SAMPL TA 50 004

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Date: December 6, 2004
Refer To: ENV-WQH: 04-249

Mr. Christopher F. Vick
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: HANDOUTS AND PHOTOGRAPHS, NOVEMBER 2004 TOUR OF THE TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, GROUND WATER DISCHARGE PLAN APPLICATION (DP-1132)

Dear Mr. Vick:

As you may recall, during your November 19, 2004, tour of the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) I offered to provide you with copies of handouts and photographs once these documents had undergone a security review. A security review has been completed and the following documents are enclosed as supporting documentation for Los Alamos National Laboratory's Ground Water Discharge Plan Application (DP-1132) for the TA-50 RLWTF.

- Attachment 1.0. Overview of the TA-50 RLWTF (November 19, 2004).
- Attachment 2.0. TA-50 RLWTF Processes Schematic (November 16, 2004).
- Attachment 3.0. Perchlorate Reduction in RLWTF Effluent.
- Attachment 3.1. Tritium Reduction in RLWTF Effluent.
- Attachment 3.2. Reduction in Radioactive Material Discharged to the Environment.
- Attachment 3.3. RLWTF Discharges (1963-2002).
- Attachment 3.4 Reduction in Nitrate-Nitrogen Discharged.
- Attachment 4.0. RLWTF Annual Report for 2003, pages 30, 31, 34, 45, 46, and 47.
- Attachment 5.0. Photographs (33) taken by you during the tour.

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

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/tml

Attachments: a/s

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C. Nylander, ENV-GP, w/o att., MS M992
S. Rae, ENV-WQH, w/att., MS K497
D. Rogers, ENV-WQH, w/o att., MS K497
M. Saladen, ENV-WQH, w/att., MS K497
ENV-WQH File, w/att., MS K497
IM-5, w/att., MS A150

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Title: TA-50 Radioactive Liquid Waste Treatment Facility
Los Alamos National Laboratory
Tour for NMED-GWQB
November 19, 2004

Author(s): NWO-RLW Staff

Submitted to: NWO-DO

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Form 836 (8/00)

Attachment 1.0

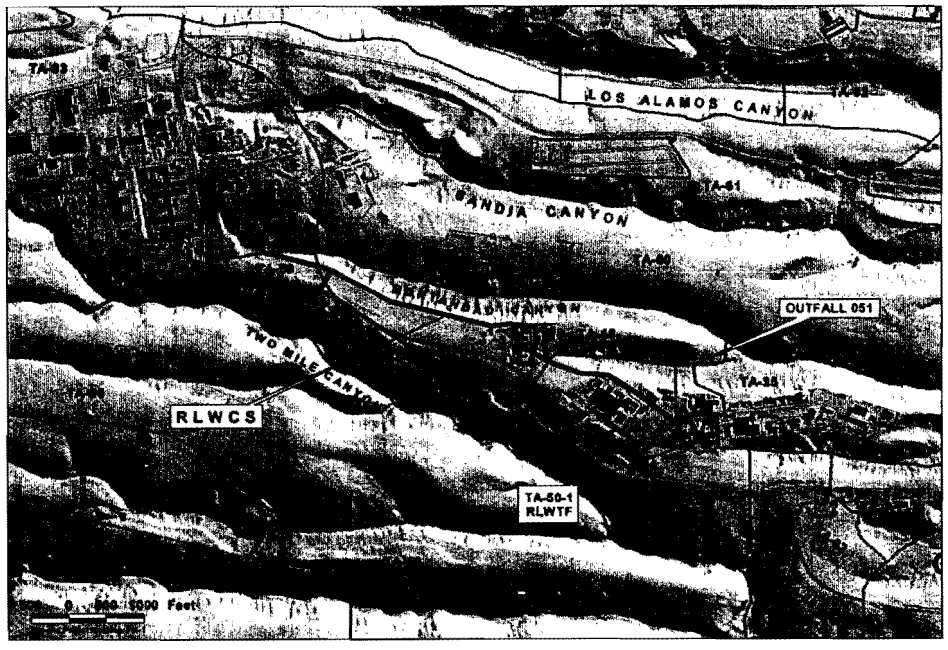
Radioactive Liquid Waste Treatment Facility
Los Alamos National Laboratory
TA-50

Operated by Nuclear Waste Operations Division
Radioactive Liquid Waste Group
Rick Alexander, Group Leader
Phone: 505-667-4301

November 19, 2004

The radioactive liquid waste treatment facility **(RLWTF)** at Technical Area 50 (TA-50) at Los Alamos National Laboratory (LANL) began operation in the summer of **1963**. **Low level radioactive liquid waste (LLW)** is conveyed to the facility via a buried, four mile long double contained pipeline made of high density polyethylene. Additionally, a small volume of LLW is trucked to the RLWTF. Figure 1 shows the location of the RLWTF and of the pipeline that is known as the radioactive liquid waste collection system **(RLWCS)**. The point where treated effluent is discharged to **Mortandad Canyon** is also shown in Figure 1.

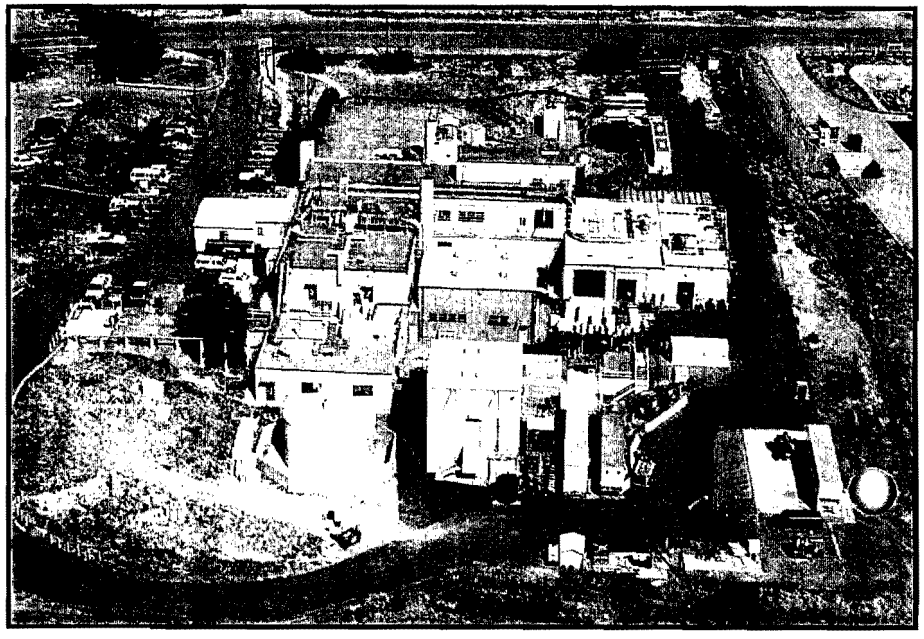
Figure 1



During **Calendar Year 2003** the RLWTF received and treated about **twelve million liters of LLW**. Generators of liquid waste are required to profile their waste and receive approval from the RLWTF prior to discharge of the waste to the RLWTF.

Transuranic (TRU) liquid waste is also treated at the RLWTF. This material is more radioactive than the LLW and is generated at the **TA-55 Facility**. The volume of this waste is minimal compared to the LLW, but due to its unique characteristics it is treated by a separate treatment process within the RLWTF. Figure 2 is an aerial photo of the RLWTF in 2003 as viewed from the south.

Figure 2

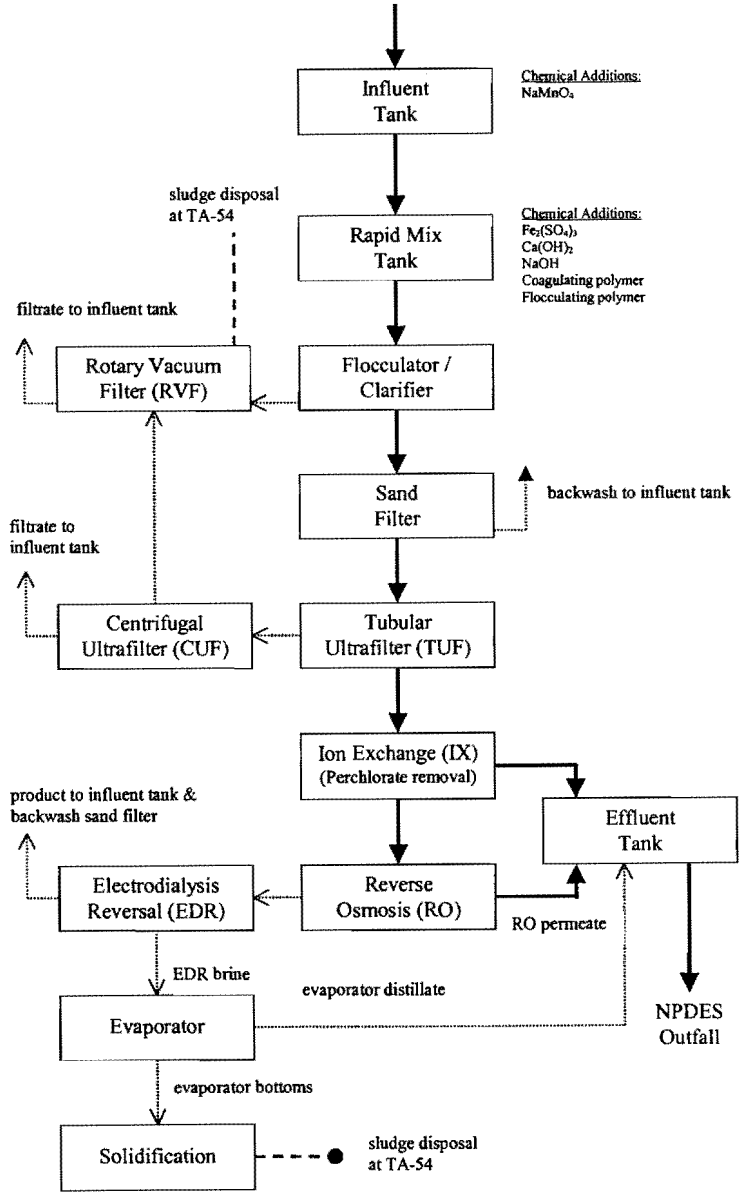


The **LLW treatment process**, shown in Figure 3, consists of oxidation and pH adjustment of the influent followed by chemical addition, coagulation, flocculation and sedimentation in the clarifier followed by rapid sand filtration. This water is then treated by ultrafiltration, ion exchange and reverse osmosis and analyzed for eleven parameters prior to discharge to the environment.

Secondary wastewaters and sludge are generated in this LLW process. The clarifier sludge and secondary wastewaters are

dewatered, volume reduced and drummed. These drums are disposed at the TA-54 radioactive solid waste disposal facility. Prior to **upgrades beginning in 1999**, LLW treatment consisted only of the first five processes shown in Figure 3.

