PF MKF (pCi/L)	MKP (pCi/L)	PF MKF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
16 5/29/02	4.2	60 581	143	-138 75	0.22 (104)	97	59	37^{0}C TMP = 5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 16.5 gpm
17 5/30/02	3.6	87 1006	34	61 97	0.23 (108)	98	50	39^{0}C TMP = 4.5 psig BW freq/dur = 10 min/8 sec (1 liter) Recycle = 17 gpm
18 6/3/02	5.0	156 943	110	30 88	0.17 (82)	96	58	39^{0}C TMP = 3.5 psig BW freq/dur = 10 min/8 sec (1 liter) Recycle = 14 gpm
19 6/4/02	4.5	158 1160	45	72 96	0.23 (112)	81	75	34^{0}C TMP = 4.5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 17 gpm
20 6/5/02	4.8	28 549	23	18 96	0.23 (109)	80	73	36^{0}C TMP = 5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 18 gpm
21 6/6/02	4.4	102 223	69	32 69	0.22 (104)	85	88	33^{0}C TMP = 5 psig BW freq/dur = 6 min/8 sec (1 liter) Recycle = 17 gpm
22 6/10/02	2.1	89 235	40	55 83	0.21 (102)	84	40	35^{0}C TMP = 9 psig BW freq/dur = 15 min/8 sec (1 liter) Recycle = 12 gpm
23 6/11/02	6.7	111 458	34	69 93	0.3 (142)	91	136	39^{0}C TMP = 8 psig BW freq/dur = 10 min/8 sec (1 liter) Recycle = 25 gpm

Table A1. Memtek® continued

Ops Day Date	Daily Ops (Hours)	PF MKF (pCi/L)	MKP (pCi/L)	PF MKF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
24 6/12/02	5.0	92 225	33	64 85	0.24 (114)	91	101	34^{0}C TMP = 10.5 psig BW freq/dur = 30 min/8 sec (1 liter) Recycle = 23 gpm
25 6/17/02	5.3	406 1124	116	72 90	0.18 (85)	97	74	38^{0}C TMP = 5.5 psig BW freq/dur = 30 min/8 sec (1 liter) Recycle = 17 gpm
26 6/18/02	4.7	360 1288	138	62 89	0.17 (82)	96	50	39^{0}C TMP = 6 psig BW freq/dur = 30 min/8 sec (1 liter) Recycle = 19 gpm
27 6/19/02	4.2	280 2408	154	45 94	0.42 (203)	97	74	42^{0}C TMP = 7.5 psig BW freq/dur = 30 min/8 sec (1 liter) Recycle = 25 gpm
28 6/24/02	5.3	805 2100	129	84 94	0.14 (69)	97	95	41^{0}C TMP = 4 psig BW freq/dur = 30 min/8 sec (1 liter) Recycle = 16 gpm
29 6/25/02	5.3	177 2225	101	43 96	0.21 (100)	96	64	38^{0}C TMP = 5 psig BW freq/dur = 30 min/8 sec (1 liter) Recycle = 19 gpm
30 6/26/02	6.8	66 1700	84	-27 95	0.17 (84)	96	75	39^{0}C TMP = 5.5 psig BW freq/dur = 60 min/8 sec (1 liter) Recycle = 17 gpm
Totals	**163 hours**	-----	-----	-----	-----	-----	**2,872 gallons**	

Table A2 Memcor® Pilot Unit Operational and Radiological Data

Ops Day Date	Daily Ops (Hours)	PF (pCi/L)	MRP (pCi/L)	Percent Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
1 5/1/02	4.6	369	80	78	10 (30)	90	3,479	19^0C TMP = 1.6 psig BW freq = 46 min BW dur = 3 min (58 gallons)
		216	35	84				
2 5/2/02	7.8	273	67	76	10 (30)	89	5,070	19^0C TMP = 1.7 psig BW freq = 46 min BW dur = 3 min (58 gallons)
		328	170	48				
3 5/3/02	6.1	452	190	58	9.8 (29)	90	4,202	18^0C TMP = 1.7 psig BW freq = 46 min BW dur = 3 min (58 gallons)
		621	182	71				
4 5/6/02	7.3	818	190	77	10.1 (30)	93	4,807	17^0C TMP = 1.7 psig BW freq = 116 min BW dur = 3 min (58 gallons)
		495	315	36				
5 5/7/02	8.2	484	314	35	10 (30)	95	5,031	18^0C TMP = 1.7 psig BW freq = 116 min BW dur = 3 min (58 gallons)
		440	194	56				
6 5/8/02	7.3	454	266	41	9.8 (29)	96	4,712	19^0C TMP = 1.7 psig BW freq = 116 min BW dur = 3 min (58 gallons)
		281	194	31				
7 5/9/02	4.6	310	NA	NA	9.8 (29)	96	3,846	19^0C TMP = 1.6 psig BW freq = 116 min BW dur = 3 min (58 gallons)
8 5/10/02	3.9	322	158	51	9.8 (29)	95	2,285	20^0C TMP = 1.6 psig BW freq = 116 min BW dur = 3 min (58 gallons)

Table A2, Memcor® continued

Ops Day Date	Daily Ops (Hours)	PF (pCi/L)	MRP (pCi/L)	Percent Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
9 5/13/02	6.8	567 550	756 466	-33 15	9.9 (30)	96	4,527	19^{0}C TMP = 1.6 psig BW freq = 116 min BW dur = 3 min (58 gallons) pH low in feed water (pH 8.3)
10 5/14/02	8.3	363 174	373 204	-3 -17	10 (30)	95	4,963	TMP = 1.6 psig BW freq = 116 min BW dur = 3 min (58 gallons) pH low in feed water (pH 8.3)
11 5/15/02	8.0	156	254	-63	10 (30)	95	5,194	19^{0}C TMP = 4.7 psig BW freq = 77 min BW dur = 3 min (58 gallons)
12 5/16/02	6.5	88	93	-6	10 (30)	95	4,030	19^{0}C TMP = 1.5 psig BW freq = 116 min BW dur = 3 min (58 gallons)
13 5/21/02	5.1	93	70	25	5.3 (16)	93	2,110	19^{0}C TMP = 0.6 psig BW freq = 116 min BW dur = 3 min (58 gallons)
14 5/22/02	3.1	83	60	28	4.9 (15)	94	948	20^{0}C TMP = 0.6 psig BW freq = 220 min BW dur = 3 min (58 gallons)
15 5/23/02	5.3	146	49	66	4.9 (14)	95	1,803	20^{0}C TMP = 0.5 psig BW freq = 220 min BW dur = 3 min (58 gallons)
16 5/28/02	3.9	50	23	54	4.8 (14)	95	1,201	19^{0}C TMP = 0.5 psig BW freq = 220 min BW dur = 3 min (58 gallons)
17 5/29/02	3.9	60	35	42	4.8 (14)	95	1,241	TMP = 0.5 psig BW freq = 220 min BW dur = 3 min (58 gallons)

Table A2, Memcor® continued

Ops Day Date	Daily Ops (Hours)	PF (pCi/L)	MRP (pCi/L)	Percent Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
18 5/30/02	3.9	87	65	25	4.6 (14)	94	1,070	TMP = 0.5 psig BW freq = 220 min BW dur = 3 min (58 gallons)
19 6/3/02	5.4	156	123	21	5 (15)	95	1,704	21°C TMP = 0.4 psig BW freq = 220 min BW dur = 3 min (58 gallons)
20 6/4/02	4.3	158	25	84	5.2 (16)	77	1,710	20°C TMP = 0.45 psig BW freq = 35 min BW dur = 3 min (58 gallons)
21 6/5/02	4.3	28	17	39	5.2 (16)	76	1,634	20°C TMP = 0.45 psig BW freq = 35 min BW dur = 3 min (58 gallons)
22 6/6/02	4.6	102	70	31	5 (15)	76	1,770	20°C TMP = 0.45 psig BW freq = 35 min BW dur = 3 min (58 gallons)
23 6/10/02	2.1	89	45	49	5 (15)	88	970	TMP = 0.35 psig BW freq = 35 min BW dur = 3 min (58 gallons)
24 6/11/02	6.8	111	33	70	7.5 (22)	90	3,410	21°C TMP = 0.65 psig BW freq = 70 min BW dur = 3 min (58 gallons)
25 6/12/02	3.5	92	38	59	7.3 (22)	100	1,575	21°C TMP = 0.8 psig BW freq = 240 min BW dur = 3 min (58 gallons)
26 6/17/02	5.5	406	126	69	5.2 (15)	95	1,769	24°C TMP = 0.4 psig BW freq = 220 min BW dur = 3 min (58 gallons)

Table A2, Memcor® continued

Ops Day Date	Daily Ops (Hours)	PF (pCi/L)	MRP (pCi/L)	Percent Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
27 6/18/02	4.6	360	150	58	5.2 (15)	95	1,494	22^{0}C TMP = 0.4 psig BW freq = 220 min BW dur = 3 min (58 gallons)
28 6/19/02	3.1	280 1304	161 378	43 71	5 (15)	95	985	23^{0}C TMP = 0.35 psig BW freq = 220 min BW dur = 3 min (58 gallons)
29 6/24/02	4.3	890	170	81	5 (15)	95	1,367	23^{0}C TMP = 0.35 psig BW freq = 220 min BW dur = 3 min (58 gallons)
30 6/25/02	5.3	177	60	66	5.1 (15)	95	1,658	23^{0}C TMP = 0.3 psig BW freq = 220 min BW dur = 3 min (58 gallons)
31 6/26/02	6.9	66	54	18	5.1 (15)	95	2,170	23^{0}C TMP = 0.3 psig BW freq = 220 min BW dur = 3 min (58 gallons)
Totals	**165 hours**	-----	-----	-----	-----	-----	**82,735 gallons**	

Table A3 Zenon® Pilot Unit Operational and Radiological Data

Ops Day Date	Daily Ops (Hours)	PF ZF (pCi/L)	ZP (pCi/L)	PF ZF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
1 5/1/02	4.6	369 467	126	66 73	10.7 (24.9)	84	3,315	20^0C Vacuum = 4.9 inch Hg BW freq/dur = 30 min/15sec BW flow rate = 9.5 gpm
		216 510	56	74 89	10.8 (25.1)			
2 5/2/02	8.0	273 679	55	80 92	11.0 (25.6)	84	6,205	19^0C Vacuum = 6.0 inch Hg BW freq/dur = 30 min/15sec BW flow rate = 9.5 gpm
		328 688	148	55 79				
3 5/3/02	7.2	452 794	160	65 80	11.0 (25.6)	83	5,506	18^0C Vacuum = 5.3 inch Hg BW freq/dur = 30 min/15sec BW flow rate = 9.5 gpm
		621 926	225	64 76				
4 5/6/02	7.5	818 1435	271	67 81	10.9 (25.3)	90	5,608	18^0C Vacuum = 6.7 inch Hg BW freq/dur = 30 min/15sec BW flow rate = 9.5 gpm
		495 1567	279	44 82				
5 5/7/02	8.3	484 1720	248	49 86	11.0 (25.6)	94	5,760	18^0C Vacuum = 6.4 inch Hg BW freq/dur = 30 min/15sec BW flow rate = 9.5 gpm
		440 1423	219	50 85				
6 5/8/02	8.3	454 1686	133	71 92	10.9 (25.3)	94	5,648	18.5^0C Vacuum = 8.8 inch Hg BW freq/dur = 30 min/15sec BW flow rate = 9.5 gpm
		281 937	148	47 84				
7 5/9/02	8.0	310 641	191	38 70	11.0 (25.6)	94	4,653	18.5^0C Vacuum = 7.3 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 29.6 gpm

Table A3, Zenon® continued

Ops Day Date	Daily Ops (Hours)	PF ZF (pCi/L)	ZP (pCi/L)	PF ZF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
8 5/10/02	3.8	322 820	134	58 84	11.1 (25.8)	96	2,388	19^0C Vacuum = 7.4 inch Hg BW freq/dur = 15 min/15sec
9 5/13/02	7.2	567 1122	663	-17 41	11.1 (25.8)	93	5,079	19^0C Vacuum = 8.8 inch Hg BW freq/dur = 15 min/15sec
		550 1214	490	11 60				
10 5/14/02	8.1	363 691	418	-15 40	11.0 (25.6)	94	5,623	19^0C Vacuum = 8.8 inch Hg BW freq/dur = 15 min/15sec
		174 721	208	-20 71				
11 5/15/02	7.2	156 686	125	20 82	17.8 (41.3)	94	7,403	19^0C Vacuum = 14.5 inch Hg BW freq/dur = 7 min/15sec Unit would not BW
12 5/21/02	2.0	93 186	145	-56 22	6.2 (14.4)	94	1,186	21^0C Vacuum = 3.8inch Hg BW freq/dur = 15 min/15sec
13 5/23/02	5.7	146 697	56	62 92	6.6 (15.3)	95	2,009	20^0C Vacuum = 1.0inch Hg BW freq/dur = 5 min/15sec
14 5/28/02	4.3	50 863	42	16 95	6.1 (14.2)	96	1,586	20^0C Vacuum = 0.7 inch Hg BW freq/dur = 10 min/15sec BW flow rate = 9.5 gpm
15 5/29/02	4.3	60 633	37	38 94	6.0 (13.9)	97	1,528	20^0C Vacuum = 1.1 inch Hg BW freq/dur = 10 min/15sec BW flow rate = 9.5 gpm
16 5/30/02	3.8	87 1221	39	55 97	6.3 (14.6)	95	1,422	21^0C Vacuum = 0.9 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 9.5 gpm

Table A3, Zenon® continued

Ops Day Date	Daily Ops (Hours)	PF ZF (pCi/L)	ZP (pCi/L)	PF ZF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
17 6/3/02	5.5	156 578	94	40 84	5.9 (13.7)	96	2,001	22^{0}C Vacuum = 1.2 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 9.5 gpm
18 6/4/02	4.7	158 324	37	77 89	6.6 (15.3)	76	2,293	21^{0}C Vacuum = 1.4 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 9.5 gpm
19 6/5/02	4.8	28 212	17	39 92	6.6 (15.3)	75	2,257	21^{0}C Vacuum = 1.1 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 9.5 gpm
20 6/6/02	3.8	102 129	72	29 44	6.6 (15.3)	81	1,963	21^{0}C Vacuum = 1.2 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 9.5 gpm
21 6/10/02	4.0	89 275	37	58 87	9.7 (22.5)	56	2,154	22^{0}C Vacuum = 2.0 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 9.5 gpm
22 6/11/02	7.1	111 628	33	70 95	8.8 (20.4)	93	3,921	22^{0}C Vacuum = 2.0 inch Hg BW freq/dur = 15 min/15sec BW flow rate = 13.0 gpm
23 6/12/02	5.0	92 219	31	66 86	8.7 (20.2)	94	2,699	23^{0}C Vacuum = 2.5 inch Hg BW freq/dur = 30 min/15sec BW flow rate = 13.0 gpm
24 6/17/02	5.5	406 1324	148	64 89	6.6 (15.3)	105	2,067	22^{0}C Vacuum = 1.6 inch Hg BW freq/dur = 30 min/15sec
25 6/18/02	4.7	360 1459	161	55 89	6.5 (15.1)	95	1,860	22^{0}C Vacuum = 1.6 inch Hg BW freq/dur = 30 min/15sec