Figure 3



The quality of the effluent waters from the **RLWTF is regulated** by the U.S. Environmental Protection Agency **(EPA)** National Pollutant Discharge Elimination System (NPDES) [21 parameters], the New Mexico Environment Department **(NMED)** [3 parmeters] and by U.S. Department of Energy **(DOE)** guidelines [radionuclides].

Future Plans at the RLWTF include the following:

1. Construction is underway on the 300,000 gallon influent tank farm at TA-50 (Cerro Grande Rehabilitation Project funding of $30M)
2. Critical Decision Zero (CD-0) DOE approval was gi 10/4/2004 for up to $86M to begin conceptual design of an upgraded/new RLWTF capability addressing the following issues.
    a. LLW treatment process and facility
    b. TRU treatment process and facility
    c. Secondary waste treatment and facility
    d. Zero liquid discharge capability
3. Other Future Projects
    a. Renovation of the collection system (RLWCS)
    b. Waste minimization efforts
    c. Generator controls

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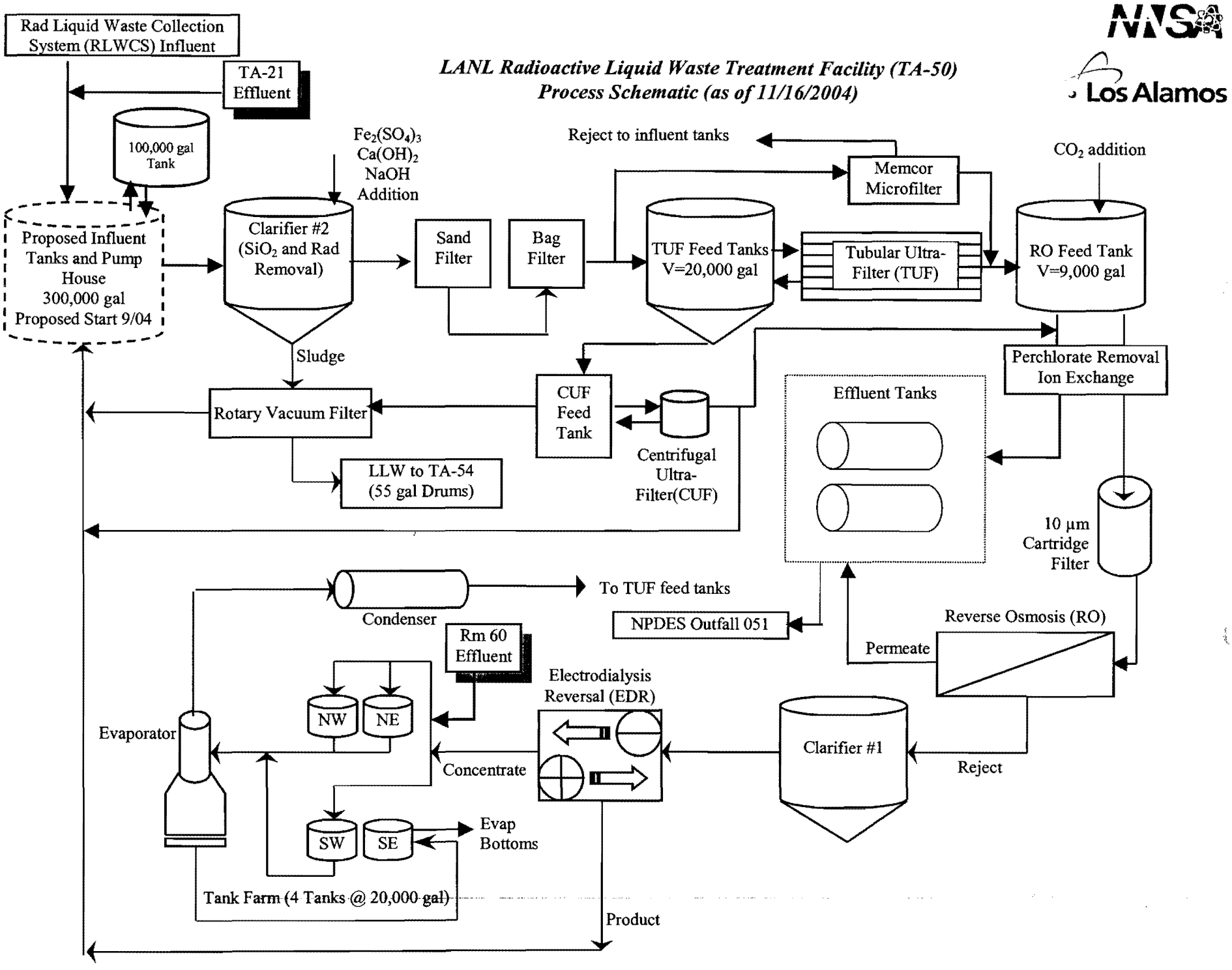
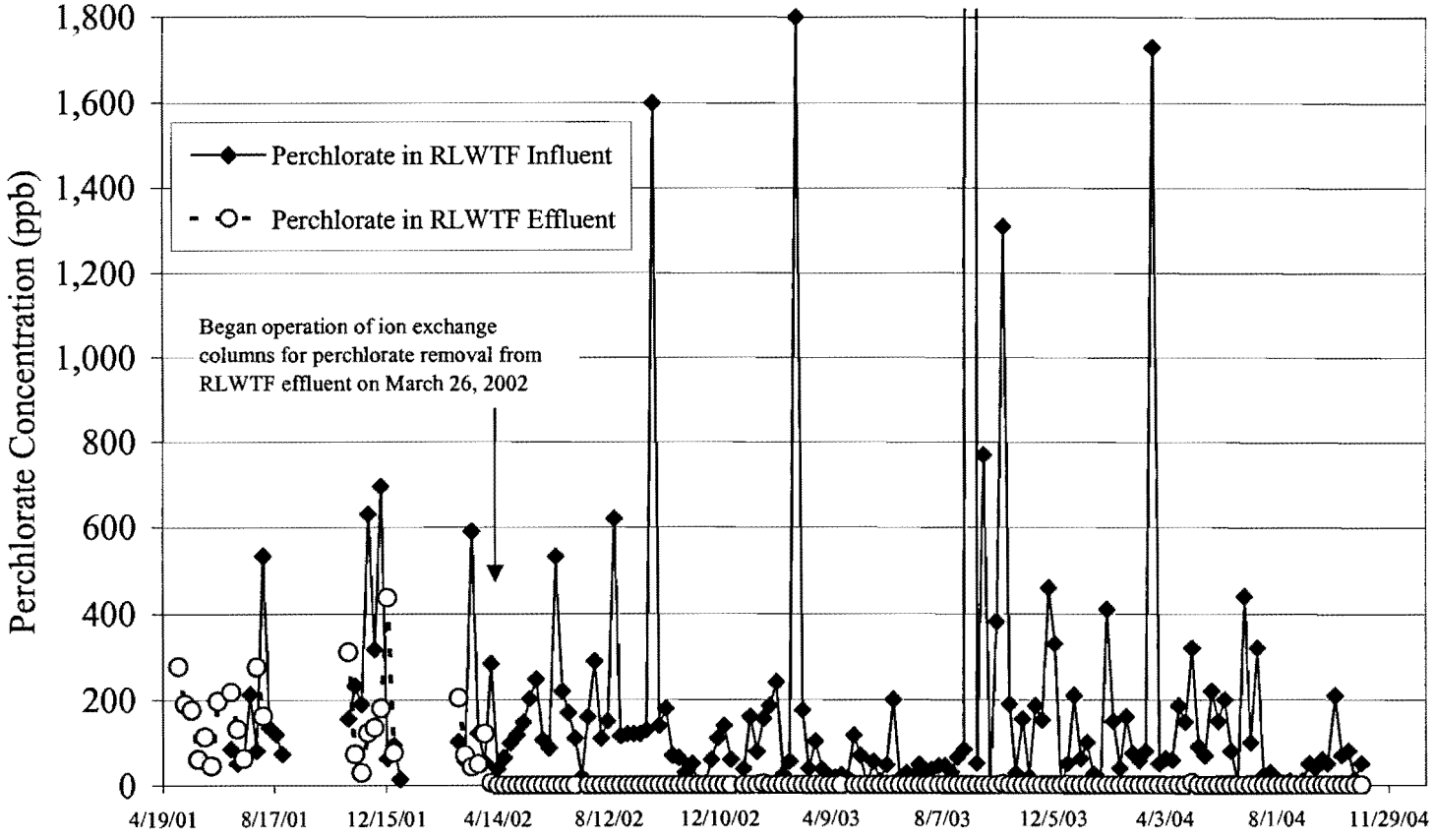
Attachment 2.0



Perchlorate Reduction in RLWTF Effluent

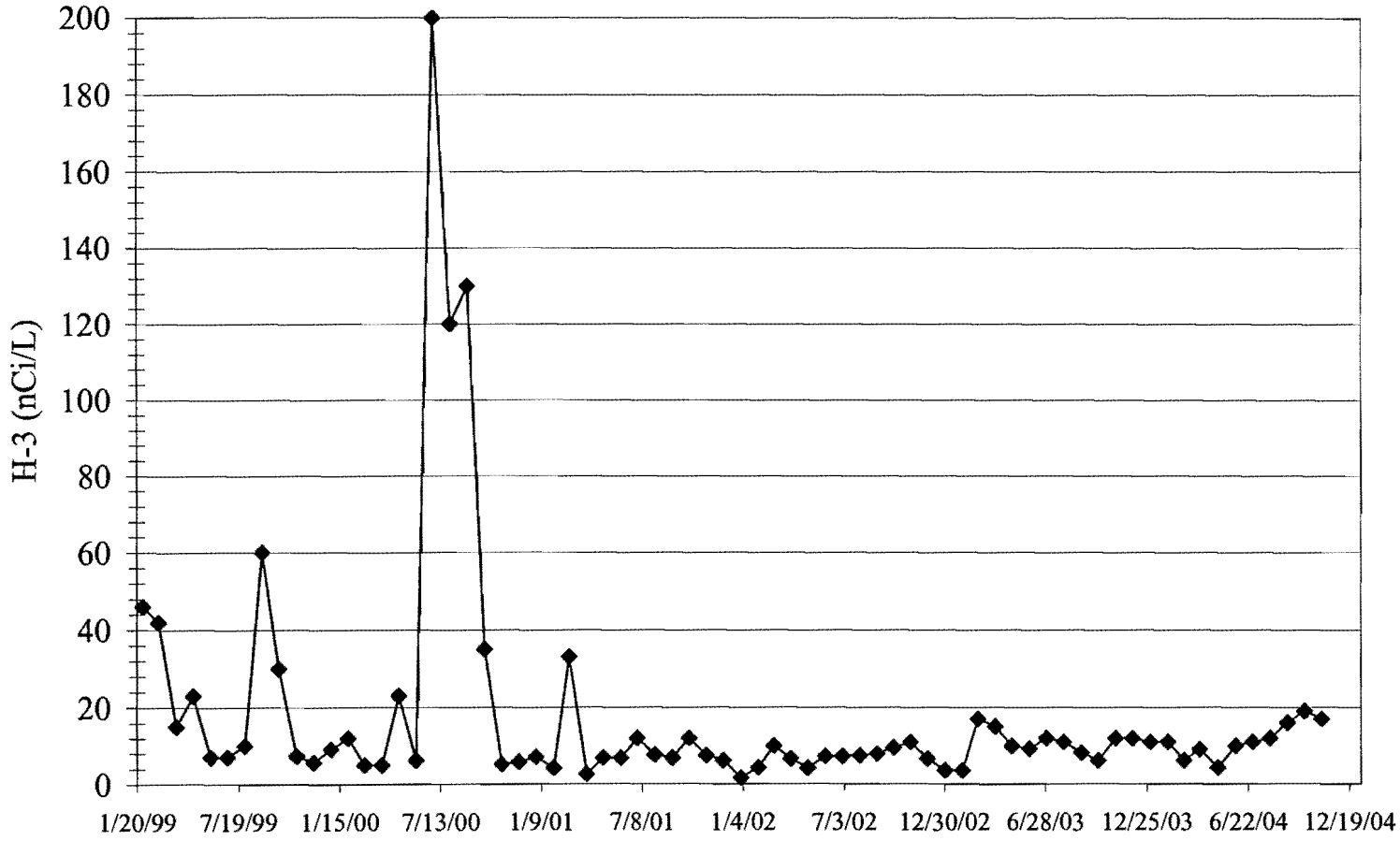
Perchlorate in RLWTF Influent and Effluent from May 2001 - October 2004
Analysis of Flow Weighted Weekly Composite Samples