Table A3, Zenon® continued

Ops Day Date	Daily Ops (Hours)	PF ZF (pCi/L)	ZP (pCi/L)	PF ZF % Removal	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
26 6/19/02	4.0	280 1582	125	55 92	6.5 (15.1)	99	1,192	24°C Vacuum = 1.7 inch Hg BW freq/dur = 30 min/15sec
27 6/25/02	5.3	177 2239	89	50 96	6.4 (14.9)	81	2,479	23°C Vacuum = 1.4 inch Hg BW freq/dur = 30 min/15sec
28 6/26/02	6.8	66 990	66	0 93	6.6 (15.3)	95	3,113	23°C Vacuum = 1.4 inch Hg BW freq/dur = 30 min/15sec
Totals	**159 hours**	-----	-----	-----	-----	-----	**92,918 gallons**	

Table A4 Koch® Hollow-Fiber Pilot Unit Operational and Radiological Data

Ops Day Date	Daily Ops (Hours)	PF KF (pCi/L)	KP (pCi/L)	PF KF (% Removal)	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
1 5/1/02	1.1	369 546	62	83 89	1.7 (92)	100	104	21^0C TMP = 17.5 psig BW freq/dur = 15min/20sec(0.64 gal) Concentrate recycle = 20 gpm
		216 642	60	72 91	1.5 (82)			
2 5/2/02	8.0	273 1609	44	84 97	1.0 (54)	91	348	22^0C TMP = 24 psig BW freq/dur = 15min/20sec(0.64 gal) Concentrate recycle = 14 gpm Membrane plugging
		328 632	135	59 79	1.3 (71)			20^0C TMP = 23 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 15 gpm
3 5/3/02	6.9	452 1175	176	61 85	1.1 (60)	82	401	19^0C TMP = 23 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 15 gpm
		621 1075	201	68 81				
4 5/6/02	7.3	818 1771	234	71 87	1.2 (65)	93	586	20^0C TMP = 22 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 16 gpm
		495 1486	260	47 83				
5 5/7/02	8.4	484 2684	274	43 90	1.2 (65)	94	340	20^0C TMP = 21 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 16 gpm
		440 2022	232	47 89				
6 5/8/02	7.3	454 2523	202	56 92	1.0 (54)	89	242	20^0C TMP = 21 psig BW freq/dur = 5min/20sec(0.64 gal)
		281 2101	159	43 92				
7 5/9/02	6.2	310 1541	157	49 90	1.0 (54)	94	395	20^0C TMP = 21 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 16 gpm

Table A4, Koch® Hollow-Fiber continued

Ops Day Date	Daily Ops (Hours)	PF KF (pCi/L)	KP (pCi/L)	PF KF (% Removal)	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
8 5/10/02	5.5	322 2011	157	51 92	1.3 (71)	96	449	21^{0}C TMP = 21 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 15.5 gpm
9 5/13/02	6.8	567 1323	599	-6 55	0.95 (52)	94	394	21^{0}C TMP = 21 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 15 gpm pH low in the feed water (pH 8.3)
		550 1171	469	15 60				
10 5/14/02	7.1	363 784	350	4 55	1.3 (71)	95	537	20^{0}C TMP = 23 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 14 gpm pH low in the feed water (pH 8.3)
		174 463	238	-37 49				
11 5/15/02	8.0	156 478	127	19 73	1.25 (70)	95	558	22^{0}C TMP = 30 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 8 gpm
12 5/16/02	8.5	88 1102	108	-23 90	1.0 (54)	95	567	19^{0}C TMP = 23 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 14 gpm
13 5/21/02	2.0	93 117	43	54 63	1.25 (70)	100	150	22^{0}C TMP = 23 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 14 gpm
14 5/22/02	4.0	83 143	50	40 65	1.2 (65)	98	283	24^{0}C TMP = 14 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 13 gpm
15 5/23/02	5.6	146 381	54	63 86	0.6 (33)	96	208	20^{0}C TMP = 5 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 8.5 gpm

Table A4, Koch® Hollow-Fiber continued

Ops Day Date	Daily Ops (Hours)	PF KF (pCi/L)	KP (pCi/L)	PF KF (% Removal)	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
16 5/28/02	4.5	50 308	26	48 92	0.6 (33)	96	168	20^0C TMP = 4 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 9 gpm
17 5/29/02	4.3	60 248	40	33 84	0.6 (33)	95	133	23^0C TMP = 4 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 9 gpm
18 5/30/02	3.7	87 254	33	62 87	0.6 (33)	96	123	24^0C TMP = 4 psig BW freq/dur = 10min/20sec(0.64 gal) Concentrate recycle = 8.8 gpm
19 5/31/02	4.8	84 84	53	37 37	1.0 (54)	90	316	22^0C TMP = 6.5 psig BW freq/dur = 5min/30sec(0.96 gal) Operated in "dead head" mode
20 6/3/02	5.0	156 208	74	53 64	0.65 (35)	96	193	27^0C TMP = 3 psig BW freq/dur = 10min/20sec(0.64 gal) Concentrate recycle = 7.8 gpm
21 6/4/02	4.3	158 1884	35	78 98	0.6 (33)	78	165	26^0C TMP = 2.5 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 7.9 gpm
22 6/5/02	4.8	28 185	18	36 90	0.6 (33)	78	164	22^0C TMP = 2.5 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 7.6 gpm
23 6/6/02	4.6	102 162	65	36 60	0.6 (33)	82	151	25^0C TMP = 3.5 psig BW freq/dur = 5min/20sec(0.64 gal) Concentrate recycle = 7.8 gpm
24 6/10/02	2.5	89 394	31	65 92	1.8 (98)	100	170	26^0C TMP = 9 psig BW freq/dur = 15min/20sec(0.64 gal) Concentrate recycle = 12.5 gpm

Table A4, Koch® Hollow-Fiber continued

Ops Day Date	Daily Ops (Hours)	PF KF (pCi/L)	KP (pCi/L)	PF KF (% Removal)	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Total Feed (Gallons)	Operational Details
25 6/11/02	7.0	111 446	25	77 94	0.9 (49)	91	372	25^0C TMP = 4.5 psig BW freq/dur = 10min/20sec(0.64 gal) Concentrate recycle = 9.6 gpm
26 6/12/02	5.0	92 237	27	71 89	0.9 (49)	92	248	25^0C TMP = 5 psig BW freq/dur = 30min/20sec(0.64 gal) Concentrate recycle = 10.1 gpm
27 6/17/02	5.7	406 1534	115	72 93	0.6 (33)	96	203	28^0C TMP = 3.5 psig BW freq/dur = 30min/20sec(0.64 gal) Concentrate recycle = 8.1 gpm
28 6/18/02	4.7	360 1478	140	61 91	0.6 (33)	97	168	27^0C TMP = 5 psig BW freq/dur = 30min/20sec(0.64 gal) Concentrate recycle = 8.7 gpm
29 6/19/02	3.8	280 1991	118	58 94	0.6 (33)	97	136	27^0C TMP = 6 psig BW freq/dur = 30min/20sec(0.64 gal) Concentrate recycle = 9.2 gpm
30 6/24/02	5.8	805 2500	144	82 94	0.65 (35)	97	242	23^0C TMP = 4.5 psig BW freq/dur = 30min/20sec(0.64 gal) Concentrate recycle = 8.3 gpm
31 6/25/02	5.8	177 4063	63	64 98	0.6 (33)	97	204	28^0C TMP = 5 psig BW freq/dur = 30min/20sec(0.64 gal) Concentrate recycle = 8.2 gpm
32 6/26/02	6.8	66 2200	67	-2 97	0.6 (33)	97	244	28^0C TMP = 6 psig BW freq/dur = 60min/20sec(0.64 gal) Concentrate recycle = 8.0 gpm
Totals	**176 hours**	-----	-----	-----	-----	-----	**8,963 gallons**	

Table A5 Full-Scale RLWTF Tubular Ultrafilter Operational and Radiological Data

Ops Day Date	Daily Ops (Hours)	PF TF (pCi/L)	TP (pCi/L)	PF TF (% Removal)	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Operational Details
1 5/21/02	3.6	93 517	40	57 92	83 (155)	97	22°C Recycle: 683 gpm / 67 psig Concentrate: 93 gpm / 21 psig Spongeball frequency: 50 min
2 5/22/02	6.7	83 550	46	45 92	74 (138)	97	23°C Recycle: 710 gpm / 68 psig Concentrate: 122 gpm / 23 psig
3 5/23/02	6.0	146 681	37	75 95	69 (129)	98	23°C Recycle: 720 gpm / 67 psig Concentrate: 135 gpm / 22 psig
4 5/24/02	3.9	-----	-----	-----	73 (135)	93	23°C Recycle: 750 gpm / 69 psig Concentrate: 136 gpm / 20 psig
5 5/28/02	3.3	50 660	24	52 96	67 (126)	94	23°C Recycle: 688 gpm / 66 psig Concentrate: 140 gpm / 20 psig
6 5/29/02	3.8	60 1263	45	25 96	70 (131)	-----	25°C Recycle: 759 gpm / 71 psig Concentrate: 141 gpm / 19 psig Spongeball frequency: 90 min
7 5/30/02	6.0	-----	-----	-----	-----	-----	-----
8 6/3/02	4.0	156 1187	33	79 97	-----	-----	-----
9 6/4/02	2.0	158 1041	30	81 97	66 (124)	98.6	26°C Recycle: 770 gpm / 65 psig Concentrate: 133 gpm / 17 psig Spongeball frequency: 90 min
10 6/5/02	2.4	28 1028	50	-79 95	66 (124)	98.6	26°C Recycle: 680 gpm / 60 psig Concentrate: 140 gpm / 19 psig Spongeball frequency: 60 min

Table A5, Full-Scale RLWTF Tubular Ultrafilter continued

Ops Day Date	Daily Ops (Hours)	PF TF (pCi/L)	TP (pCi/L)	PF TF (% Removal)	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Operational Details
11 6/6/02	6.8	102 1101	58	43 95	63 (118)	98.6	24^0C Recycle: 715 gpm / 66 psig Concentrate: 140 gpm / 20 psig Spongeball frequency: 60 min
12 6/7/02	3.3	-----	-----	-----	63 (118)	93	26^0C Recycle: 690 gpm / 63 psig Concentrate: 154 gpm / 18 psig Spongeball frequency: 60 min
13 6/10/02	2.8	89 3372	1239	-1292 63	86 (161)	97	
14 6/11/02	5.0	111 6313	1528	-1277 76	65 (121)	97	26^0C Recycle: 710 gpm / 65 psig Concentrate: 146 gpm / 21 psig Spongeball frequency: 80 min
15 6/12/02	3.6	92 2419	439	-377	77 (144)	90	28^0C Recycle: 715 gpm / 62 psig Concentrate: 138 gpm / 18 psig Spongeball frequency: 60 min
16 6/13/02	7.3	-----	-----	-----	68 (127)	90	28^0C Recycle: 729 gpm / 65 psig Concentrate: 139 gpm / 20 psig Spongeball frequency: 80 min
17 6/14/02	4.9	----- 4010	100	----- 98	67 (126)	90	29^0C Recycle: 710 gpm / 66 psig Concentrate: 144 gpm / 21 psig Spongeball frequency: 80 min
18 6/17/02	2.0	406 1712	128	68 93	92 (172)	95.6	25^0C Recycle: 765 gpm / 67 psig Concentrate: 132 gpm / 18 psig
19 6/18/02	3.4	360 1937	98	73 95	82 (153)	95	27^0C Recycle: 746 gpm / 62 psig Concentrate: 129 gpm / 17 psig Spongeball frequency: 60 min

Table A5, Full-Scale RLWTF Tubular Ultrafilter continued

Ops Day Date	Daily Ops (Hours)	PF TF (pCi/L)	TP (pCi/L)	PF TF (% Removal)	Permeate Flow [gpm (GFD)]	Water Recovery (%)	Operational Details
20 6/19/02	2.7	280 1571	99	65 94	81 (152)	95	27°C Recycle: 740 gpm / 60 psig Concentrate: 132 gpm / 17 psig Spongeball frequency: 60 min
21 6/20/02	4.7	-----	-----	-----	73 (137)	96	28°C Recycle: 715 gpm / 66 psig Concentrate: 132 gpm / 18 psig Spongeball frequency: 60 min
22 6/21/02	4.7	-----	-----	-----	60 (112)	95	28°C Recycle: 729 gpm / 62 psig Concentrate: 140 gpm / 18 psig
23 6/24/02	7.4	-----	-----	-----	73 (137)	97	29°C Recycle: 733 gpm / 64 psig Concentrate: 137 gpm / 18 psig Spongeball frequency: 60 min
24 6/25/02	3.0	177 4800	400	-126 92	81 (151)	94	34°C Recycle: 708 gpm / 57 psig Concentrate: 130 gpm / 18 psig Spongeball frequency: 60 min
25 6/26/02	7.0	66 3900	203	-208 95	68 (127)	97	33°C Recycle: 712 gpm / 62 psig Concentrate: 132 gpm / 19 psig Spongeball frequency: 120 min
Totals	**110 hours**	-----	-----	-----	-----	-----	

Los Alamos
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Risk Reduction & Environmental Stewardship Division
Water Quality & Hydrology Group (RRES-WQH)
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
(505) 665-1859/Fax: (505) 665-9344

Date: November 27, 2002
Refer to: RRES-WQH: 02-438

Mr. Samual Coleman, P. E., Director
Compliance Assurance and Enforcement Division (6-EN)
U. S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

SUBJECT: NOTICE OF PLANNED CHANGES AT TA-50 RLWTF, NPDES PERMIT NO. NM0028355

Dear Mr. Coleman:

The National Pollutant Discharge Elimination System (NPDES) Permit No. NM0028355 for Los Alamos National Laboratory requires the permittee to notify the U. S. Environmental Protection Agency (EPA) regarding any physical alterations or additions to the permitted facility that could significantly change the nature or the quantity of pollutants discharged. In accordance with Part III.D.1.a. *Reporting Requirements* of the Laboratory's NPDES Permit, the Laboratory is notifying EPA regarding the proposed installation of the influent tank farm and reverse osmosis (RO) pilot units at Technical Area 50, Radioactive Liquid Waste Treatment Facility (TA-50 RLWTF). These modifications to the TA-50 RLWTF will significantly increase storage capacity and should improve future water quality at NPDES Outfall 051. The following changes are shown on the enclosed schematic diagram:

1) Proposed Influent Tanks and Pump House (dashed lines) are estimated to be installed and operational in September, 2004; and,

2) Brackish Water (BW) RO unit and Sea Water (SW) RO unit with associated Ultra Filter (dashed lines) are currently being installed for a pilot study at the facility.

Please note that a Memcor Microfilter and Centrifugal Ultra Filtration (CUF) have previously been installed in order to improve operation and facilitate removal of reject and solids from the treatment process.

Please contact Mike Saladen of the Laboratory's Water Quality and Hydrology Group at (505) 665-6085 if additional information would be helpful.