Attachment 3.1

Tritium Reduction in RLWTF Effluent

Tritium in Final Monthly Composite Samples (1/99 - 10/04)



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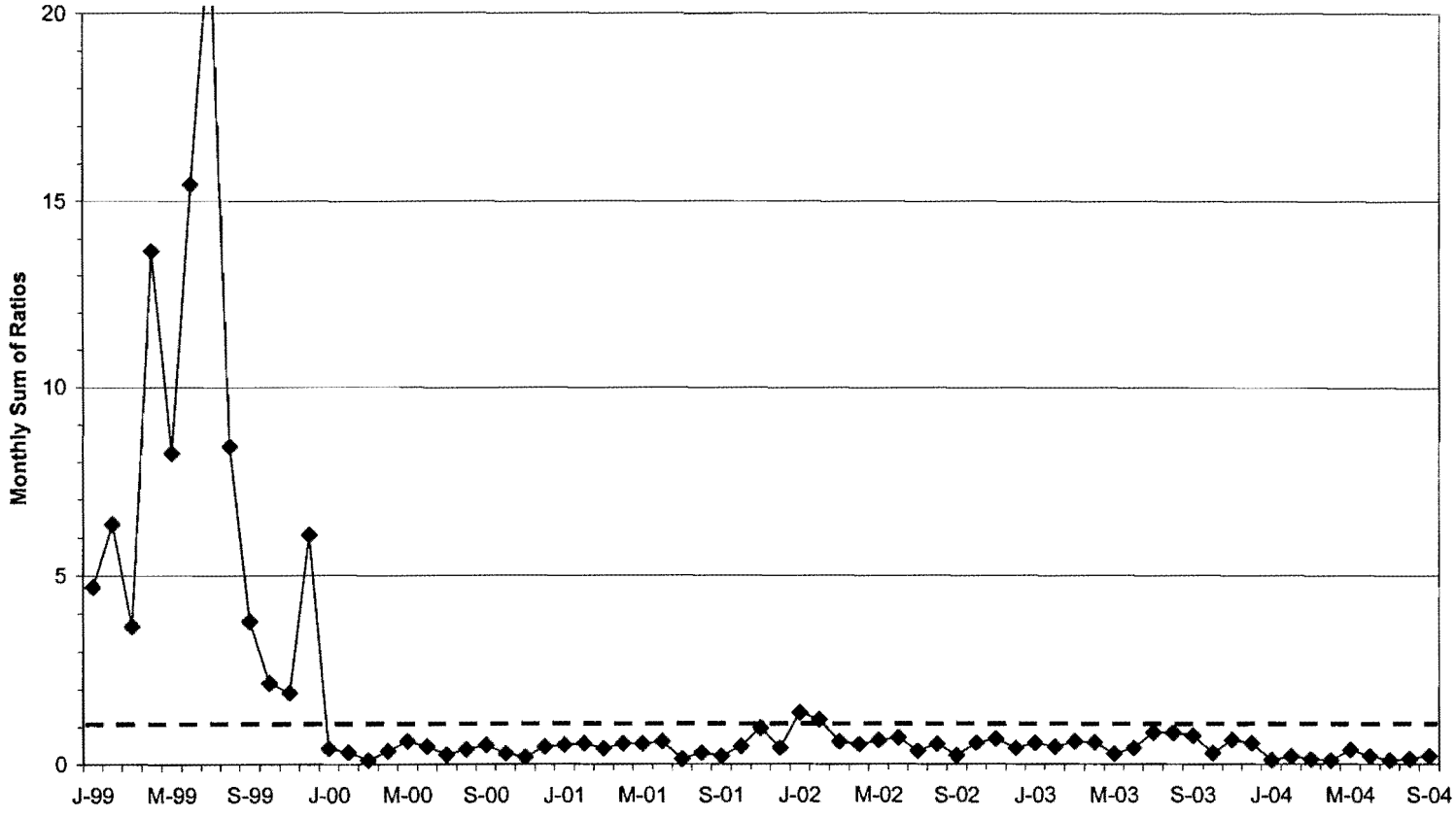
Attachment 3.2

Reduction in Radioactive Material Discharged to the Environment

DOE Order 5400.5 Derived Concentration Guidelines for Radionuclides
70 Months of Flow Weighted Monthly Composite Effluent Samples (Jan. 99 - Sept. 04)
SoR = 1 (100 mrem/yr dose @ 2 liters/day)



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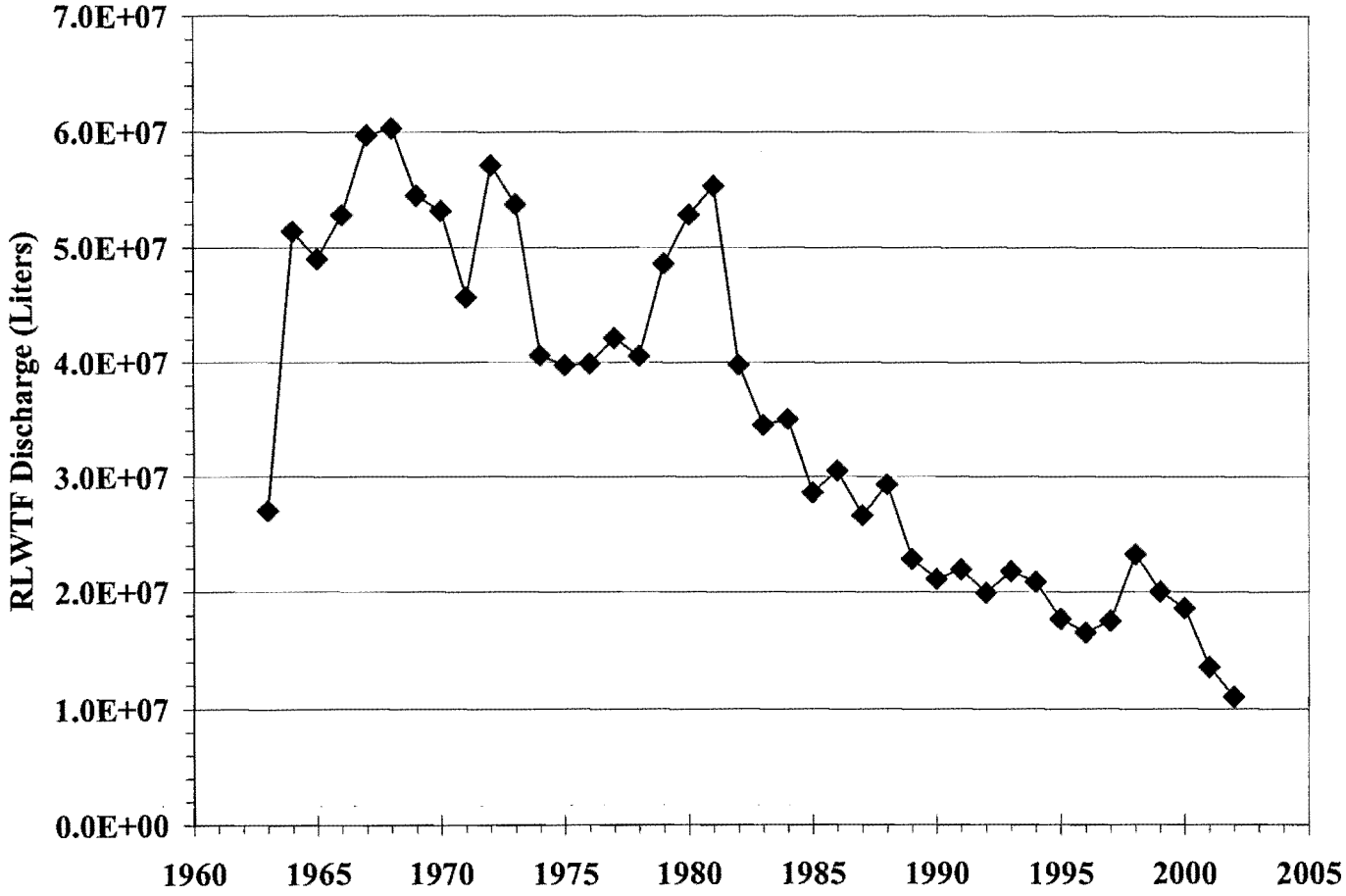
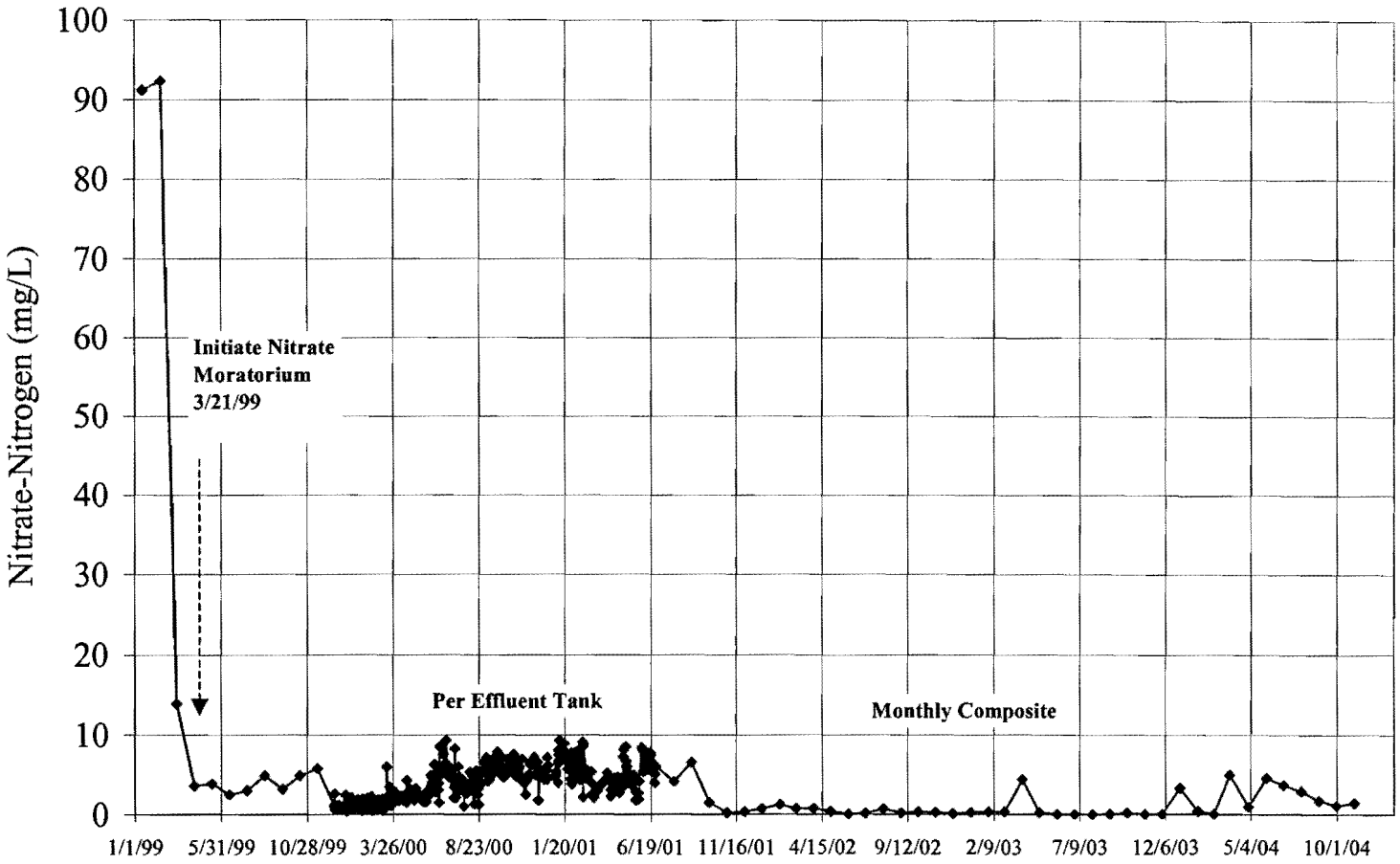
RLWTF Discharges (1963 – 2002)