Sincerely,

Steven Rae
Water Quality & Hydrology Group

SR:MS/tml

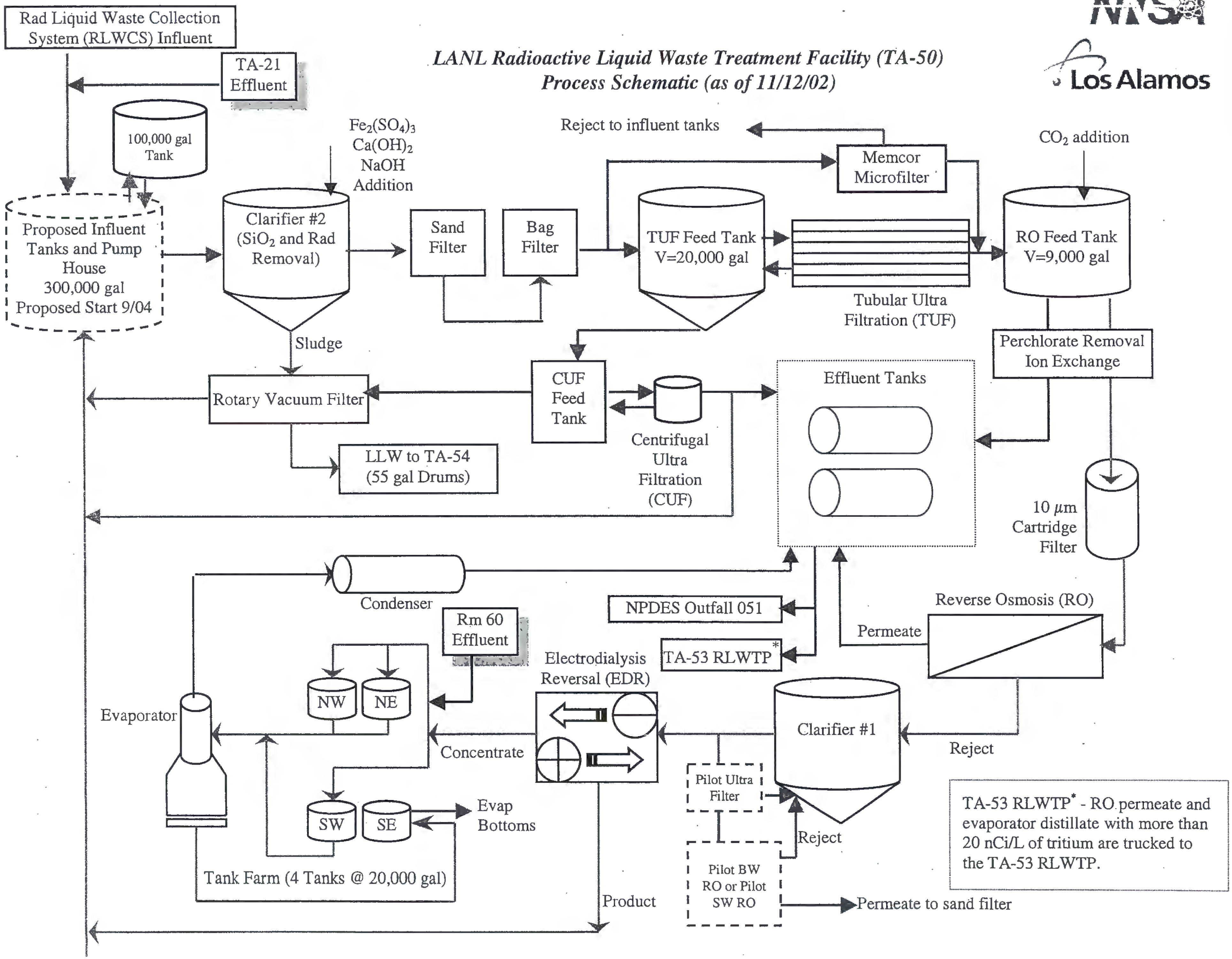
Enclosures: a/s

Cy: W. Strickley, USEPA, Region VI, Dallas, Texas, w/enc.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
M. Leavitt, NMED/GWPB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/OLASO, w/enc., MS A316
G. Turner, DOE/OLASO, w/enc., MS A316
J. Holt, ADO, w/enc., MS A104
A. Stanford, FWO-DO, w/enc., MS K492
D. McLain, FWO-WFM, w/enc., MS E518
R. Alexander, FWO-WFM, w/enc., MS E518
P. Worland, FWO-WFM, w/enc., MS E518
D. Moss, FWO-WFM, w/enc., MS E518
B. Ramsey, RRES-DO, w/enc., MS J591
K. Hargis, RRES-DO, w/enc., MS J591
D. Stavert, RRES-EP, w/enc., MS J591
M. Saladen, RRES-WQH, w/enc., MS K497
B. Beers, RRES-WQH, w/enc., MS K497
M. Bailey, RRES-WQH, w/enc., MS K497
D. Woitte, LC-ESH, w/enc., MS A187
RRES-WQH File, w/enc., MS K497
IM-5, w/enc., MS A150

NNSA

Los Alamos

LANL Radioactive Liquid Waste Treatment Facility (TA-50) Process Schematic (as of 11/12/02)



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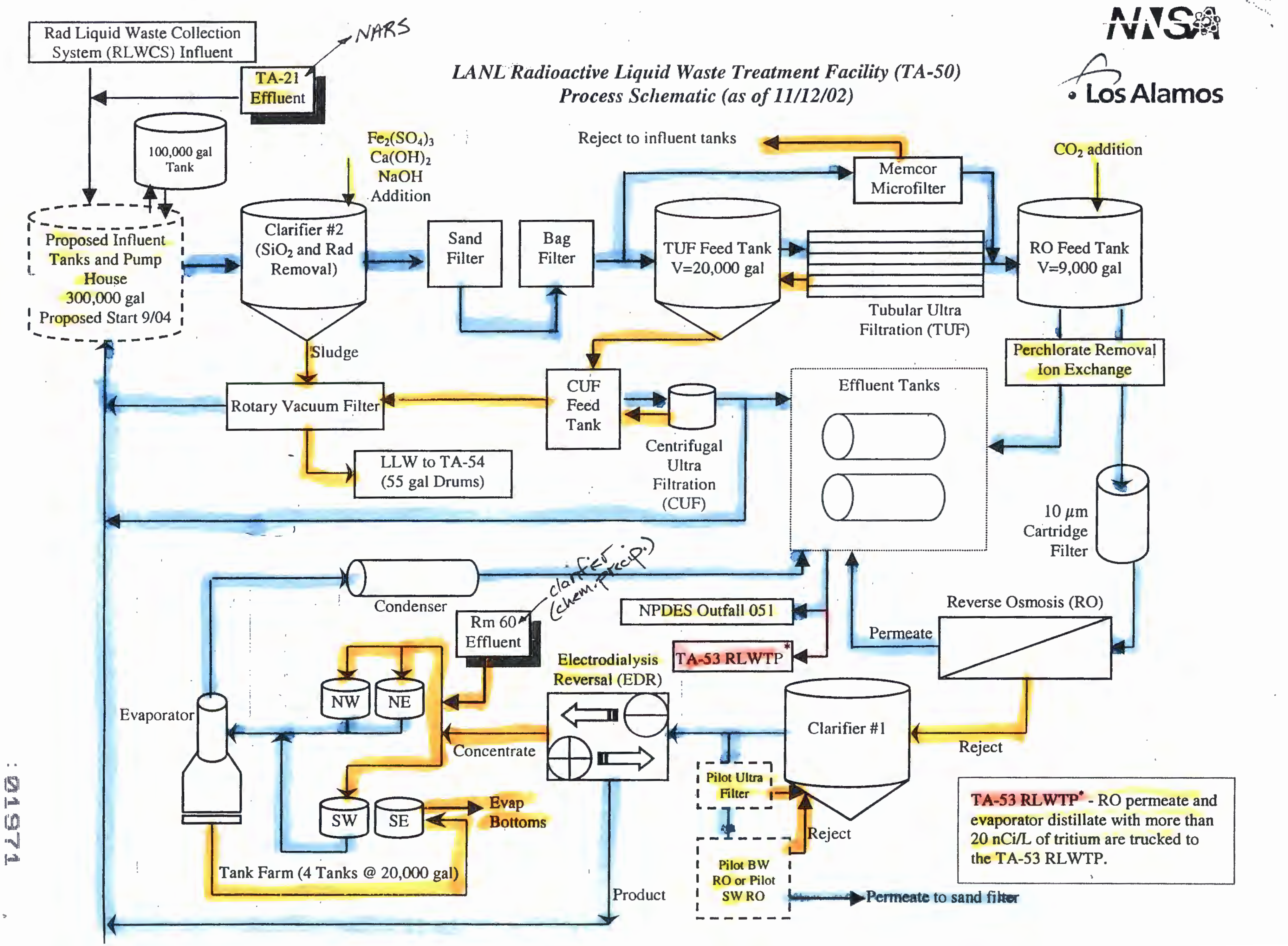
LANL Radioactive Liquid Waste Treatment Facility (TA-50)
Process Schematic (as of 11/12/02)



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Risk Reduction & Environmental Stewardship Division
Water Quality & Hydrology Group (RRES-WQH)
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
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DEC 13 2002

Date: December 10, 2002
Refer to: RRES-WQH: 02-455

Mr. Curt Frischkorn
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132), MINOR MODIFICATION

Dear Mr. Frischkorn:

In accordance with Section 3107 of the New Mexico Water Quality Control Commission Regulations, I am notifying you of a minor modification to Los Alamos National Laboratory's Ground Water Discharge Plan (DP-1132) for the Radioactive Liquid Waste Treatment Facility (RLWTF) at Technical Area (TA)-50. This notification regards the proposed installation of an influent tank farm and reverse osmosis (RO) pilot units at the RLWTF. These modifications will significantly increase storage capacity and should improve the quality of the effluent discharged at NPDES Outfall 051. The following changes are shown on the enclosed figure:

1) Proposed Influent Tanks and Pump House (dashed lines) are estimated to be installed and operational in September, 2004; and,

2) Brackish Water (BW) RO unit and Sea Water (SW) RO unit with associated Ultra Filter (dashed lines) are currently being installed for a pilot study at the facility.

Please note that a Memcor Microfilter and Centrifugal Ultrafilter (CUF) have previously been installed in order to improve operation and facilitate removal of reject and solids from the treatment process.

Please contact Bob Beers of the Laboratory's Water Quality and Hydrology Group at (505) 667-7969 if additional information would be helpful.

Sincerely,

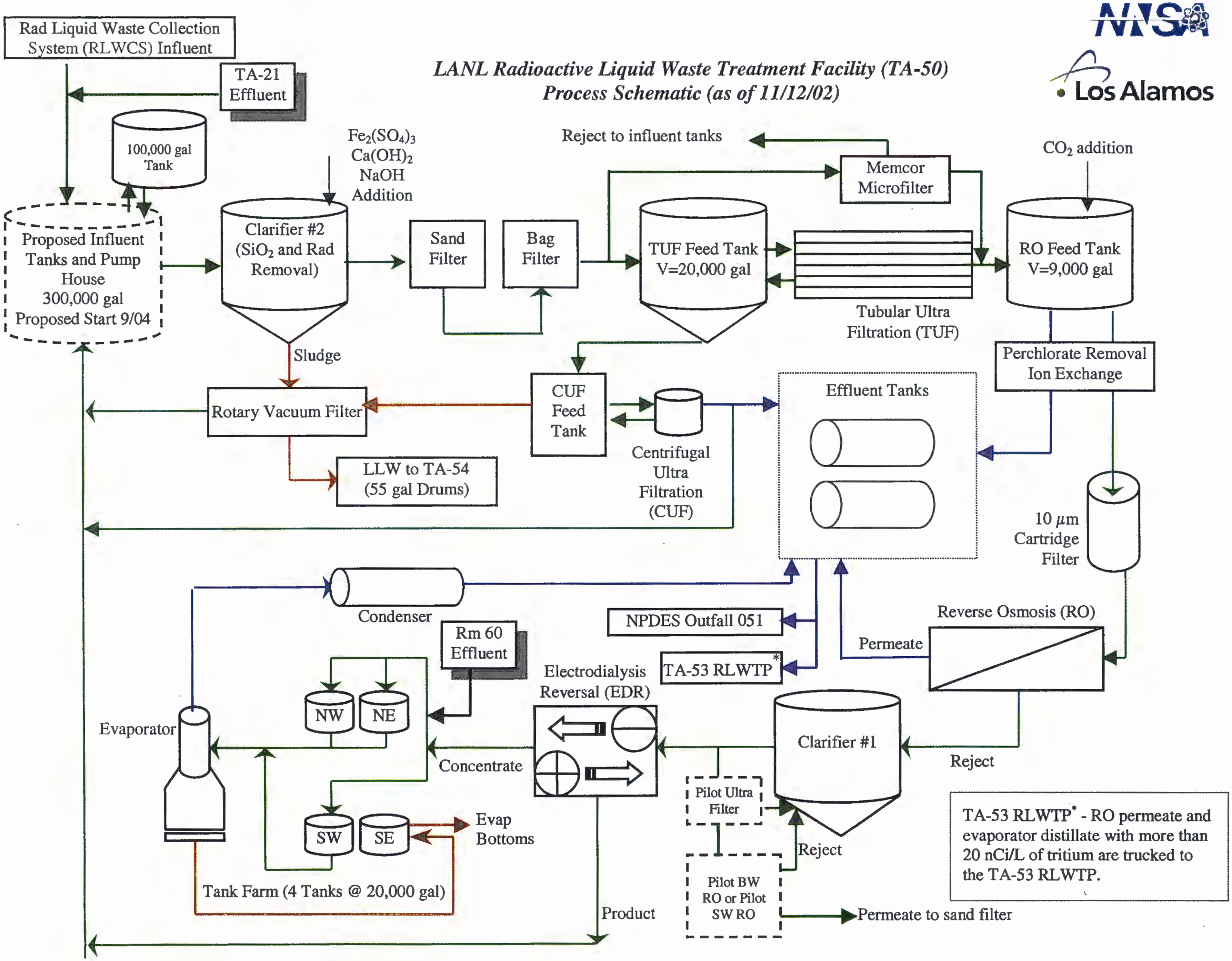
Bob Beers
Water Quality & Hydrology Group

BB/tml

Enclosures: a/s

Cy: J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/OLASO, w/enc., MS A316
G. Turner, DOE/OLASO, w/enc., MS A316
J. Holt, ADO, w/enc., MS A104
A. Stanford, FWO-DO, w/enc., MS K492
D. McLain, FWO-WFM, w/enc., MS E518
R. Alexander, FWO-WFM, w/enc., MS E518
P. Worland, FWO-WFM, w/enc., MS E518
D. Moss, FWO-WFM, w/enc., MS E518
B. Ramsey, RRES-DO, w/enc., MS J591
K. Hargis, RRES-DO, w/enc., MS J591
D. Stavert, RRES-EP, w/enc., MS J591
S. Rae, RRES-WQH, w/enc., MS K497
M. Saladen, RRES-WQH, w/enc., MS K497
D. Woitte, LC-ESH, w/enc., MS A187
RRES-WQH File, w/enc., MS K497
IM-5, w/enc., MS A150

LANL Radioactive Liquid Waste Treatment Facility (TA-50) Process Schematic (as of 11/12/02)



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Risk Reduction & Environmental Stewardship Division
Water Quality & Hydrology Group (RRES-WQH)
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
(505) 667-7969 / Fax: (505) 665-9344

Date: January 29, 2003
Refer to: RRES-WQH: 03-014

Mr. Curt Frischkorn
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132) QUARTERLY REPORT, FOURTH QUARTER 2002

Dear Mr. Frischkorn:

This letter and the enclosed attachments are 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 4th quarter of 2002. Since the 1st quarter of 1999, Los Alamos National Laboratory has provided your agency with voluntary quarterly reports containing analytical results from effluent and ground water monitoring.

Mortandad Canyon Alluvial Ground Water Monitoring Results
Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at three Mortandad Canyon alluvial monitoring wells during the 4th quarter of 2002. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO3-N), fluoride (F), and total dissolved solids (TDS).

Mortandad Canyon alluvial monitoring well MCO-4B did not have sufficient water for sampling during the 4th quarter. The prolonged drought conditions have resulted in declining water levels in many of the Laboratory's shallow alluvial monitoring wells. We will continue to measure the water level in MCO-4B each quarter and will sample the well whenever sufficient water is present.