Attachment 3.4

Reduction in Nitrate-Nitrogen Discharged

Nitrate-Nitrogen in RLWTF Effluent January 1999 through October 2004



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5. Non-Radiological Nature of the CY 2003 TA-50 RLWTF Influent and Effluent Waters and Process Waste Sludge

In addition to radionuclides, the influent wastewater to the TA-50 RLWTF also includes many other inorganic and organic contaminants that require treatment prior to discharge via the NPDES permitted outfall to the environment. Twenty-one (21) parameters in the effluent from the RLWTF are regulated by the National Pollutant Discharge Elimination System (NPDES) in compliance with the Federal Clean Water Act. LANL also has a voluntary commitment with the New Mexico Environment Department (NMED) to not discharge effluent from the TA-50 RLWTF that exceeds groundwater standards set by the New Mexico Water Quality Control Commission (NMWQCC) for three (3) water quality parameters: fluoride, nitrate-nitrogen and total dissolved solids (TDS). Table 5-1 identifies these 24 discharge parameters and also indicates the frequency of sampling required for each parameter.

Table 5-1 NPDES and NMED Discharge Parameters

NPDES (21 parameters)			**NMED (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]	
Chromium[1]	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

The quantitative limits for the twenty-four (24) NPDES and three (3) NMED discharge parameters which pertain to the RLWTF effluent are given in Table 5-2.

The TA-50 RLWTF effluent, for the 4th consecutive year, was in compliance with all twenty-one (21) NPDES water quality parameters during calendar year 2003.

LANL also has a voluntary commitment with the New Mexico Environment Department (NMED) to not discharge effluent from the TA-50 RLWTF that exceeds groundwater standards set by the New Mexico Water Quality Control Commission (NMWQCC) for three (3) water quality parameters: fluoride, nitrate-nitrogen and total dissolved solids (TDS). Two (2) weekly composite samples of RLWTF effluent slightly exceeded the

NMED groundwater standard for fluoride of 1.6 mg/L (sample values were 2.07 mg/L and 1.64 mg/L). Each effluent tank is now analyzed for fluoride prior to discharge to ensure that the voluntary commitment is not exceeded again.

Table 5-2 Discharge Limits for NPDES and NMED Parameters in the RLWTF Effluent

NPDES Parameters	**Monthly Average (mg/L)**	**Daily Max (mg/L)**
Flow	Report	Report
pH	6 – 9 su	6 – 9 su
Chemical Oxygen Demand	125	125
Total Suspended Solids	30	45
Total Cadmium	0.05	0.05
Total Chromium	1.34	2.68
Total Copper	1.393	1.393
Total Iron	-----	-----
Total Lead	0.423	0.524
Total Mercury	0.00077	0.00077
Total Zinc	4.37	8.75
Total Toxic Organics	1.0	1.0
Total Arsenic	0.368	0.368
Total Aluminum	5.0	5.0
Total Boron	5.0	5.0
Total Cobalt	1.0	1.0
Total Selenium	0.005	0.005
Total Vanadium	0.1	0.1
Radium 226 + Radium 228	30 pCi/L	30 pCi/L
Tritium (when accelerator produced)	20,000 pCi/L	20,000 pCi/L
Total Nickel	Report	Report
Perchlorate	Report	Report
NMED Parameters	**Per Discharge (mg/L)**	
Fluoride	1.6	
Nitrate-nitrogen	10.0	
Total Dissolved Solids	1,000	

Table 5-4 TA-50 RLWTF Mineral Summary for CY 2003

TA-50 RLWTF Mineral Summary

JAN-2003 through DEC-2003

	RAW Average	Maximum	Minimum	No. Samp.	Total (Kg)	FINAL Average	Maximum	Minimum	No. Samp.	Total (Kg)
ALKALINITY-MO**	97.6 E0	212. E0	34.7 E0	12	1.2 E3	126.7 E0	284. E0	42.2 E0	12	1.4 E3
ALKALINITY-P**	3.4 E0	26.4 E0	7.2 E0	12	41.5 E0	0	*	*	12	0
ALUMINUM	1. E0	3.5 E0	259. E-3	12	12.4 E0	34.3 E-3	116. E-3	6. E-3	12	385.7 E-3
AMMONIA-N	4.6 E0	6.3 E0	2.7 E0	12	56.4 E0	3.9 E0	6.4 E0	1.6 E0	12	44.2 E0
ARSENIC	3.4 E-3	11. E-3	8. E-3	12	41.2 E-3	3.7 E-3	15. E-3	10. E-3	12	41.7 E-3
BARIUM	33.6 E-3	50. E-3	4. E-3	12	407.9 E-3	115.2 E-6	2. E-3	2. E-3	12	1.3 E-3
BERYLLIUM	8.2 E-3	47. E-3	2. E-3	12	99.6 E-3	0	*	*	12	0
BORON	80.6 E-3	140. E-3	20. E-3	12	980.2 E-3	61.6 E-3	98. E-3	31. E-3	12	692.9 E-3
CADMIUM	3.6 E-3	7. E-3	3. E-3	12	43.5 E-3	234.1 E-6	3. E-3	3. E-3	12	2.6 E-3
CALCIUM	11.7 E0	19. E0	8. E0	12	142.2 E0	543.6 E-3	2. E0	130. E-3	12	6.1 E0
CHLORIDE	26.5 E0	77. E0	14. E0	12	322.2 E0	9.9 E0	27. E0	980. E-3	12	112. E0
COBALT	657.5 E-6	3. E-3	1. E-3	12	8. E-3	273.1 E-6	4. E-3	1. E-3	12	3.1 E-3
COD	257.3 E0	1.1 E3	77. E0	12	3.1 E3	32.9 E0	62. E0	18. E0	12	370.1 E0
CONDUCTIVITY**	383.5 E0	809. E0	230. E0	12	4.7 E3	359.6 E0	840. E0	100. E0	12	4. E3
COPPER	861.8 E-3	6. E0	150. E-3	12	10.5 E0	19.3 E-3	40. E-3	10. E-3	12	217.2 E-3
CYANIDE	5.2 E-3	23. E-3	3. E-3	12	63. E-3	990.6 E-6	5. E-3	2. E-3	12	11.2 E-3
FLUORIDE	628.1 E-3	1.4 E0	230. E-3	12	7.6 E0	384.5 E-3	1.4 E0	210. E-3	12	4.3 E0
HARDNESS**	45. E0	76.3 E0	31.5 E0	12	547.2 E0	1.2 E0	5.2 E0	324.6 E-3	12	13.2 E0
IRON	1.3 E0	2.8 E0	780. E-3	12	16.3 E0	62.9 E-3	171. E-3	20. E-3	12	708.2 E-3
LEAD	80.5 E-3	130. E-3	40. E-3	12	978.2 E-3	0	*	*	12	0
MAGNESIUM	3.8 E0	7. E0	2.8 E0	12	46.7 E0	8.1 E-3	50. E-3	40. E-3	12	91.7 E-3
MERCURY	4.4 E-3	9.1 E-3	1.9 E-3	12	53.2 E-3	39.1 E-6	100. E-6	20. E-6	12	440.6 E-6
NICKEL	85.4 E-3	450. E-3	30. E-3	12	1. E0	0	*	*	12	0
NITRATE-N	3.9 E0	9.1 E0	830. E-3	12	47.9 E0	626.8 E-3	4.4 E0	26. E-3	12	7.1 E0
NITRITE-N	722.4 E-3	1.8 E0	171. E-3	12	8.8 E0	505.9 E-3	3.6 E0	100. E-3	12	5.7 E0
PERCHLORATE	141.3 E-3	490. E-3	17. E-3	12	1.7 E0	0	*	*	12	0
PHOSPHORUS	2.2 E0	4.2 E0	28. E-3	12	26.6 E0	47.5 E-3	186. E-3	20. E-3	12	534.2 E-3
POTASSIUM	3.8 E0	11. E0	400. E-3	12	46.3 E0	1.8 E0	7.5 E0	200. E-3	12	20.8 E0
SELENIUM	0	*	*	12	0	0	*	*	12	0
SILICON	30.8 E0	40. E0	11. E0	12	374.7 E0	4. E0	12. E0	610. E-3	12	44.6 E0
SILVER	29.4 E-3	170. E-3	2. E-3	12	357.9 E-3	24.5 E-3	280. E-3	3. E-3	12	276.2 E-3
SODIUM	49.9 E0	140. E0	18. E0	12	606.5 E0	68.1 E0	179. E0	16. E0	12	766.6 E0
SULFATE	27.7 E0	100. E0	10. E0	12	337.1 E0	30.4 E0	98. E0	6. E0	12	342.3 E0
TDS	200.1 E0	478. E0	110. E0	12	2.4 E3	130.5 E0	338. E0	156. E0	12	1.5 E3
TKN	11.1 E0	38.7 E0	3.3 E0	12	134.9 E0	4.6 E0	8.5 E0	2. E0	12	51.8 E0
TOTAL CATIONS**	3.7 E0	8. E0	2.1 E0	12	44.9 E0	3.6 E0	8.8 E0	1.1 E0	12	40.5 E0
TOTAL CHROMIUM	33.5 E-3	70. E-3	23. E-3	12	406.7 E-3	78. E-6	1. E-3	1. E-3	12	878.4 E-6
TOXIC ORGANICS**						789.6 E-3	1.9 E0	1. E0	12	8.9 E0
TSS	29.2 E0	58. E0	11. E0	12	355.2 E0	0	*	*	12	0
URANIUM	98.6 E-3	147. E-3	56. E-3	12	1.2 E0	69.4 E-6	400. E-6	320. E-6	12	781.8 E-6
VANADIUM	39.4 E-3	220. E-3	10. E-3	12	479.6 E-3	12.9 E-3	150. E-3	20. E-3	12	145.6 E-3
ZINC	142.4 E-3	190. E-3	20. E-3	12	1.7 E0	7.5 E-3	30. E-3	9. E-3	12	83.9 E-3
pH	7.1 E0	9.1 E0	6.2 E0	12	85.9 E0	7.4 E0	8. E0	7. E0	12	83.7 E0

Volume of Flow: Influent = 12156083 liters Final = 11257314 liters

**Alkalinities and hardness as mg CaCO3/l; Conductivity as uS/cm; Total Cations as meq/l; Toxic Organics as ug/l; Otherwise: mg/l.

* Less than Detection Limit Issued 02/11/2004 16:24:29

Volatile organic chemicals (VOC) and semi-volatile organic chemicals (SVOC) are also analyzed for in the TA-50 RLWTF influent wastewaters, treated effluent waters and in the chemical sludge produced by the clarification process. A grab sample of influent water is analyzed for VOC/SVOC on a weekly basis. A monthly grab sample of effluent water is analyzed for VOC/SVOC. Additionally, individual batches of sludge are also analyzed for VOC/SVOC. These analyses are performed according to EPA approved methods 624, 625A and 625B by an external EPA certified laboratory.

Table 5-5 shows the VOC/SVOC detected in the RLWTF influent and the number of weeks in which that chemical was detected during CY 2003. More information pertaining to VOC/SVOC in the RLWTF influent is given in Appendices E, F, G and H.

Table 5-5 VOC/SVOC Detected in Weekly Samples of 2003 RLWTF Influent

VOC/SVOC Detected in the RLWTF Weekly Influent Samples

JAN-2003 through DEC-2003

VOC (Method 624)	Weeks	Low (mg/L)	High (mg/L)
1,2,3-TRICHLOROBENZENE	1	2.6 E-3	2.6 E-3
1,2,4-TRIMETHYLBENZENE	15	840. E-6	11. E-3
1,2-DICHLOROBENZENE	1	1. E-3	1. E-3
1,2-DICHLOROETHANE	2	490. E-6	30. E-3
1,2-XYLENE	3	510. E-6	3. E-3
1,3,5-TRIMETHYLBENZENE	1	650. E-6	650. E-6
1,3-XYLENE+XYLENE[1,4-]	2	1. E-3	10. E-3
2-BUTANONE	5	7. E-3	15. E-3
4-ISOPROPYLTOLUENE	1	890. E-6	890. E-6
4-METHYL-2-PENTANONE	16	2.4 E-3	340. E-3
ACETONE	49	78. E-3	3.1 E0
BROMOBENZENE	3	820. E-6	1.7 E-3
BROMOMETHANE	1	3.5 E-3	3.5 E-3
CHLOROFORM	39	360. E-6	6. E-3
CHLOROMETHANE	4	260. E-6	3.9 E-3
CIS-1,2-DICHLOROETHENE	1	1.6 E-3	1.6 E-3
CIS/TRANS-1,2-DICHLOROETHENE	1	1.6 E-3	1.6 E-3
DI-N-OCTYL PHTHALATE	1	2.8 E-3	2.8 E-3
ETHYLBENZENE	2	1. E-3	3. E-3
HEXACHLOROBUTADIENE	1	2. E-3	2. E-3
ISOPROPYLBENZENE	1	760. E-6	760. E-6
METHYL TERT-BUTYL ETHER	1	76. E-3	76. E-3
METHYLENE CHLORIDE	45	790. E-6	66. E-3
N-NITROSO-DI-N-PROPYLAMINE	3	7.5 E-3	46. E-3
SEC-BUTYLBENZENE	1	900. E-6	900. E-6
STYRENE	1	640. E-6	640. E-6
TERT-BUTYLBENZENE	1	820. E-6	820. E-6
TOLUENE	3	1.2 E-3	14. E-3
TRICHLOROETHENE	1	4. E-3	4. E-3
XYLENE (TOTAL)	3	1.7 E-3	13. E-3
XYLENE[1,3-]+XYLENE[1,4-]	2	1.2 E-3	4.3 E-3

SVOC (Methods 625A and 625B)	Weeks	Low (mg/L)	High (mg/L)
2-NITROPHENOL	3	2. E-3	3.3 E-3
3-METHYLPHENOL & 4-METHYLPHENOL	3	2. E-3	3.3 E-3
BENZOIC ACID	31	2.7 E-3	430. E-3
BENZYL ALCOHOL	7	2. E-3	210. E-3
BIS(2-ETHYLHEXYL)PHTHALATE	41	2.8 E-3	130. E-3
BUTYLBENZYLPHTHALATE	3	2. E-3	3. E-3
DI-N-BUTYLPHTHALATE	1	3. E-3	3. E-3
DIETHYLPHTHALATE	12	2. E-3	9. E-3
N-NITROSO-DI-N-PROPYLAMINE	3	3.7 E-3	54. E-3
N-NITROSODIMETHYLAMINE	1	4. E-3	4. E-3
PHENOL	13	2. E-3	370. E-3
PYRIDINE	21	5.1 E-3	100. E-3
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Table 5-6 summarizes the VOC/SVOC detected in the RLWTF effluent during CY 2003 and the concentration range of these chemicals. The "months" column in Table 5-6 indicates the number of monthly samples in which a particular chemical was detected. For example, the VOC chemical, chloroform, was detected in very small concentrations in six (6) of the twelve (12) monthly effluent samples. Of the SVOC chemicals, only chrysene was detected in one (1) monthly effluent sample.

Table 5-6 VOC/SVOC Detected in Monthly Samples of 2003 RLWTF Effluent

VOC/SVOC Detected in the RLWTF Monthly Effluent Samples			
JAN-2003 through DEC-2003			
VOC (Method 624)	Months	Low (ug/L)	High (ug/L)
Chloroform	6	1.1 E0	1.9 E0
SVOC (Methods 625A and 625B)	Months	Low (ug/L)	High (ug/L)
Chrysene	1	1. E0	1. E0
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Table 5-7 summarizes the VOC/SVOC chemicals detected in the RLWTF sludge during CY 2003 and the range of concentrations of these chemicals. Additional information pertaining to VOC/SVOC in the RLWTF sludge is given in Appendices I, J, K and L.

Table 5-7 VOC/SVOC Detected in Samples of 2003 RLWTF Sludge

VOC/SVOC Detected in the RLWTF Sludge Samples JAN-2003 through DEC-2003		
VOC (Method 624)	Low (mg/L)	High (mg/L)
1,1,2-TRICHLORO-1,2,2-TRIFLUORO	1. E-3	1. E-3
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	4.5 E-3	4.5 E-3
1,2,4-TRIMETHYLBENZENE	7.9 E-3	48. E-3
1,2-DICHLOROBENZENE	2. E-3	2. E-3
1,3,5-TRIMETHYLBENZENE	4. E-3	4. E-3
1,3-DICHLOROBENZENE	2. E-3	2. E-3
1,4-DICHLOROBENZENE	2. E-3	2. E-3
2-BUTANONE	24. E-3	270. E-3
4-ISOPROPYLTOLUENE	2. E-3	2. E-3
4-METHYL-2-PENTANONE	3.8 E-3	23. E-3
ACETONE	21. E-3	820. E-3
CARBON DISULFIDE	4. E-3	18. E-3
DI-N-OCTYL PHTHALATE	1.2 E0	1.7 E0
DICHLORODIFLUOROMETHANE	6. E-3	6. E-3
ETHYLBENZENE	1.3 E-3	6. E-3
METHYLENE CHLORIDE	8.6 E-3	69. E-3
SEC-BUTYLBENZENE	2. E-3	2. E-3
STYRENE	630. E-6	630. E-6
TETRACHLOROETHENE	1.3 E-3	17. E-3
TOLUENE	2. E-3	7. E-3
XYLENE (TOTAL)	3.7 E-3	25. E-3
SVOC (Methods 625A and 625B)	Low (mg/L)	High (mg/L)
BIS(2-ETHYLHEXYL)PHTHALATE	8.5 E0	24. E0
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Attachment 5.0

NMED Tour of the T[illegible]0 RLWTF
Photos Taken by Chris Vick, NMED-GWQB
November 19, 2004

Figure 1. Supervisory Control and Data Acquisition (SCADA) Monitor.

Figure 2. SCADA Monitor Close-up.