In January 2002, you asked the Laboratory to add perchlorate (ClO_4) monitoring to the quarterly sampling conducted at Mortandad Canyon alluvial wells MCO-3, MCO-4B, MCO-6, and MCO-7 (letter, Curt Frischkorn, NMED, to Bob Beers, LANL, January 16, 2002). Per your request, perchlorate (ClO_4) results from sampling conducted at MCO-3, MCO-6, and MCO-7 on November 20, 2002, are 4.3 ppb, 77.5 ppb, and 108 ppb, respectively. These results have also been summarized in Attachment 1.0, Table 1.0.

Attachment 2.0, Figures 1-6, presents a summary of the 2002 perchlorate, the sum of nitrate-nitrogen and nitrite-nitrogen (NO3+NO2-N), TDS, F, Total Kjeldahl Nitrogen (TKN), and ammonia-nitrogen (NH3-N) data collected from Mortandad Canyon alluvial wells MCO-3, MCO-6, and MCO-7. All of the 2002 analytical results are below NMWQCC Regulation 3103 standards for ground water. Perchlorate concentrations in MCO-3 declined by 95% (78.4 ppb to 4.3 ppb) during in 2002 in response to the RLWTF's installation of an ion exchange treatment unit for perchlorate removal in March 2002. Perchlorate concentrations in MCO-6 and MCO-7 for the 4th quarter of 2002 suggest a downward trend is also beginning in those wells.

RLWTF Effluent Monitoring Results

Attachment 3.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent. The weekly 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 sample results from the 4th quarter were below NMWQCC Regulation 3103 standards for NO3-N, F, and TDS with the exception of a single excursion for TDS. A composite sample for the week ending 12/8/2002 (submittal date: 12/9/02) showed a TDS concentration of 1,030 mg/L (+/-103 mg/L). As presented in Table 2.0, the 4th quarter average for TDS in the RLWTF's effluent was 753 mg/L.

The RLWTF's administrative procedures require that each tank of effluent be screened for TDS prior to discharge. Initial screening for TDS is performed using an electrical conductivity (EC) meter. If the TDS in the effluent is greater than 800 mg/L (by EC) then a sample is collected for gravimetric analysis. Four effluent tanks were discharge from the RLWTF during the week ending 12/8/02. The gravimetric results for these four tanks of effluent and the weekly composite are presented below:

RLWTF Effluent TDS Results: TDS by Gravimetric Analysis.

Date Effluent Tank Sampled	TDS (mg/L) by RLWTF	TDS (mg/L) by GEL
12/2/02	818 (+/-160)	Composite sample
12/2/02	968 (+/-190)	Composite sample
12/5/02	990 (+/-200)	Composite sample
12/6/02	760 (+/-150)	Composite sample
Weekly Average	**884 (+/-176)**	
Weekly Composite Sample		**1,030 (+/-103)**

The data presented above shows that the RLWTF's operational screening results from all four effluent tanks discharged during the week ending 12/8/02 were below the NM WQCC Regulation 3103 standard of 1,000 mg/L. The weekly composite TDS result of 1,030 mg/L (a composite sample prepared from the same four effluent tanks) was approximately 17% higher than the RLWTF's weekly average of 884 mg/L. It should be noted, however, that the discrepancy between the RLWTF's weekly average (884 mg/L) and the result reported by GEL (1,030 mg/L) is within the RLWTF's 20% analytical uncertainty.

The discrepancy between the RLWTF's operational screening results and the weekly composite result reported by GEL has prompted the Laboratory to institute the following corrective actions:

1. In accordance with current procedures, all effluent batches will be screened for TDS using electrical conductivity (EC). If the TDS concentration by EC is greater than 800 mg/L then a representative sample of effluent will be collected and analyzed for TDS using the gravimetric method.

2. The RLWTF will improve the precision of their gravimetric method for TDS analysis to an uncertainty of +/-10% (current uncertainty is +/-20%).

3. If the TDS concentration of the effluent by gravimetric analysis is less than 910 mg/L (+/- 91 mg/L) then the effluent will be released for discharge.

4. If, however, the TDS concentration of the effluent by gravimetric analysis is greater than 910 mg/L (+/- 91mg/L) then further treatment will be conducted.

By establishing the above administrative controls for TDS in the RLWTF's effluent, the Laboratory is confident that it can continue to honor its commitment to the NMED to only discharge effluent that is compliant with NMWQCC Regulation 3103 standards for ground water.

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/yg

Attachments: a/s

Cy: J. Bearzi, NMED/HRMB, Santa Fe, New Mexico, w/att.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/att.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
R. Ford-Schmid, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
J. Vozella, DOE/OLASO, w/att., MS A316
G. Turner, DOE/OLASO, w/att., MS A316
J. Holt, ADO, w/att., MS A104
T. Stanford, FWO-DO, w/att., MS K492
D. Mclain, FWO-WFM, w/att., MS J593
R. Alexander, FWO-WFM, w/att., MS E518

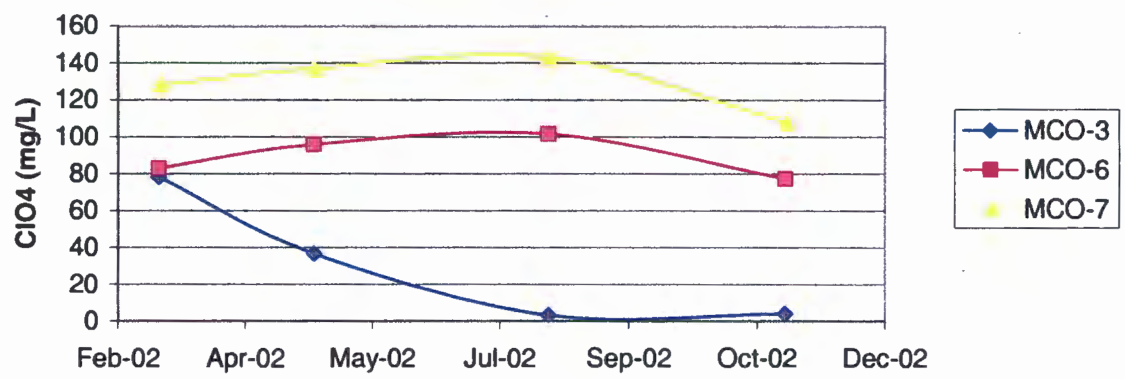
Cy (continued):
D. Moss, FWO-WFM, w/att., MS E518
P. Worland, FWO-WFM, w/att., MS E518
B. Ramsey, RRES-DO, w/att., MS J591
K. Hargis, RRES-DO, w/att., MS J591
D. Stavert, RRES-EP, w/att., MS J591
S. Rae, RRES-WQH, w/att., MS K497
D. Rogers, RRES-WQH, w/att., MS K497
M. Saladen, RRES-WQH, w/att., MS K497
RRES-WQH File, w/att., MS K497
IM-5, w/att., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Wells Analytical Results, 4th Quarter, 2002.

Sampling Location	Sample Date	Perchlorate[2] (ug/L)	NO3+NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	11/20/2002	4.3	2.22	0.450	<0.024	383	0.623
MCO-4B	11/20/2002	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
MCO-6	11/20/2002	77.5	4.41	0.350	<0.024	355	1.07
MCO-7	11/20/2002	108	4.53	0.280	<0.024	328	1.29
NM WQCC 3103. Ground Water Standards (mg/L)			*10*[3]			*1000*	*1.6*

__Notes:__
[1]NS means that there was not sufficient water available for sampling.
[2]Unfiltered sample.
[3]NM WQCC 3103 ground water standard is for NO3-N only.
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 unless otherwise noted.

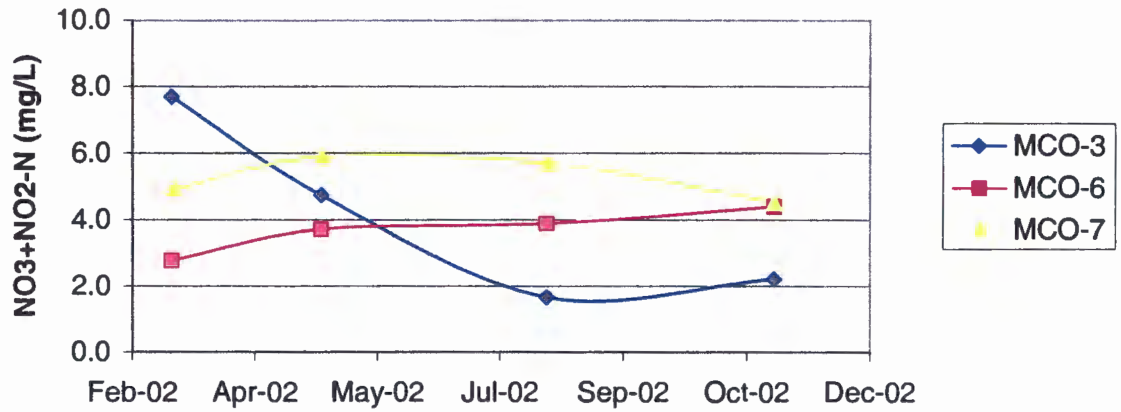
Figure 1. Perchlorate in Mortandad Canyon Alluvial Ground Water in 2002



Perchlorate (mg/L)

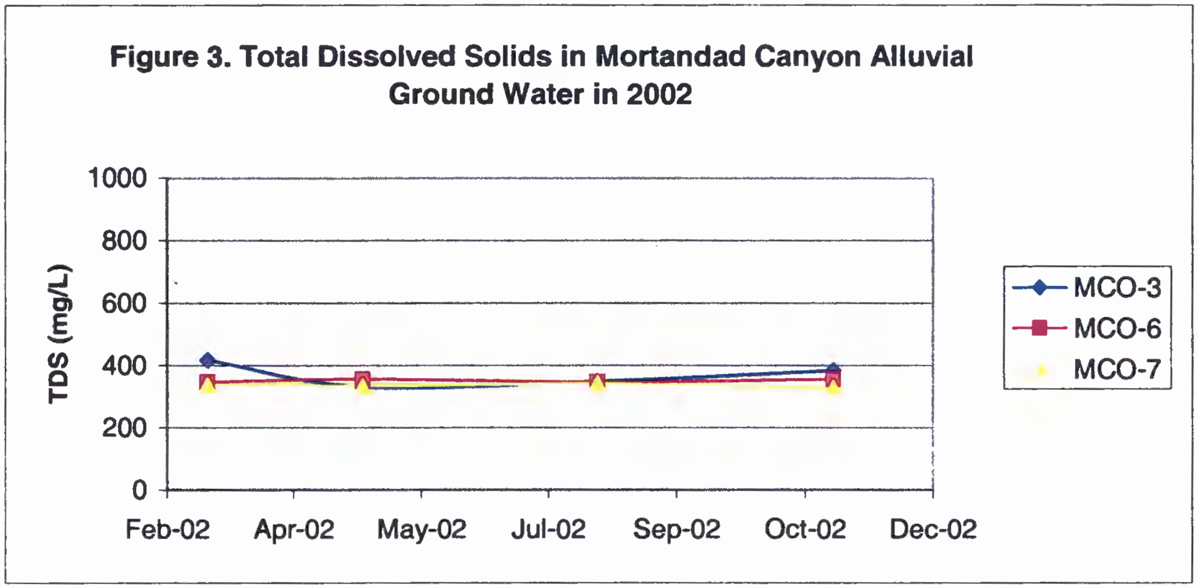
	MCO-3	MCO-6	MCO-7
Mar-02	78.4	83.2	128
May-02	36.9	96.2	137
Aug-02	3.5	102	143
Nov-02	4.3	77.5	108

Figure 2. Nitrate+Nitrite (as N) in Mortandad Canyon Alluvial Ground Water in 2002

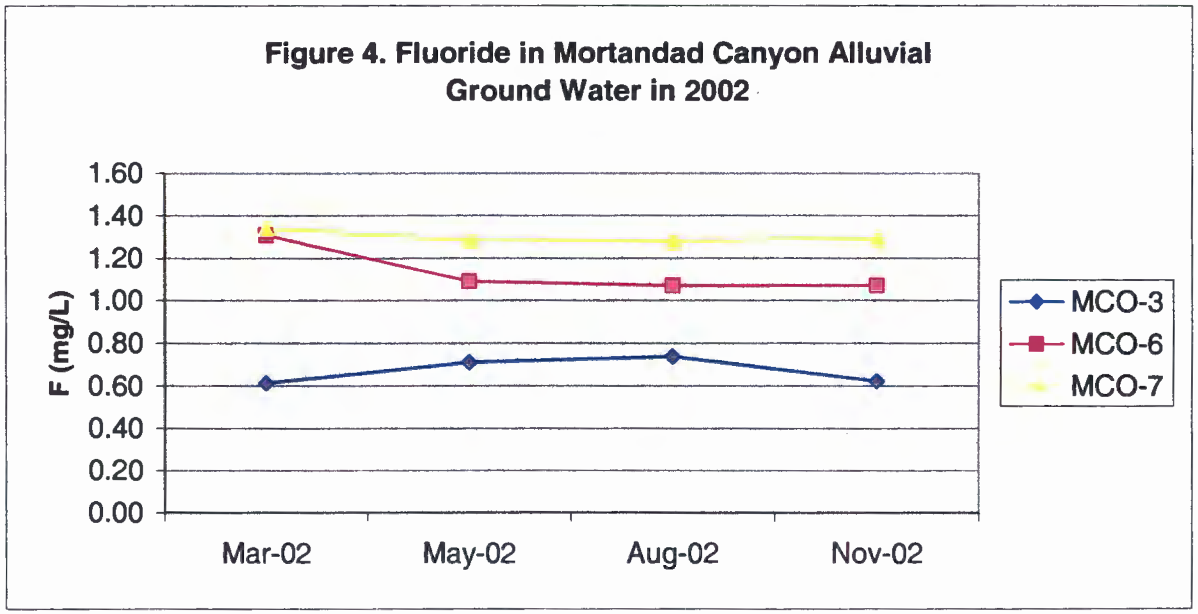


NO3+NO2-N (mg/L)

	MCO-3	MCO-6	MCO-7
Mar-02	7.70	2.78	4.90
May-02	4.75	3.72	5.90
Aug-02	1.67	3.90	5.70
Nov-02	2.22	4.41	4.53

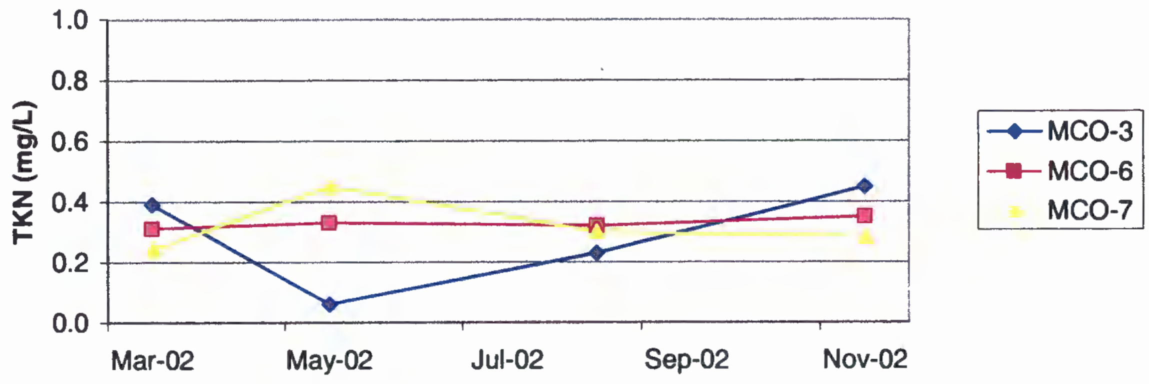


TDS (mg/L)			
	MCO-3	MCO-6	MCO-7
Mar-02	417	346	337
May-02	331	356	333
Aug-02	348	346	342
Nov-02	383	355	328