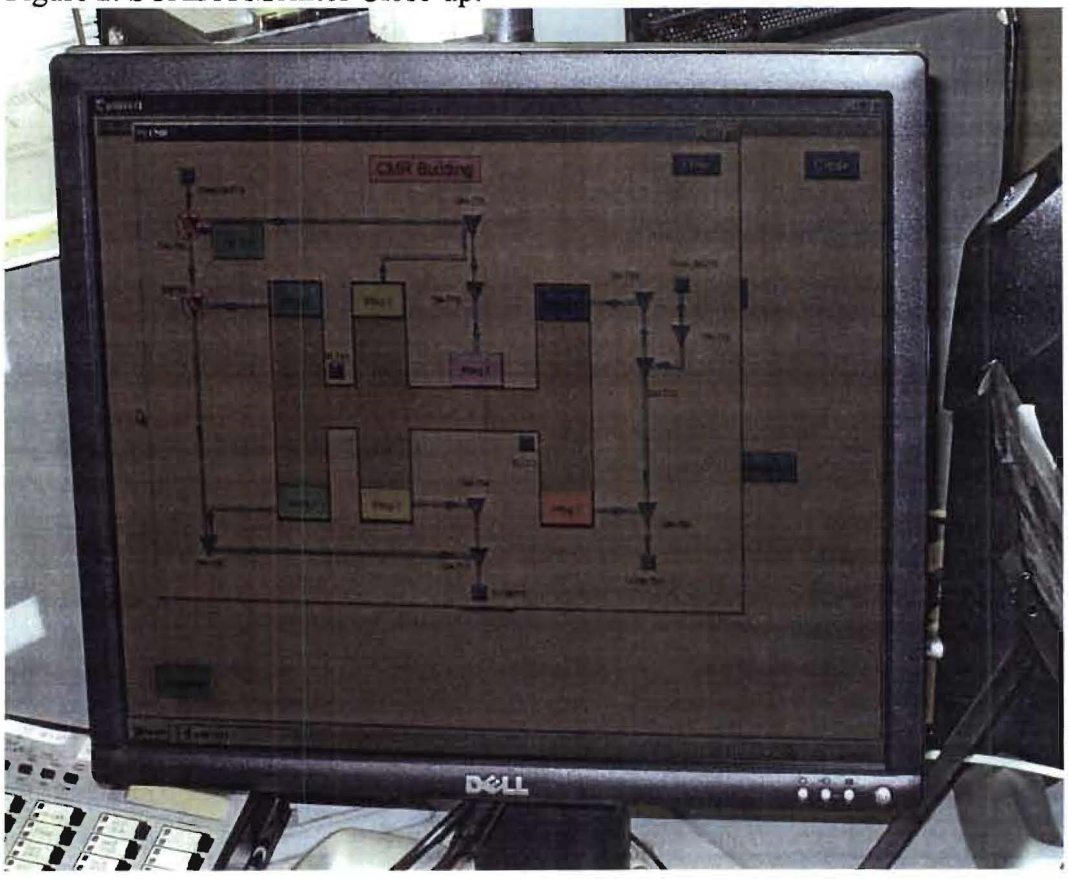

Figure 3. Older Control Panel.

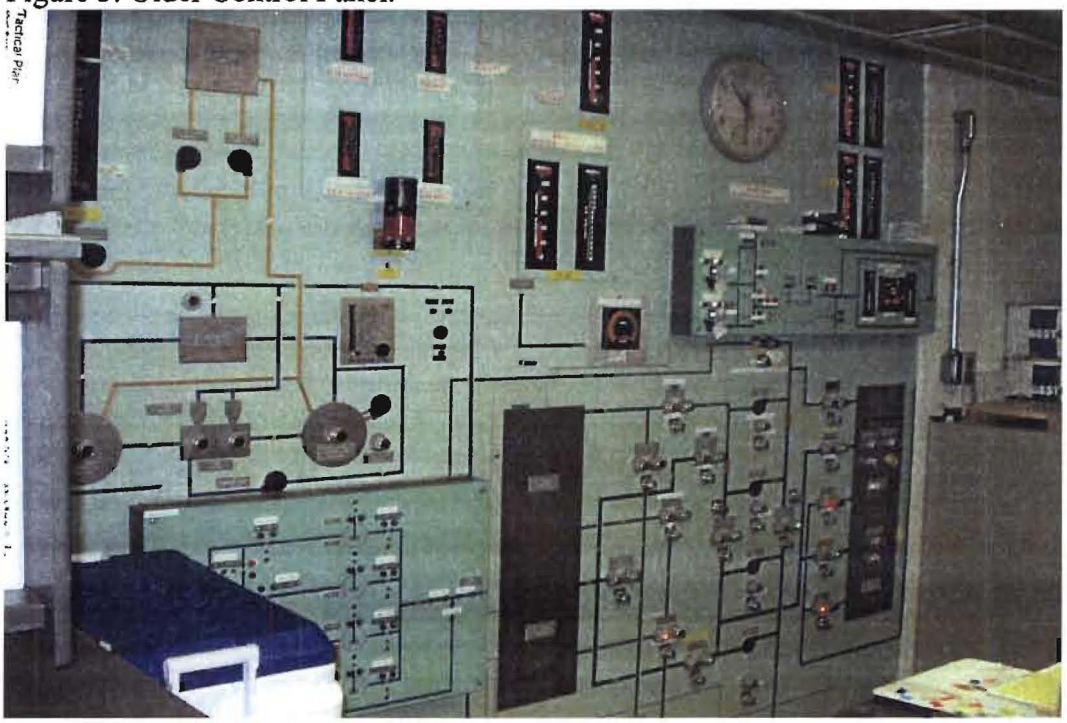

Figure 4. Seawater Reverse Osmosis (RO) Pilot Unit.

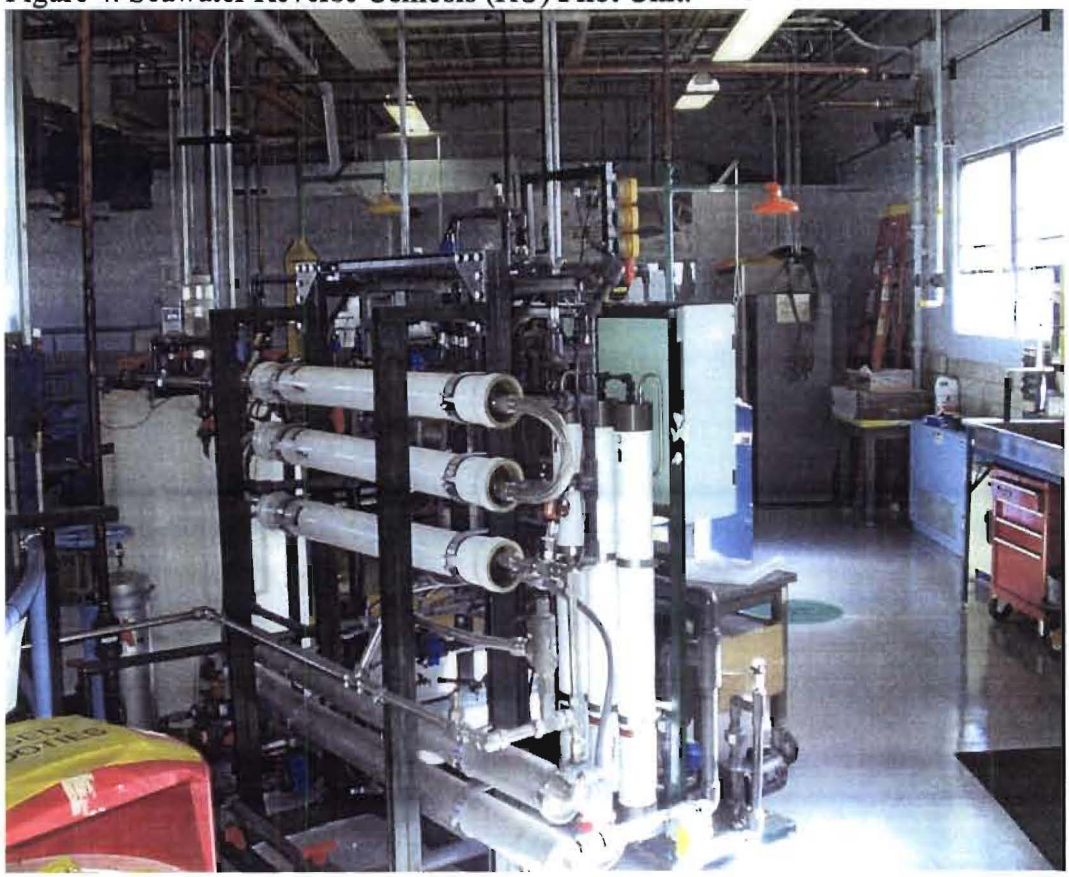

Figure 5. pH Neutralization Tank.

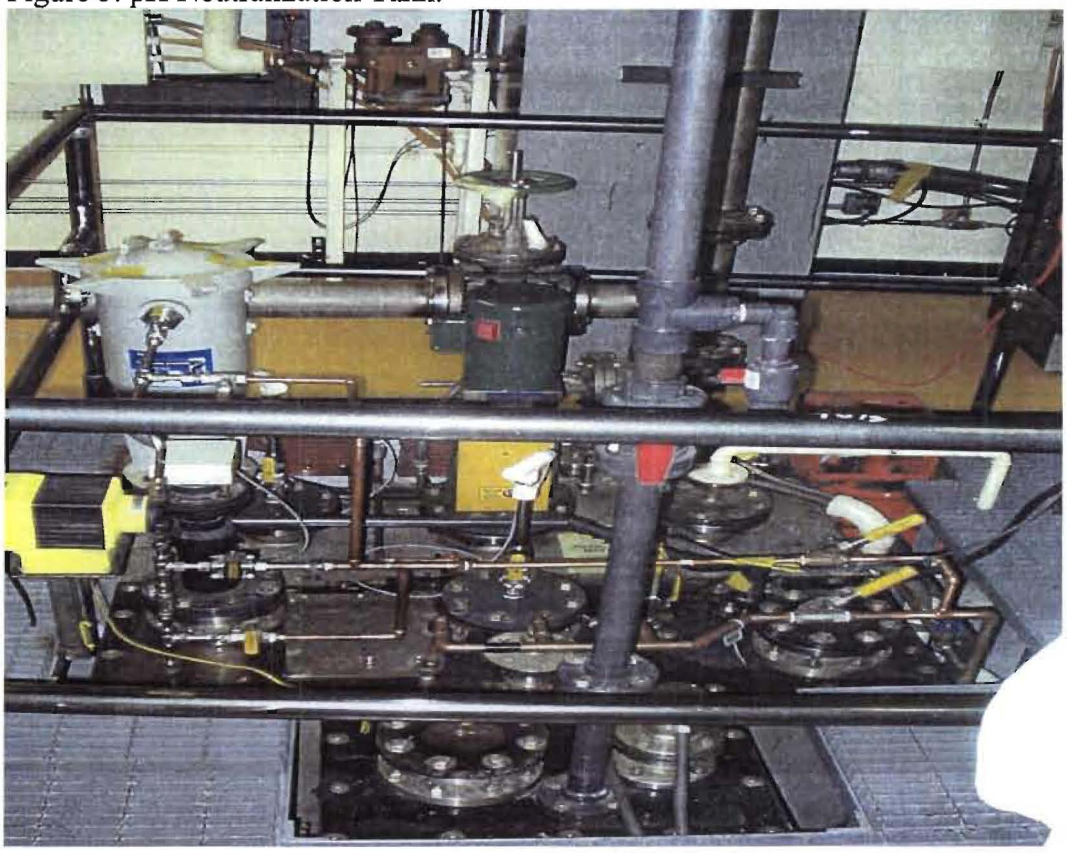

Figure 6. Influent Sampling Station.

Figure 7. Neutralization Tank Controls.

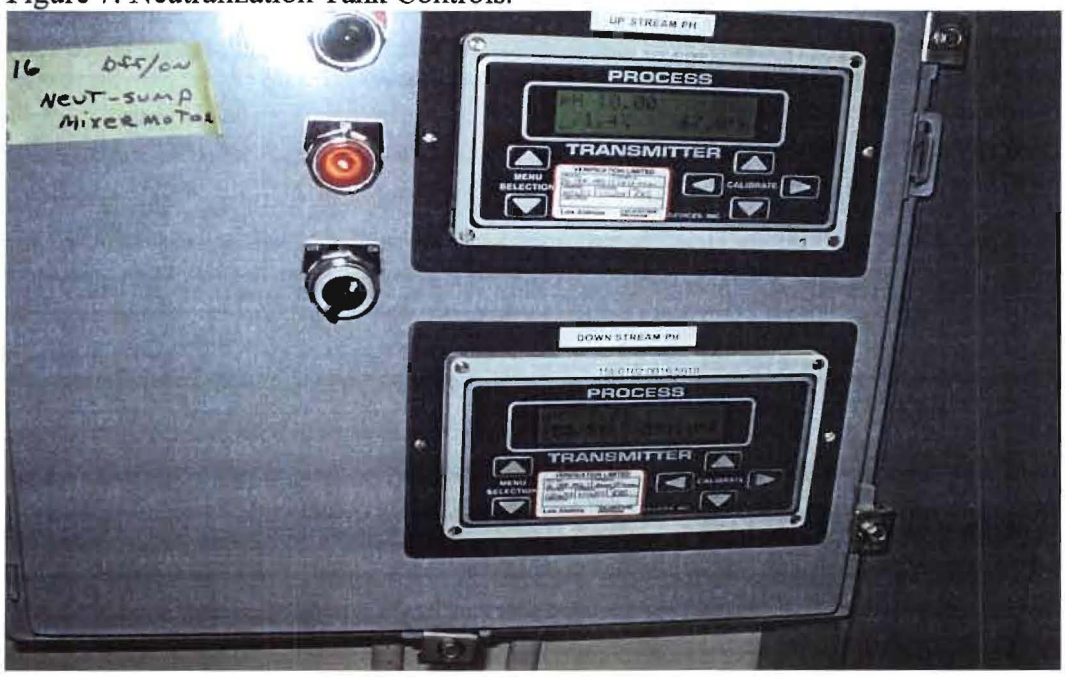

Figure 8. Ultrasonic Level Indicator.

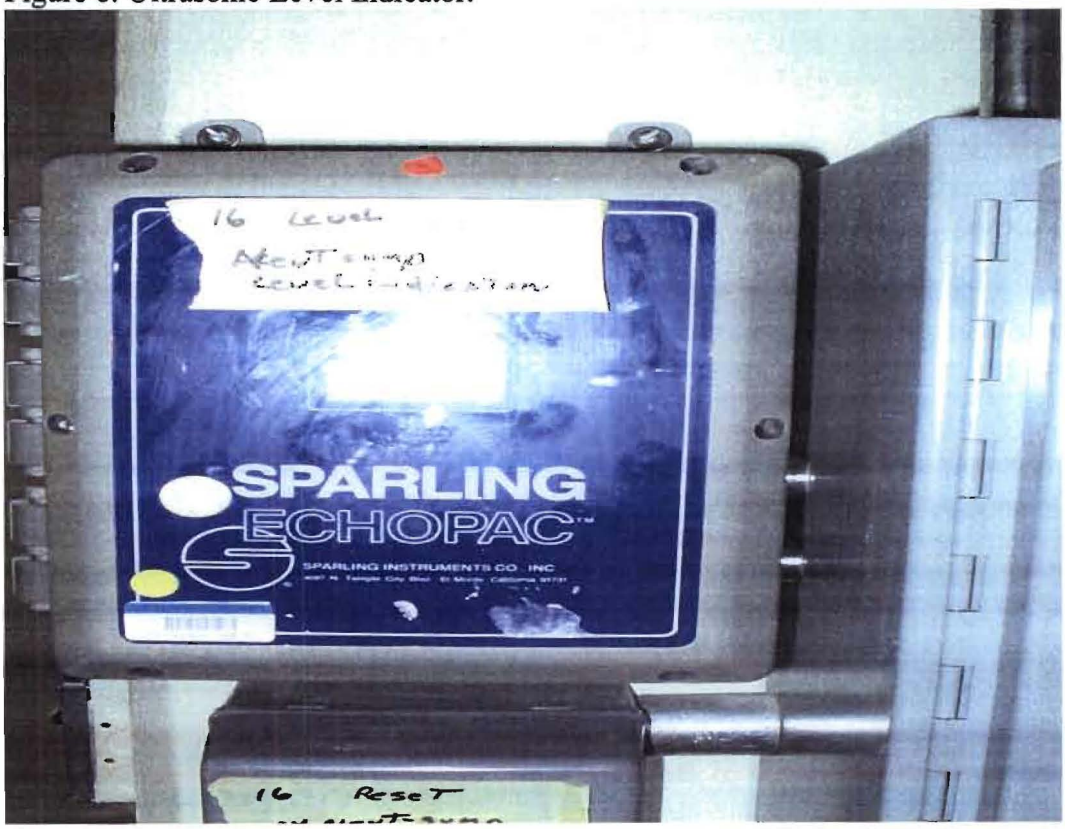

Figure 9. Gravity Filter Piping.

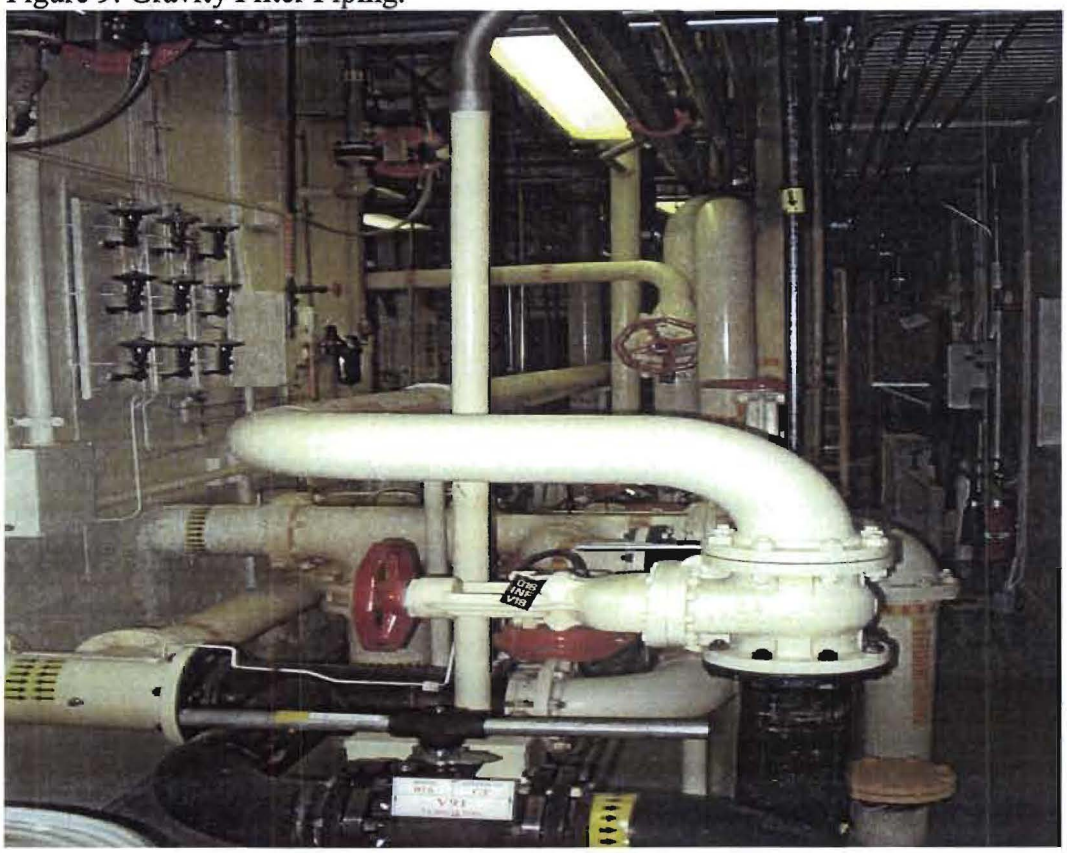

Figure 10. Caustic Tank.

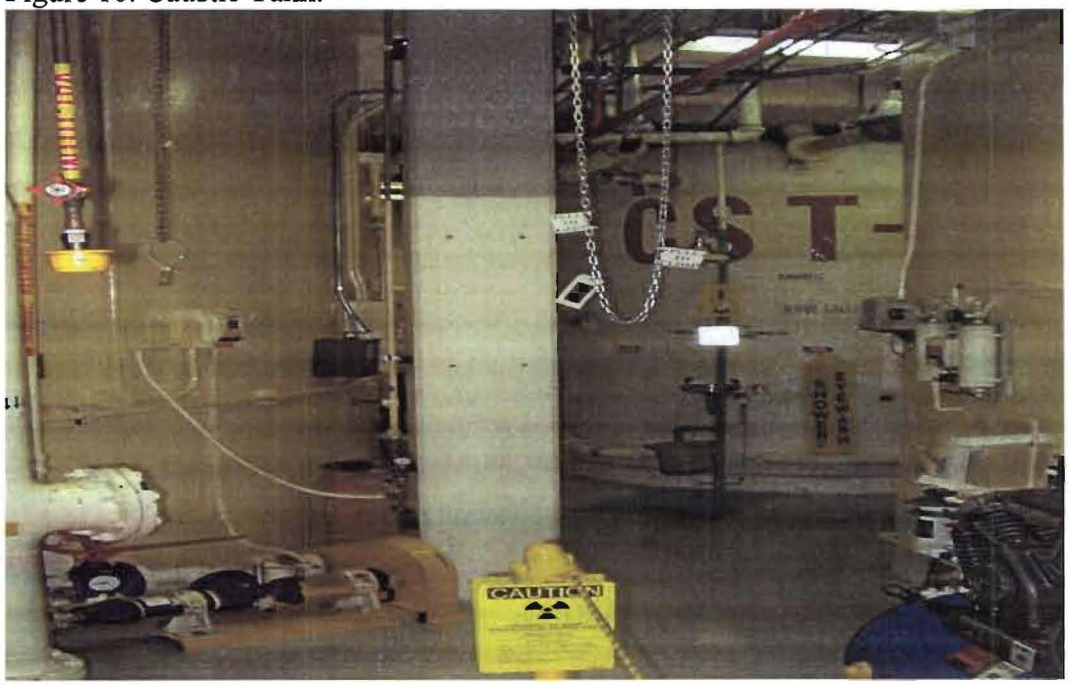

Figure 11. Low-Level Trash Awaiting Disposal.

Figure 12. Ion Exchange (IX) Columns.

Figure 13. Motor and Pump.