F (mg/L)			
	MCO-3	MCO-6	MCO-7
Mar-02	0.61	1.31	1.34
May-02	0.71	1.09	1.28
Aug-02	0.74	1.07	1.28
Nov-02	0.62	1.07	1.29

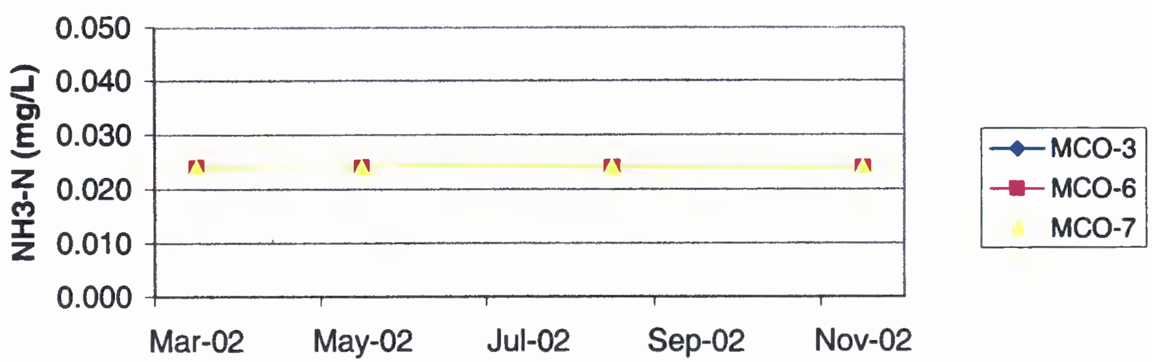
Figure 5. TKN in Mortandad Canyon Alluvial Ground Water in 2002



TKN (mg/L)

	MCO-3	MCO-6	MCO-7
Mar-02	0.39	0.31	0.24
May-02	0.06	0.33	0.45
Aug-02	0.23	0.32	0.30
Nov-02	0.450	0.350	0.280

Figure 6. Ammonia-N in Mortandad Canyon Alluvial Ground Water in 2002 (Method Detection Limit=0.024 mg/L)



NH3 (mg/L)

	MCO-3	MCO-6	MCO-7
Mar-02	0.024	0.024	0.024
May-02	0.024	0.024	0.024
Aug-02	0.024	0.024	0.024
Nov-02	0.024	0.024	0.024

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 4th Quarter, 2002.

Monitoring Period	Composite Date	RLWTF Weekly Effluent Monitoring Analytical Results (mg/L)		
		NO3+NO2-N	Fluoride	TDS
SEPTEMBER	9/24/2002	1.60	0.40	235
	9/17/2002	1.26	0.37	140
OCTOBER	10/1/802	2.49	0.63	426
	10/9/2002	2.38	0.78	591
	10/16/2002	1.19	0.65	536
	10/22/2002	1.34	1.15	746
	10/29/2002	1.00	1.19	781
NOVEMBER	11/6/2002	1.13	1.06	923
	11/13/2002	0.15	0.84	708
	11/20/2002	1.91	0.62	866
	11/25/2002	1.91	0.46	748
DECEMBER	12/3/2002	0.15	0.58	877
	12/9/2002	1.40	0.9	1030
	12/17/2002	1.92	0.89	806
	12/24/2002	results pending	results pending	results pending
4th Quarter Averages (mg/L)		**1.41**	**0.81**	**753**
NM WQCC 3103. Ground Water Standards (mg/L)		*10.0*	*1.6*	*1000*

Notes:
[1]Results for these analyses are pending.
[2]A duplicate sample result.
All analyses by the General Engineering Laboratories, Charleston, South Carolina.

01985

Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Water Quality & Hydrology Group (RRES-WQH)
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
(505) 667-7969/Fax: (505) 665-9344

Date: October 24, 2002
Refer to: RRES-WQH: 02-391

Mr. Curt Frischkorn
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: GROUND WATER DISCHARGE PLAN (DP-1132) QUARTERLY REPORT, THIRD QUARTER 2002, TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY

Dear Mr. Frischkorn:

This letter and the enclosed attachments are intended to serve as Los Alamos National Laboratory's quarterly Ground Water Discharge Plan (DP-1132) report for the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for the period July 1 through September 30, 2002. 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.

Attachment 1.0, Table 1.0, presents the analytical results from sampling conducted at the Laboratory's Mortandad Canyon alluvial monitoring wells. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate/nitrite (NO3/NO2-N), fluoride (F), and total dissolved solids (TDS). Alluvial monitoring well MCO-4B did not have sufficient water for sampling. The prolonged drought conditions have resulted in declining water levels in many of the Laboratory's shallow alluvial monitoring wells. We will continue to measure the water level in MCO-4B each quarter and will sample the well whenever sufficient water is present.

In January 2002, you asked the Laboratory to add perchlorate (ClO_4) monitoring to the quarterly sampling conducted at Mortandad Canyon alluvial wells MCO-3, MCO-4B, MCO-6, and MCO-7 (letter, Curt Frischkorn, NMED, to Bob Beers, LANL, January 16, 2002). Per your request, perchlorate (ClO_4) results from sampling conducted at MCO-3, MCO-6, and MCO-7 are 3.5J ppb (estimated), 102 ppb, and 143 ppb, respectively. These results have also been summarized in Attachment 1.0, Table 1.0.

Attachment 2.0, Table 2.0, presents the analytical results from weekly monitoring of the RLWTF's effluent holding tank. The weekly samples are flow-proportioned composite samples prepared from each batch of effluent generated by the RLWTF during a 7-day period. All sample results shown for the third quarter were below NM WQCC Regulation 3103 standards for nitrate/nitrite (NO3/NO2-N), fluoride (F), and total dissolved solids (TDS). The quarterly average for nitrate/nitrite in the RLWTF's effluent was 1.24 mg/L.

In addition to weekly composite sampling, the RLWTF also conducts operational screening for nitrates (NO3-N) in each batch of effluent. All samples were analyzed by ion chromatography (IC). Operational screening of effluent samples collected during July, August, and September, 2002, produced the following maximum, minimum, and average results for nitrate (NO3-N), respectively: 0.53 mg/L, 0.08 mg/L, and 0.22 mg/L.

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

Attachments: a/s

Cy: J. Bearzi, NMED/HRMB, Santa Fe, New Mexico, w/att.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/att.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/att.
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K. Hargis, RRES-DO, w/o att., MS J591
D. Stavert, RRES-EP, w/att., MS J978
S. Rae, RRES-WQH, w/att., MS K497
D. Rogers, RRES-WQH, w/att., MS K497
M. Saladen, RRES-WQH, w/att., MS K497
RRES-WQH File, w/att., MS K497
IM-5, w/att., MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Wells Analytical Results, 3rd Quarter, 2002.

Sampling Location	Sample Date	Perchlorate[2] (ug/L)	NO3/NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	8/27/2002	3.54J	1.67	0.230	<0.024	348	0.738
MCO-4B	8/26/2002	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
MCO-6	8/26/2002	102	3.90	0.320	<0.024	346	1.07
MCO-7	8/26/2002	143	5.70	0.300	<0.024	342	1.28
NM WQCC 3103. Ground Water Standards (mg/L)			*10.0*			*1000*	*1.6*

Notes:
[1]NS means that there was not sufficient water available for sampling.
[2]Unfiltered sample.
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 unless otherwise noted.

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 3rd Quarter, 2002.

Monitoring Period	Sample Date	RLWTF Weekly Effluent Monitoring Analytical Results (mg/L)		
		NO3/NO2 (as-N)	Fluoride	TDS
JUNE	6/17/2002	0.37	0.49	213
	6/24/2002	0.57	0.35	227
JULY	7/1/2002	0.67	0.23	204
	7/9/2002	1.19	0.20	145
	7/17/2002	0.69	0.29	131
	7/24/2002	0.54	0.24	204
	7/29/2002	0.72	0.41	316
AUGUST	8/6/2002	1.24	0.48	459
	8/12/2002	2.42	0.35	289
	8/20/2002	1.41	0.48	333
	8/20/02-dupe	1.33	0.49	325
	8/26/2002	2.16	0.50	404
SEPTEMBER	9/4/2002	1.89	0.59	332
	9/10/2002	2.13	0.86	473
	9/17/2002	results pending	results pending	results pending
	9/24/2002	results pending	results pending	results pending
3rd Quarter Averages (mg/L)		**1.24**	**0.43**	**290**
NM WQCC 3103. Ground Water Standards (mg/L)		*10.0*	*1.6*	*1000*

Notes:
[1]Results for these analyses are pending.
[2]A duplicate sample result.
All analyses by the General Engineering Laboratories, Charleston, South Carolina.

Field Trip Report

Ground Water Pollution Prevention Section

Start Date: 04/02/2003 09:00 AM **End Date:** 04/02/2003 12:00 PM

Facility Information

Facility Name: Los Alamos National Laboratory
Radioactive Liquid Waste Treatment Facility
TA-50

Type of Operation: Federal Agency

Contact: Bob Beers (LANL), Pete Worland (LANL Operator)

Location: Los Alamos

Inspector(s): Curt Frischkorn, Kurt Vollbrecht

Inspection Summary

Purpose: Facility Inspection (GWB), preparation for issuance of DP-1132.

Activities

Samples Taken: No

Observations and Information Obtained

Met with RLWTF operators/engineers to discuss the treatment system, current operational plan, effluent quality at the TA-50 RLWTF, and trends in groundwater quality data from the Mortandad Canyon alluvial aquifer. The TA-50 RLWTF is not currently permitted through the GWQB, although this facility is currently permitted under a NPDES permit. Toured the entire TA-50 treatment system. Selective ion exchange and TUF systems are functioning well. Clarifier #2 is showing some signs of deterioration (small quantity of seepage into secondary containment), and will need to be reconditioned/replaced in the next few years. The current waste acceptance criteria (WAC), and pretreatment of TA-55 wastewater in the NARS unit has decreased influent contaminant concentrations, but apparently very little of the nitric acid is being recycled at TA-55. A former sludge holding tank is in the process of being decommissioned/decontaminated, and further changes/upgrades are planned for the next several years.

Action Required

Reissue public notice for DP-1132, and create draft discharge permit for review by LANL and all interested parties. Meet with Bob Beers and RLWTF operators at facility to discuss draft discharge permit.

Water Quality Inspection & Sampling Checklist

Reference: Regulation No. HED 86 – 14 (NMED)

Entry Conference:

☐ Was facility representative informed of NMED's right of entry and authority: (To access records, inspect monitoring equipment or methods and sample effluents under Sections 74-6-9.E of the New Mexico Water Quality Act NMSA 1978)? No.

☐ Was NMED identification presented? Yes.

☐ Were other potential or suspected violations which prompted inspections listed? N/A

☐ During the inspection, was the facility representative immediately advised or addition potential violations? N/A

Exit Conference:

☐ Were the preliminary inspection results summarized? Yes.

☐ Was the facility representative advised if violations discussed during the entry conference remain under investigation? N/A

☐ Were other potential violations discovered during the inspection discussed? N/A

☐ Was a date provided as to when NMED expects to complete consideration of potential violation? N/A

Water Quality Sampling:

☐ Was the facility representative offered a reasonable opportunity to obtain split/replicate samples, perform simultaneous tests, measurements or photographs? N/A

☐ Were copies of NMED's results (sampling, testing, photos) requested? If yes, copies must be provided within ten working days after such results are in NMED's possession. N/A

04/02/03 DP-1132 NPDES outfall from TA-50 (Mortandad Canyon)

04/02/03 DP-1132 NPDES outfall from TA-50 (Mortandad Canyon)

: 01994

04/02/03 DP-1132 Monitoring Well MCO-3 (Mortandad Canyon)

TA-50 RLWTF Tour

April 2, 2003

For

Mr. Curt Frischkorn
And
Mr. Kurt Vollbrecht

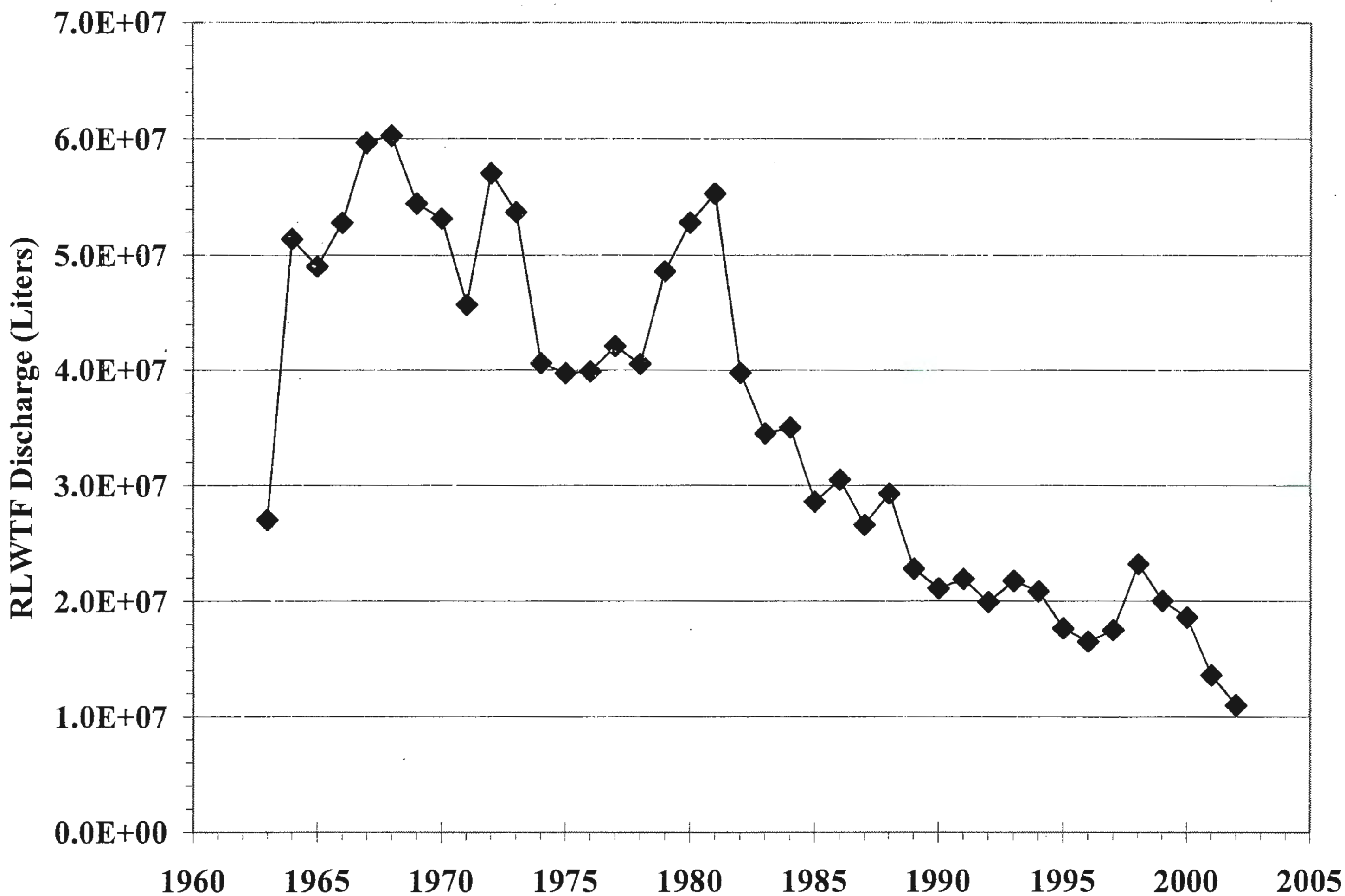
NMED Groundwater Quality Bureau

NPDES and NMED Discharge Parameters

NPDES (21 parameters)			NMED (DP-1132) (3 parameters)
pH[1]	Copper[1]	Selenium[3]	Fluoride[5]
Aluminum[3]	Iron[1]	Zinc[1]	Nitrate Nitrogen[5]
Arsenic[3]	Lead[1]	Chemical Oxygen Demand[1]	Total Dissolved Solids[5]
Boron[3]	Mercury[1]	Total Suspended Solids[1]	
Cadmium[1]	Nickel[2]	Total Toxic Organics[2]	
Chromium1	Perchlorate[3]	Tritium (accelerator produced)[3]	
Cobalt[3]	Radium-226 + Radium-228[3]	Flow[4]	

1 weekly grab sample
2 monthly grab sample
3 yearly grab sample
4 continuous record
5 each discharge

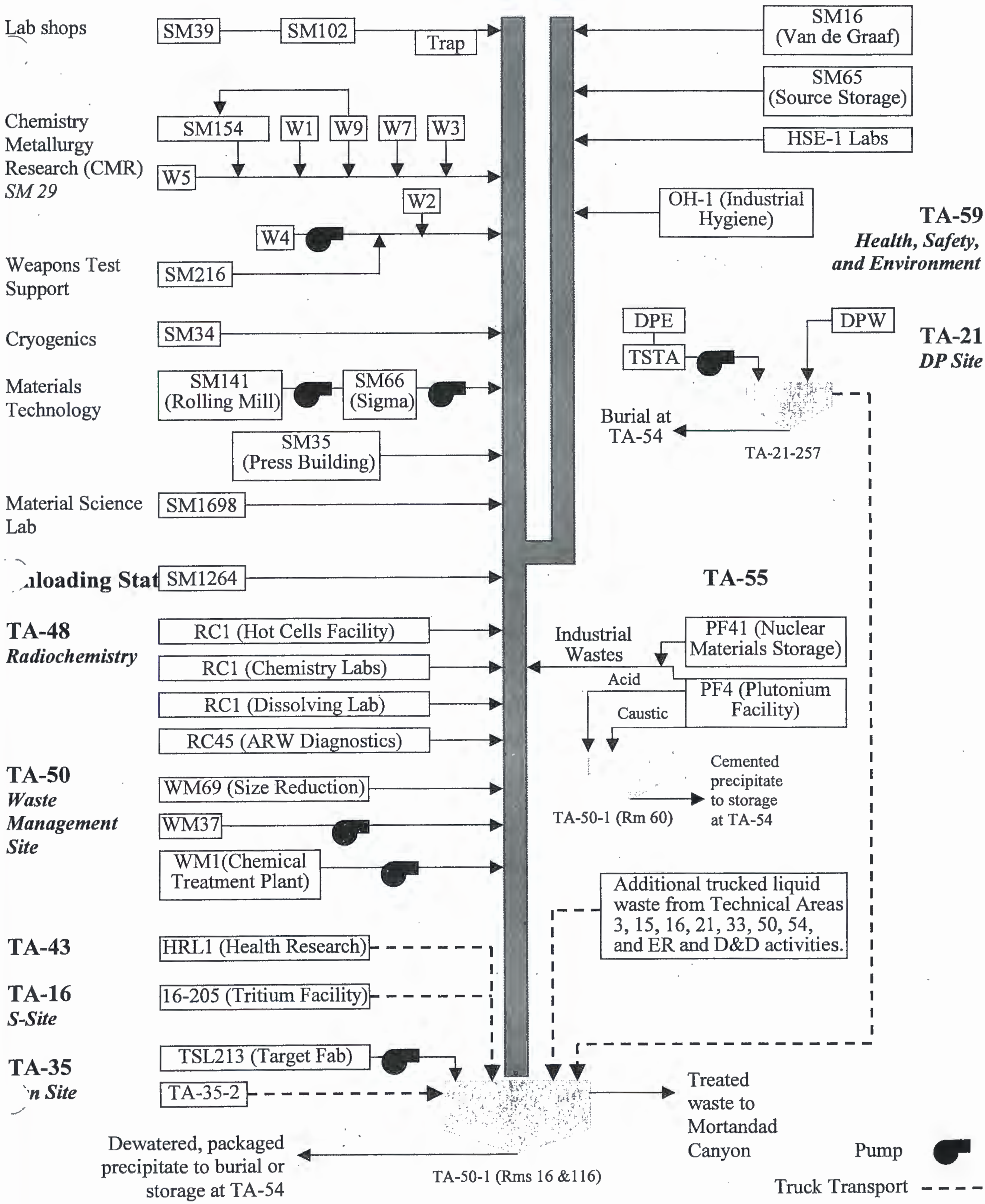
TA-50 Annual Discharge Volumes (1963 – 2002)



TA-3
South Mesa Site

Schematic of the Radioactive Liquid Waste Collection System (RLWCS)

TA-3



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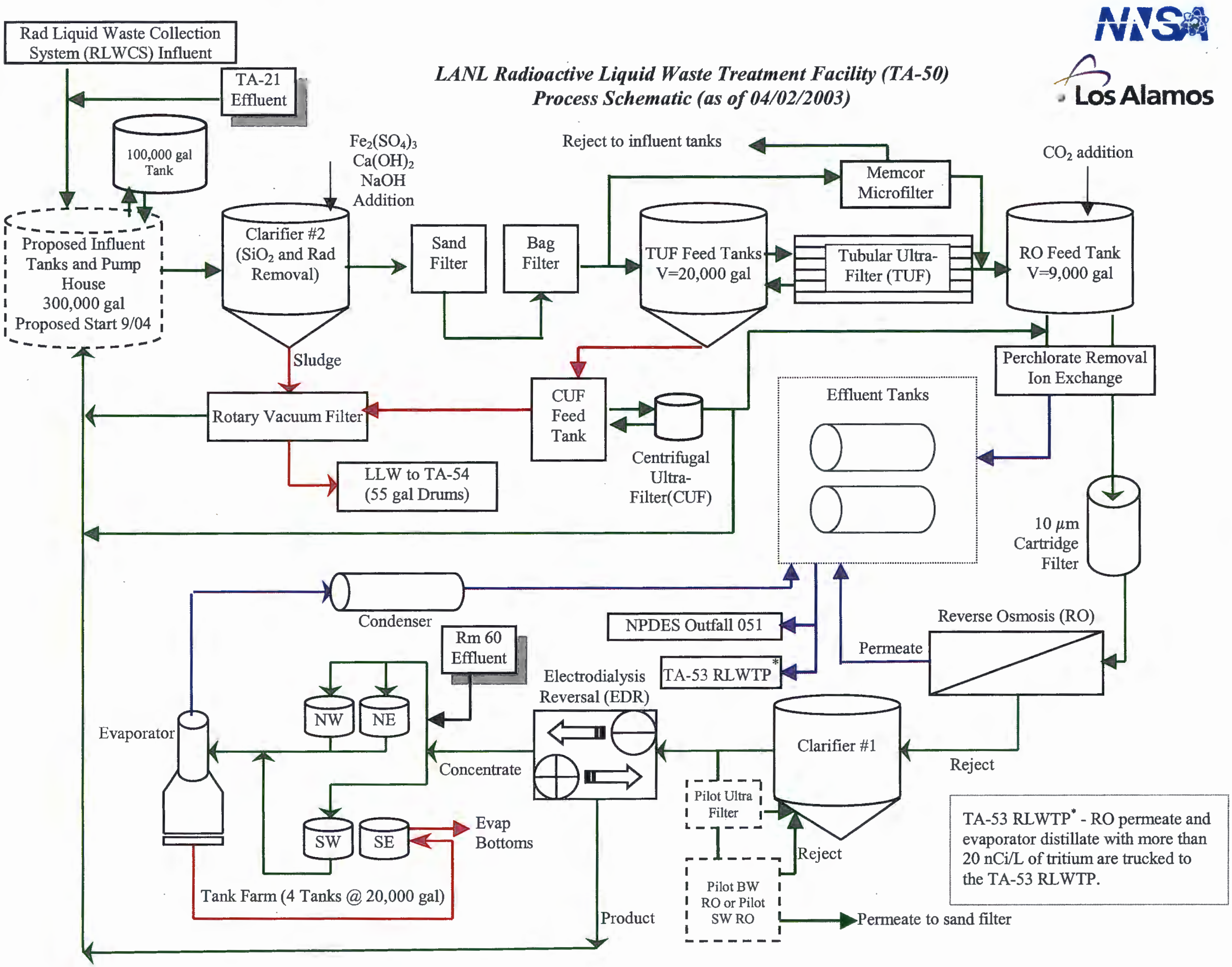
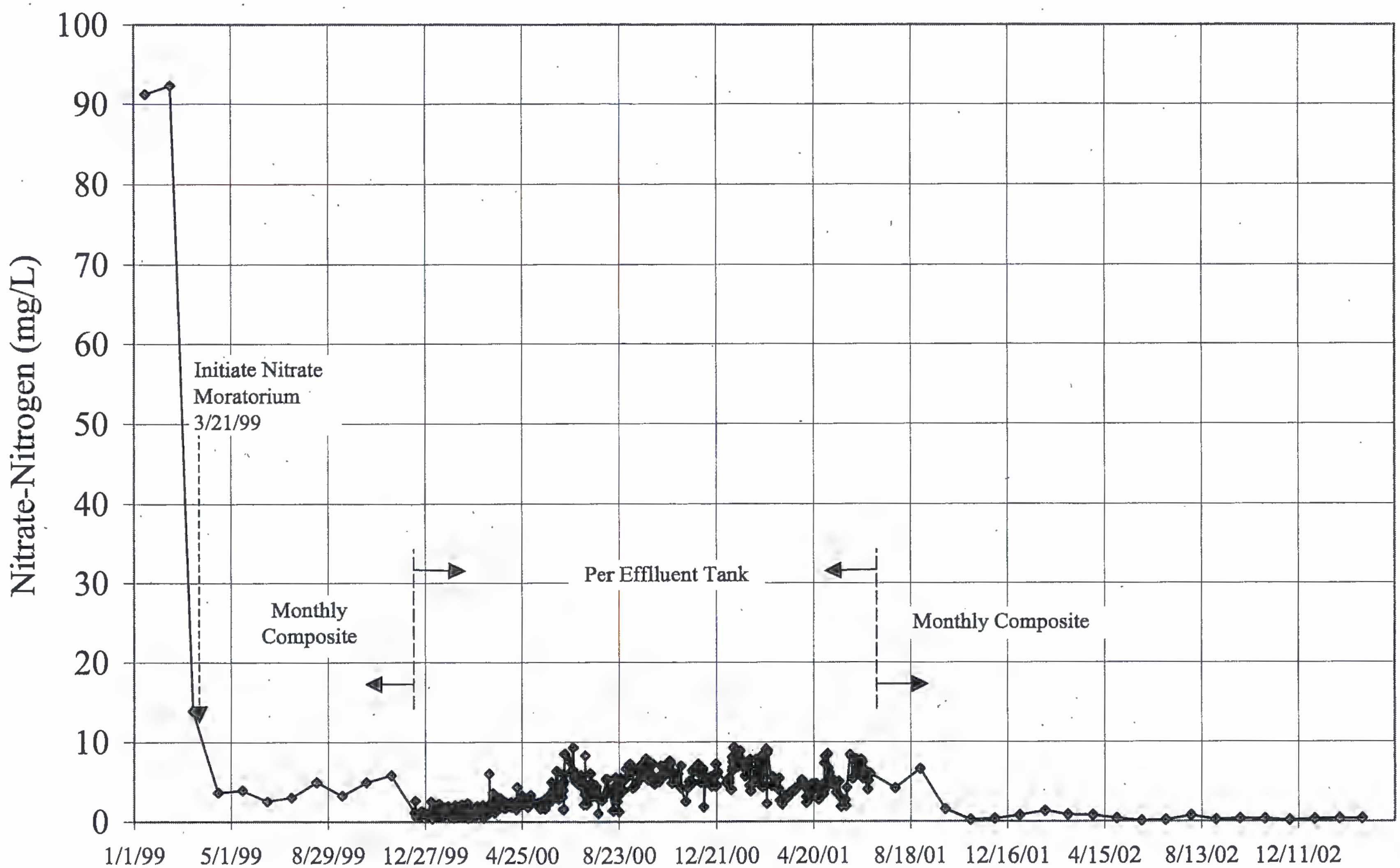


LANL Radioactive Liquid Waste Treatment Facility (TA-50)
Process Schematic (as of 04/02/2003)
NNSA
Los Alamos
Rad Liquid Waste Collection System (RLWCS) Influent
TA-21 Effluent
100,000 gal Tank
Proposed Influent Tanks and Pump House 300,000 gal Proposed Start 9/04
$Fe_2(SO_4)_3$ $Ca(OH)_2$ NaOH Addition
Clarifier #2 (SiO_2 and Rad Removal)
Sludge
Sand Filter
Bag Filter
Reject to influent tanks
Memcor Microfilter
TUF Feed Tanks V=20,000 gal
Tubular Ultra-Filter (TUF)
CO_2 addition
RO Feed Tank V=9,000 gal
Perchlorate Removal Ion Exchange
Rotary Vacuum Filter
CUF Feed Tank
Centrifugal Ultra-Filter(CUF)
LLW to TA-54 (55 gal Drums)
Effluent Tanks
10 μm Cartridge Filter
Condenser
NPDES Outfall 051
TA-53 RLWTP*
Reverse Osmosis (RO)
Permeate
Rm 60 Effluent
Electrodialysis Reversal (EDR)
Evaporator
NW
NE
SW
SE
Concentrate
Clarifier #1
Reject
Evap Bottoms
Pilot Ultra Filter
Reject
Pilot BW RO or Pilot SW RO
Permeate to sand filter
Tank Farm (4 Tanks @ 20,000 gal)
Product
TA-53 RLWTP* - RO permeate and evaporator distillate with more than 20 nCi/L of tritium are trucked to the TA-53 RLWTP.

Nitrate-Nitrogen in RLWTF Effluent January 1999 through February 2003



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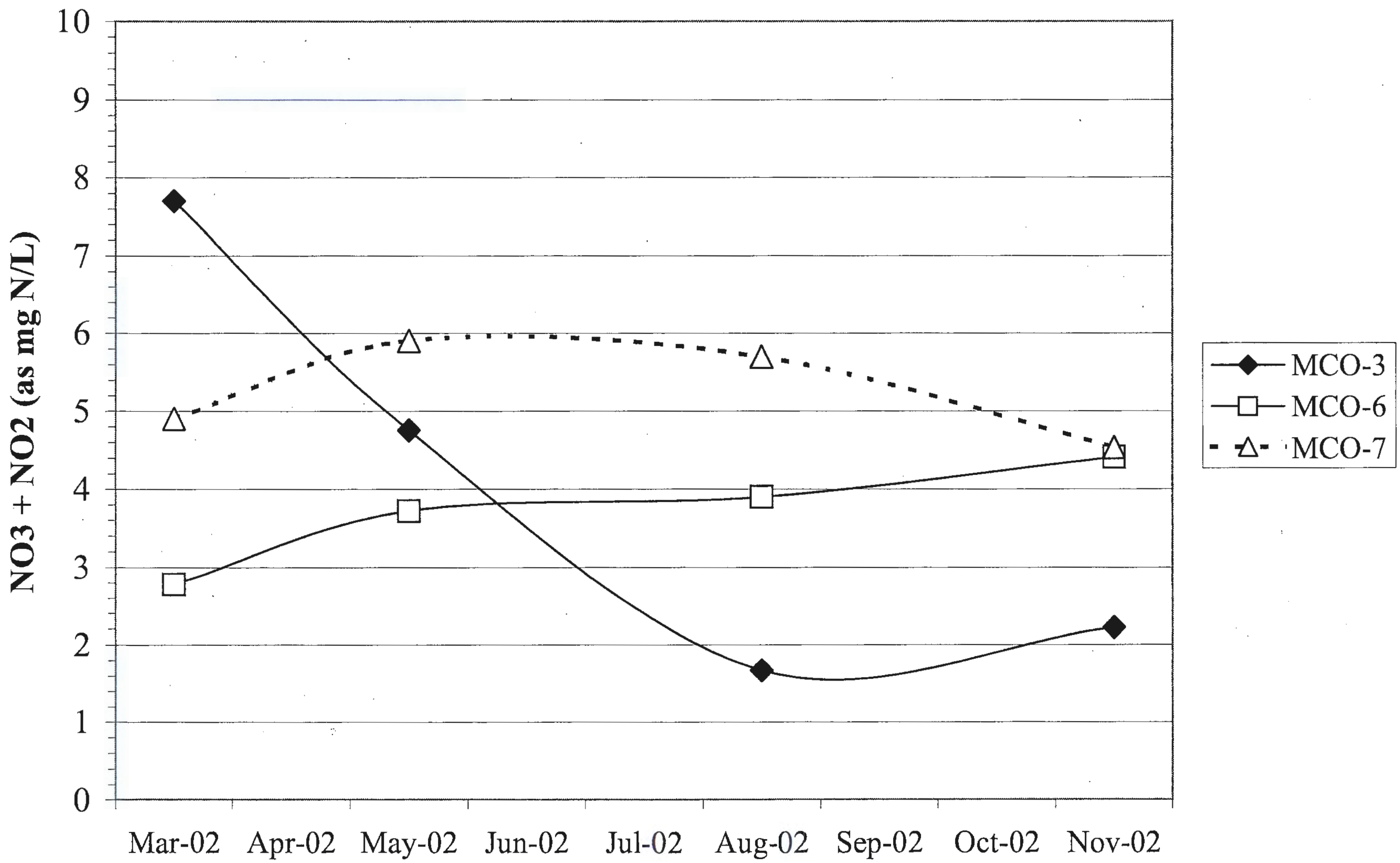
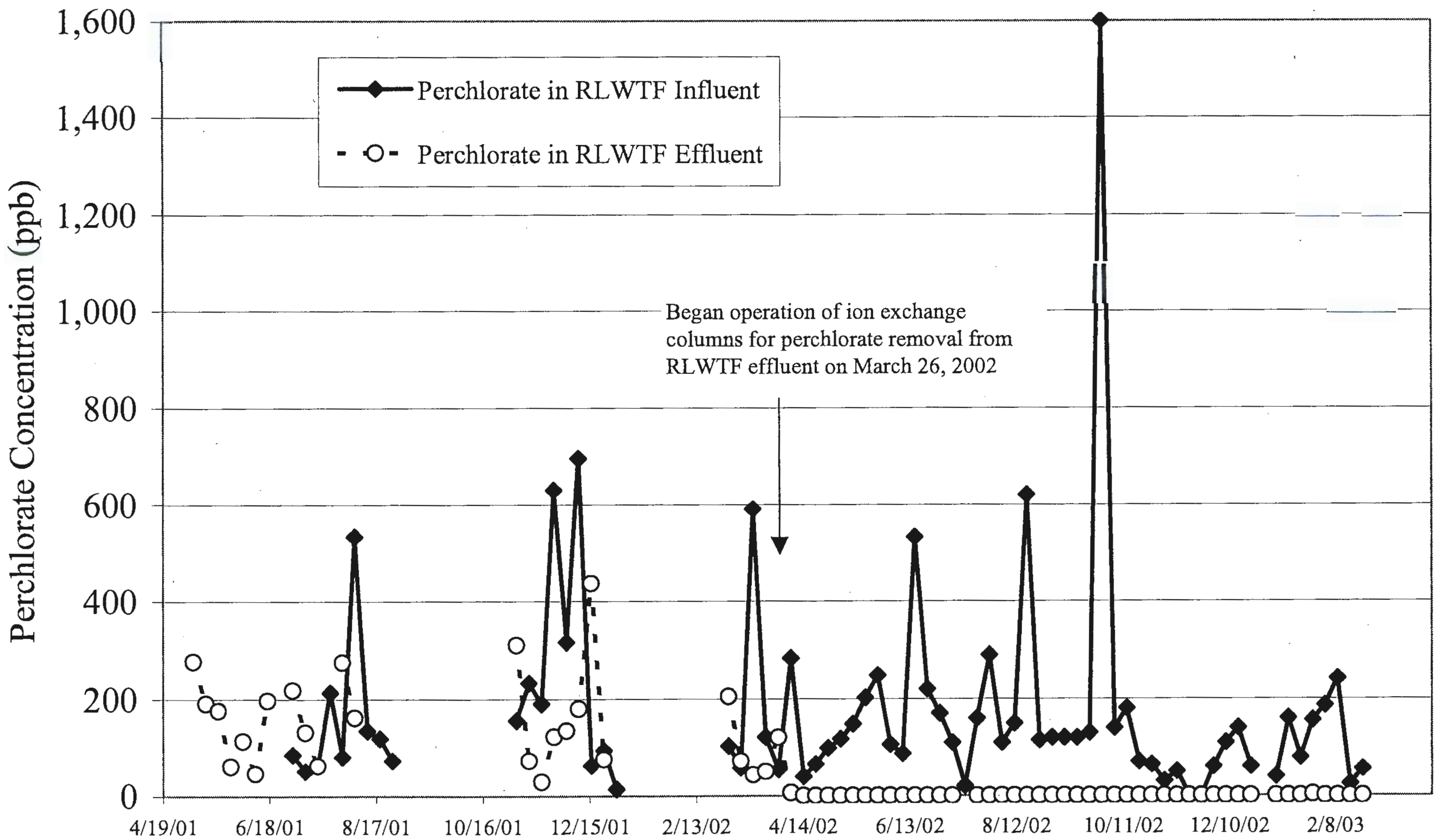
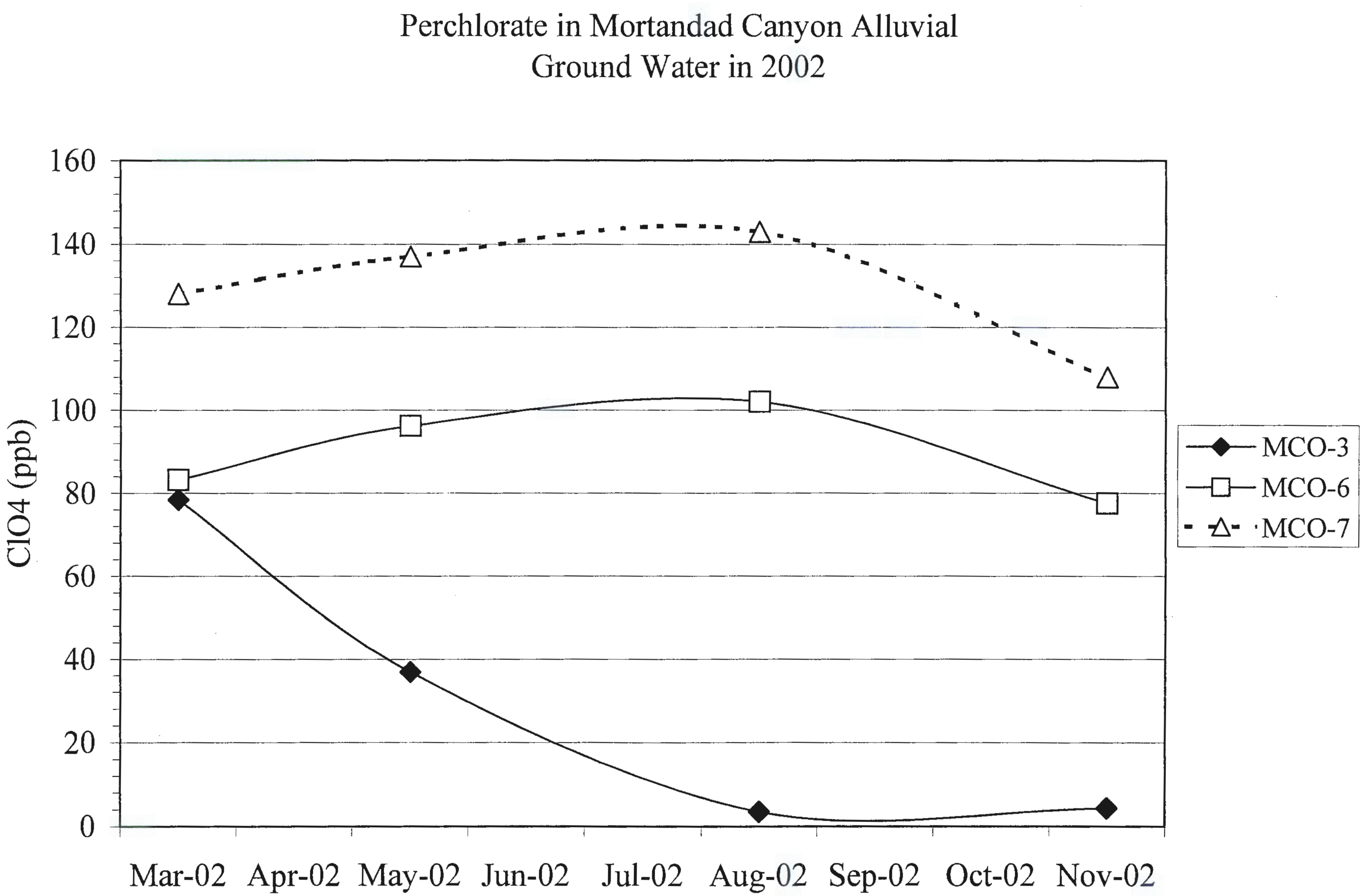
Nitrate + Nitrite (as N) in Mortandad Canyon Alluvial Ground Water in 2002



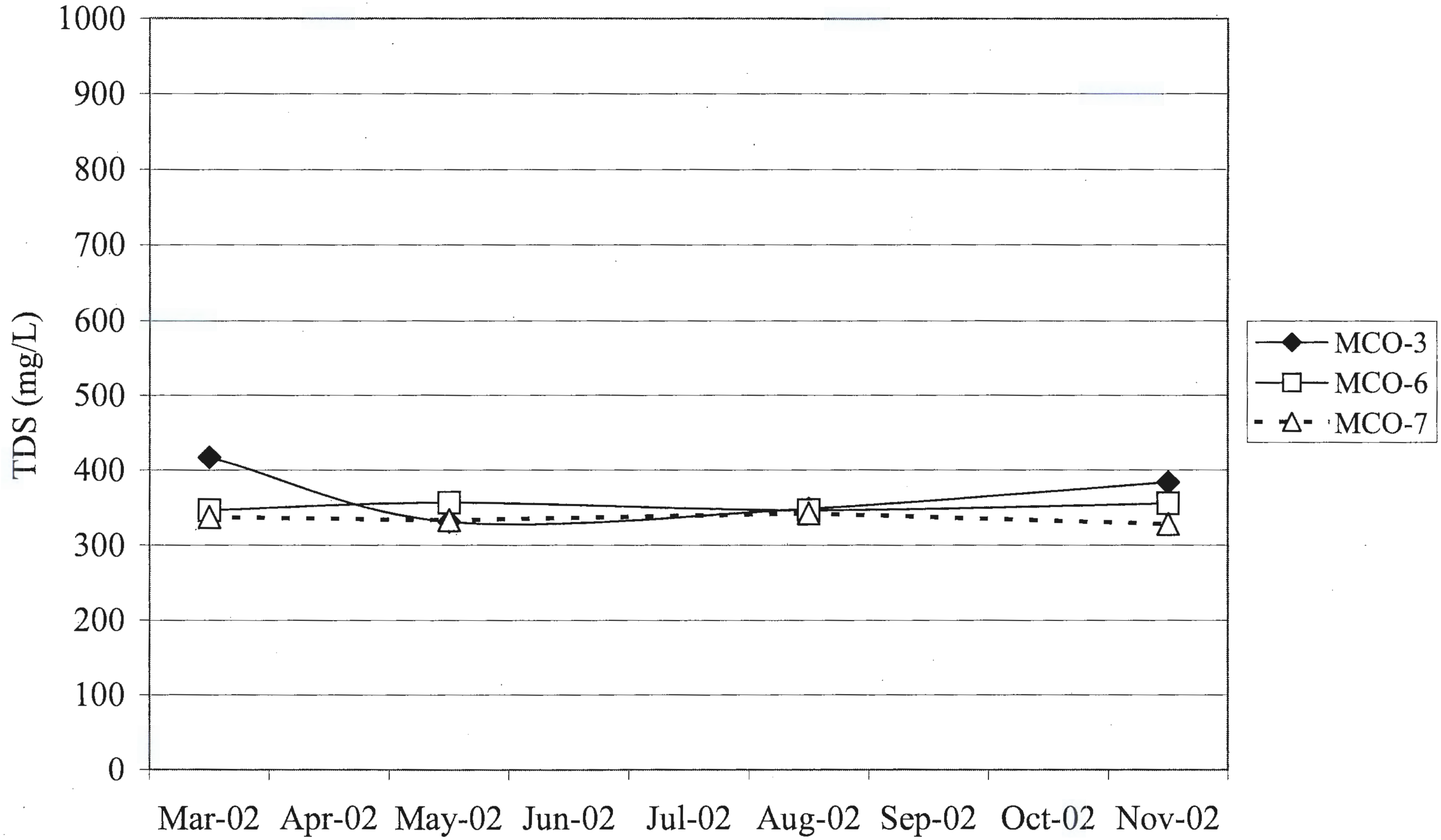
Perchlorate in RLWTF Influent and Effluent from May 2001 - February 2003
Analysis of Flow Weighted Weekly Composite Samples



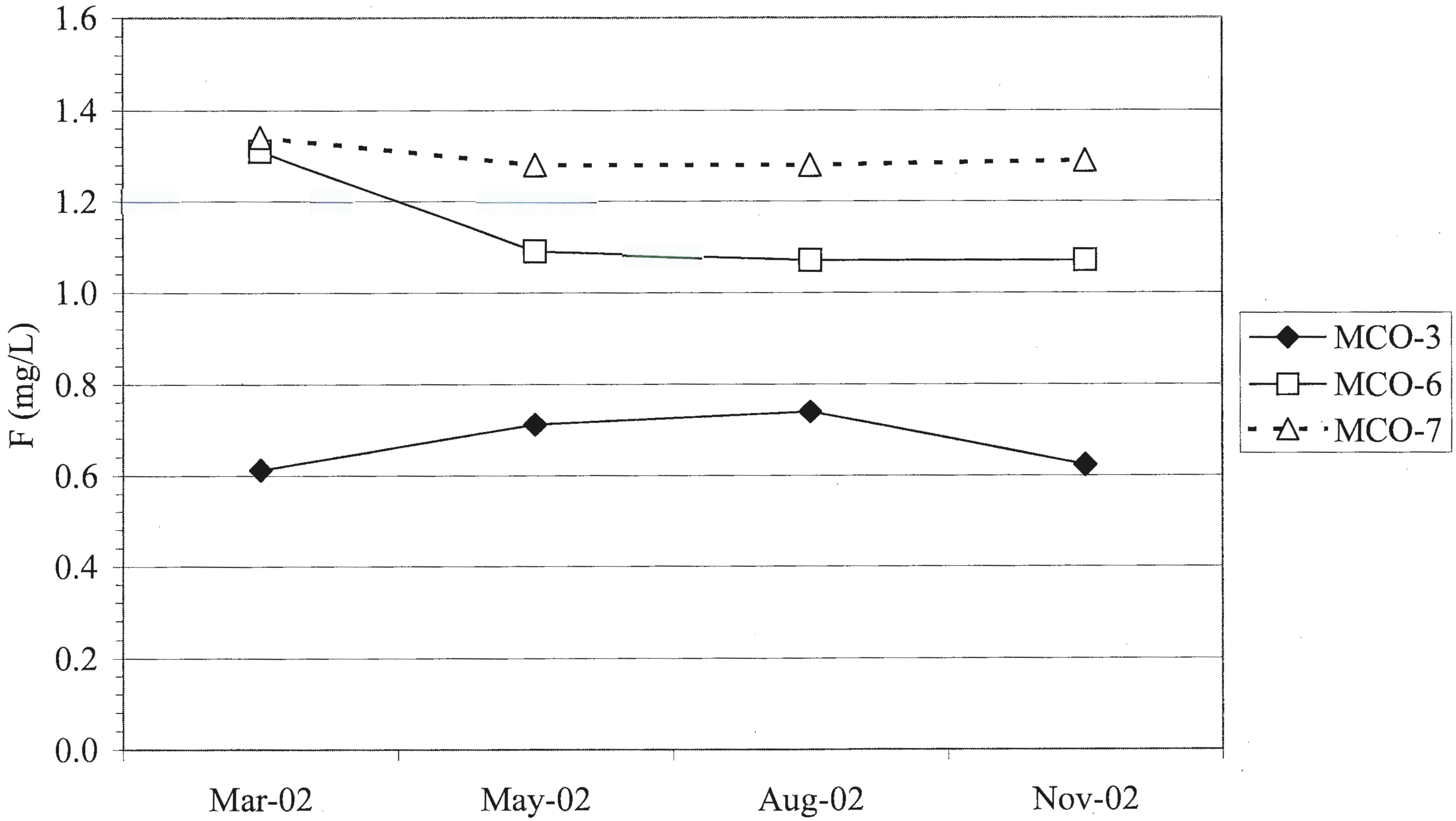


Perchlorate in Mortandad Canyon Alluvial
Ground Water in 2002
ClO4 (ppb)
160
140
120
100
80
60
40
20
0
Mar-02
Apr-02
May-02
Jun-02
Jul-02
Aug-02
Sep-02
Oct-02
Nov-02
MCO-3
MCO-6
MCO-7

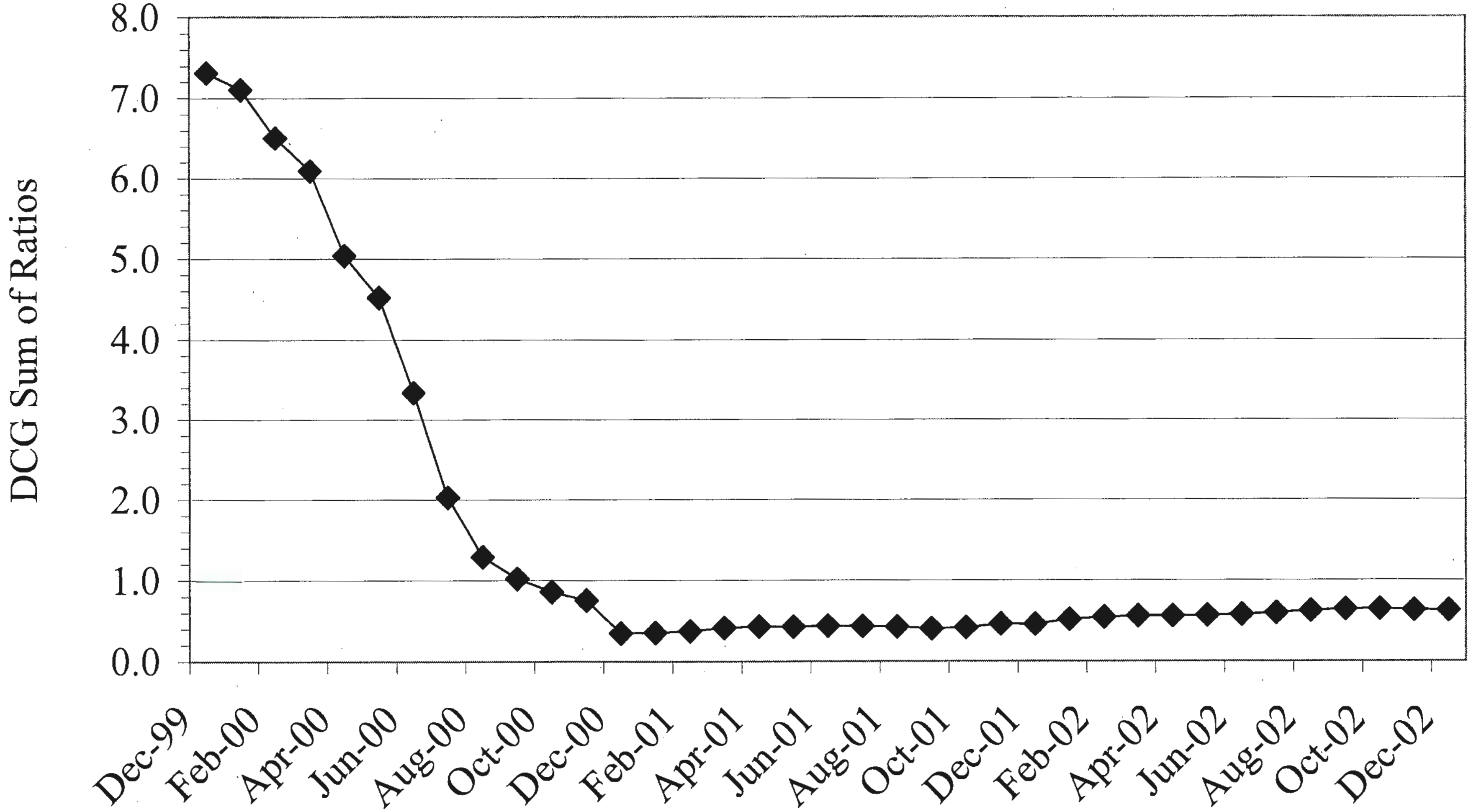
Total Dissolved Solids in Mortandad Canyon Alluvial Ground Water in 2002

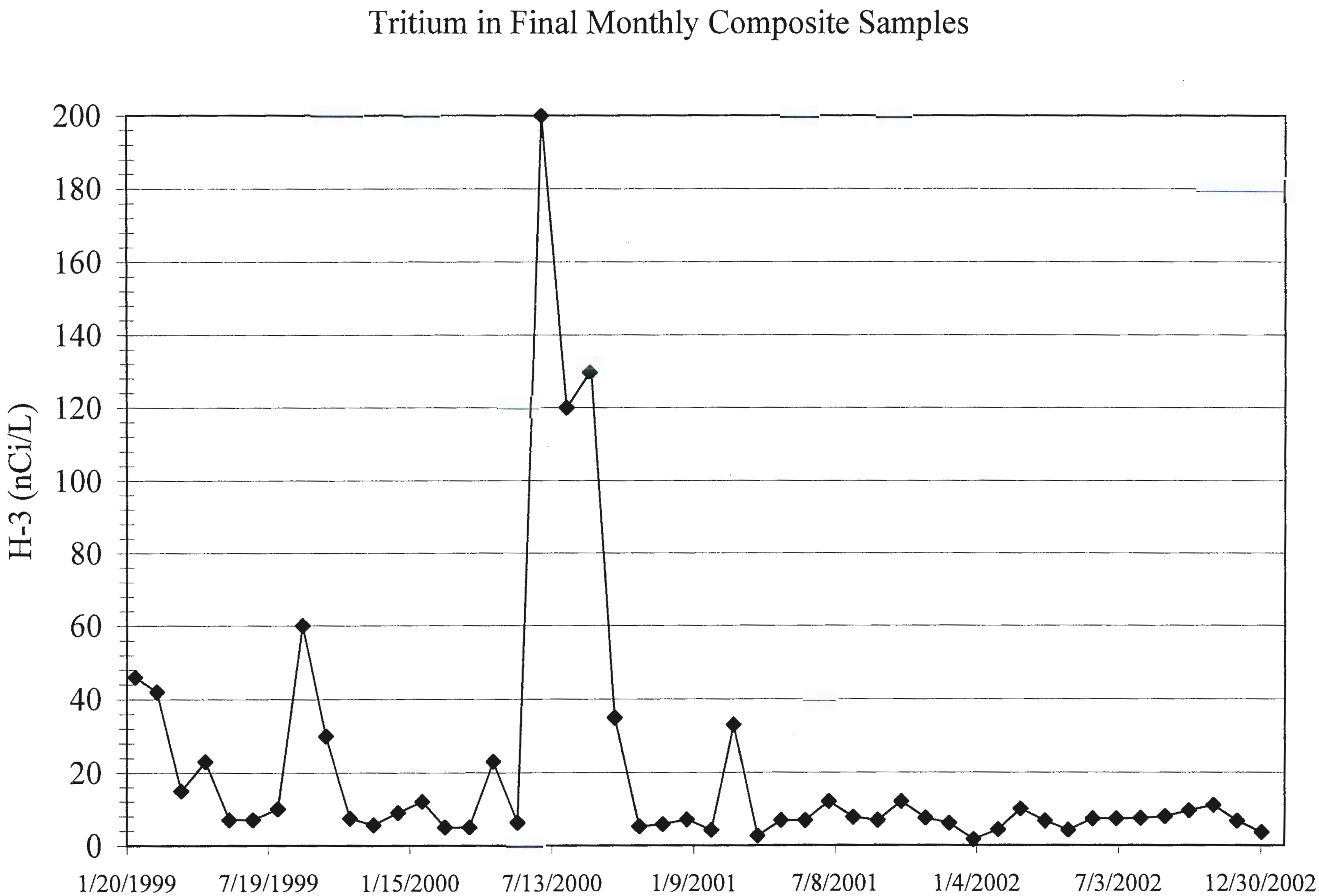


Fluoride in Mortandad Canyon Alluvial Ground Water in 2002



DOE Order 5400.5 Compliance
(12-month running average)





Tritium in Final Monthly Composite Samples
H-3 (nCi/L)
200
180
160
140
120
100
80
60
40
20
0
1/20/1999
7/19/1999
1/15/2000
7/13/2000
1/9/2001
7/8/2001
1/4/2002
7/3/2002
12/30/2002

: 02008

Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Water Quality & Hydrology Group (RRES-WQH)
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
(505) 667-7969/Fax: (505) 665-9344

Date: April 30, 2003
Refer to: RRES-WQH: 03-092

Mr. Curt Frischkorn
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN (DP-1132) QUARTERLY REPORT, FIRST QUARTER 2003

Dear Mr. Frischkorn:

This letter and the enclosed attachments are 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 of 2003. 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.

<u>Mortandad Canyon Alluvial Ground Water Monitoring Results</u>
Table 1.0 presents the analytical results from sampling conducted at three Mortandad Canyon alluvial monitoring wells during the 1st quarter of 2003. All of the analytical results from MCO-3, MCO-6, and MCO-7 were below New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 standards for nitrate-nitrogen (NO_3-N), fluoride (F), and total dissolved solids (TDS).

Mortandad Canyon alluvial monitoring well MCO-4B did not have sufficient water for sampling during the 1st quarter. The prolonged drought conditions have resulted in declining water levels in many of the Laboratory's shallow alluvial monitoring wells. We will continue to measure the water level in MCO-4B each quarter and will sample the well whenever sufficient water is present.

RLWTF Effluent Monitoring Results

Table 2.0 presents the analytical results from weekly monitoring of the RLWTF's effluent. The weekly 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 sample results from the 1st quarter were below NM WQCC Regulation 3103 standards for NO_3-N, F, and TDS with the exception of a single excursion for fluoride in January of 2.07 mg/L. As presented in Table 2.0, the 1st quarter average for fluoride in the RLWTF's effluent was 0.73 mg/L.

In response to the elevated fluoride result, on February 26, 2003, the RLWTF instituted the following administrative procedure as a corrective action: Each batch of RLWTF effluent will be screened for fluoride prior to discharge. Effluent batches that exceed the NM WQCC Regulation 3103 Ground Water Standard for fluoride of 1.6 mg/L will receive additional treatment.

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

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T. Stanford, FWO-DO, MS K492
D. Mclain, FWO-WFM, MS J593
R. Alexander, FWO-WFM, MS E518
D. Moss, FWO-WFM, MS E518
P. Worland, FWO-WFM, MS E518
B. Ramsey, RRES-DO, MS J591
K. Hargis, RRES-DO, MS J591
D. Stavert, RRES-EP, MS J591
S. Rae, RRES-WQH, MS K497
D. Rogers, RRES-WQH, MS K497
M. Saladen, RRES-WQH, MS K497
RRES-WQH File, MS K497
IM-5, MS A150

Table 1.0. Mortandad Canyon Alluvial Monitoring Wells Analytical Results, 1st Quarter, 2003.

Sampling Location	Sample Date	Perchlorate (ug/L)	NO3/NO2-N (mg/L)	TKN (mg/L)	NH3-N (mg/L)	TDS (mg/L)	F (mg/L)
MCO-3	3/27/2003	2.56J	2.35	0.47	<0.050	386	0.67
MCO-4B	3/27/2003	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
MCO-6	3/27/2003	43.2	2.66	0.32	<0.050	321	1.12
MCO-6 duplicate sample	3/27/2003	44.9	2.72	0.39	<0.050	340	1.13
MCO-7	3/27/2003	91.5	8.25	0.37	<0.050	320	1.29
NM WQCC 3103. Ground Water Standards (mg/L)			*102.0*			*1000*	*1.6*

Notes:

[1]NS means that there was not sufficient water available for sampling.

[2]The NMWQCC Regulation 3103. Ground Water Standard is for NO_3-N.

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 unless otherwise noted.

Table 2.0. RLWTF Weekly Effluent Monitoring Analytical Results, 1st Quarter, 2003.

Monitoring Period	Composite Date	RLWTF Weekly Effluent Monitoring Analytical Results (mg/L)		
		NO3+NO2-N	Fluoride	TDS
DECEMBER, 2002	12/20/2002	2.20	NA[3]	NA[3]
JANUARY, 2003	1/7/2003	2.18	2.07	907
	1/14/2003	1.49	1.13	796
	1/22/2003	0.23	0.39	284
	1/28/2003	0.24	0.30	242
FEBRUARY, 2003	2/4/2003	1.09	0.66	489
	2/11/2003	1.35	0.57	547
	2/19/2003	0.82	0.30	273
	2/25/2003	1.90	0.52	299
MARCH, 2003	3/4/2003	5.60	0.61	395
	3/4/2003-dupe[2]	6.00	0.56	391
	3/11/2003	5.60	0.75	382
	3/18/2003	2.80	0.84	446
	3/25/2003	results pending[1]	results pending[1]	results pending[1]
1st Quarter 2003 Averages (mg/L)		**2.44**	**0.73**	**454**
NM WQCC 3103. Ground Water Standards (mg/L)		*10.0*[4]	*1.6*	*1000*

Notes:
[1]Results for these analyses are pending validation.
[2]A duplicate sample result.
[3]No analysis performed due to a sample preservation error.

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