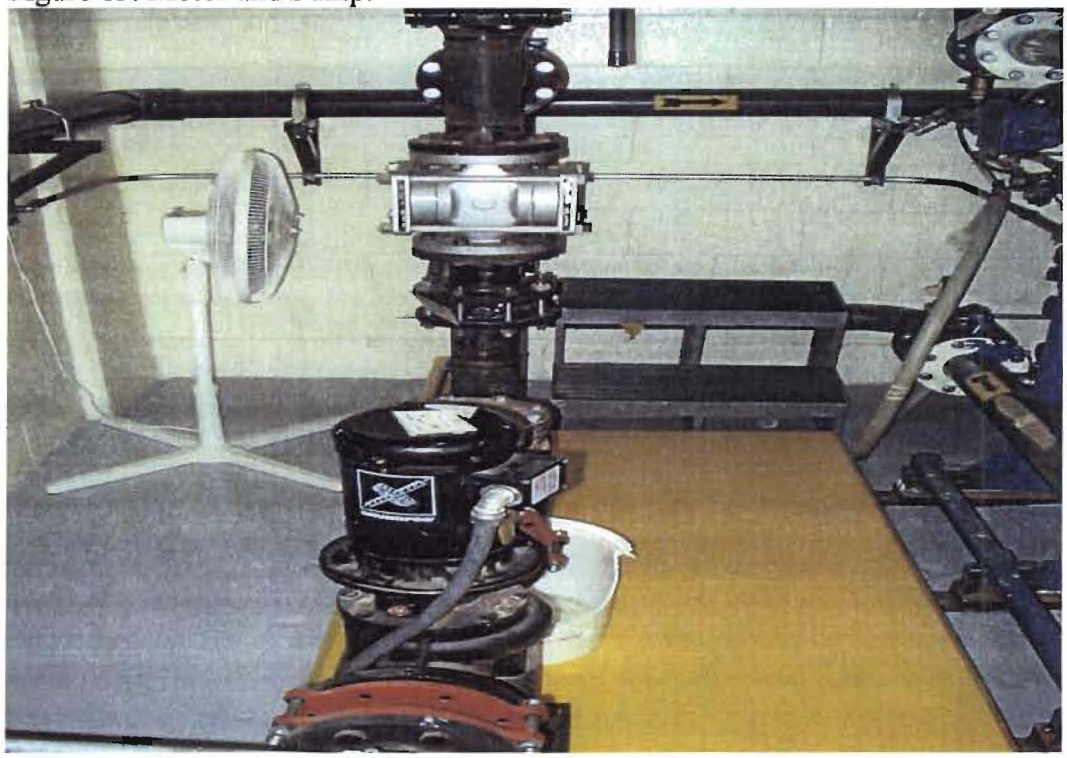

Figure 14. Tubular Ultrafilter (TUF) Tubes.

Figure 15. Tubular Ultrafilter (TUF) Feed Tanks.

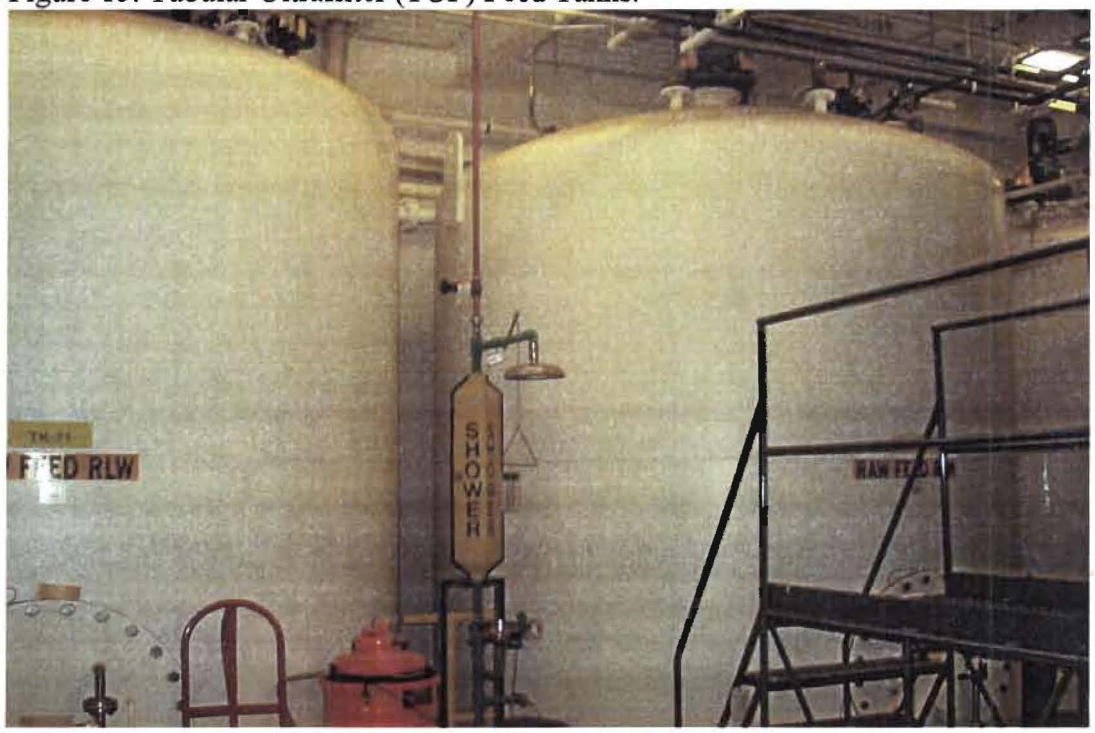

Figure 16. TUF and Feed Tanks.

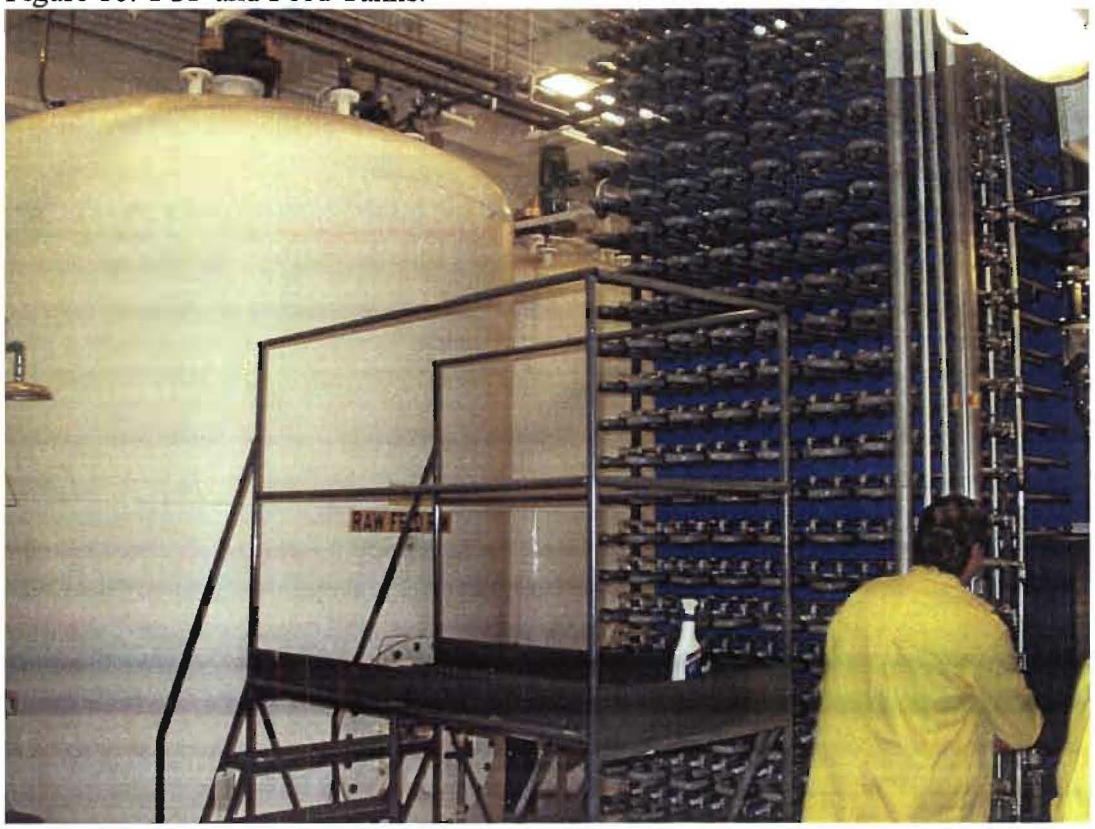

Figure 17. Reverse Osmosis (RO) Treatment Unit.

Figure 18. Cleaning-In-Place (CIP) Skid.

Figure 19. Reverse Osmosis (RO) Instruments.

Figure 20. Storage Shed.

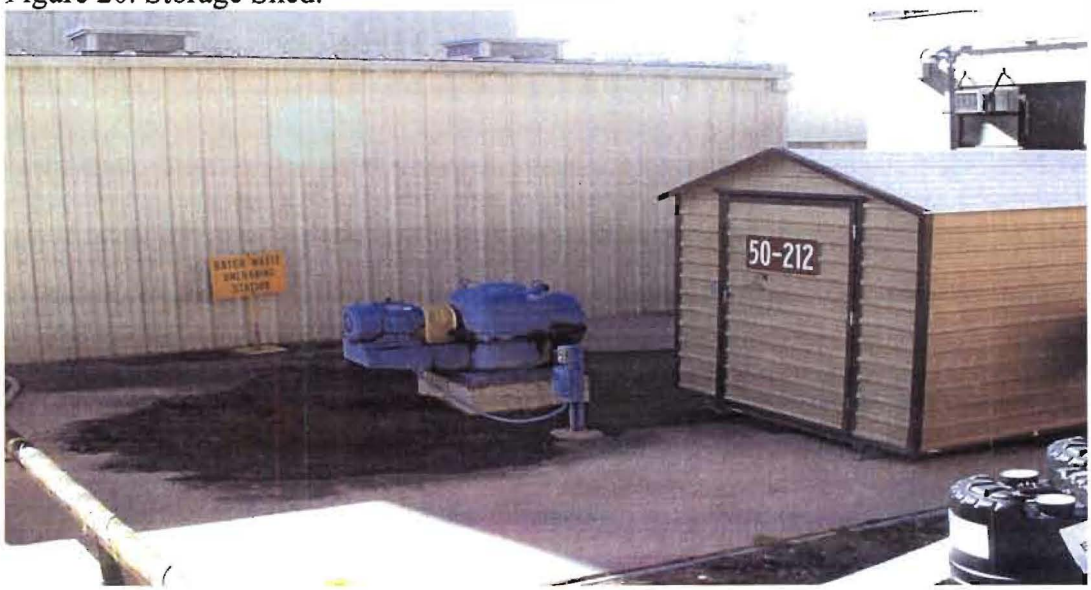

Figure 21. Evaporator Cooling Towers.

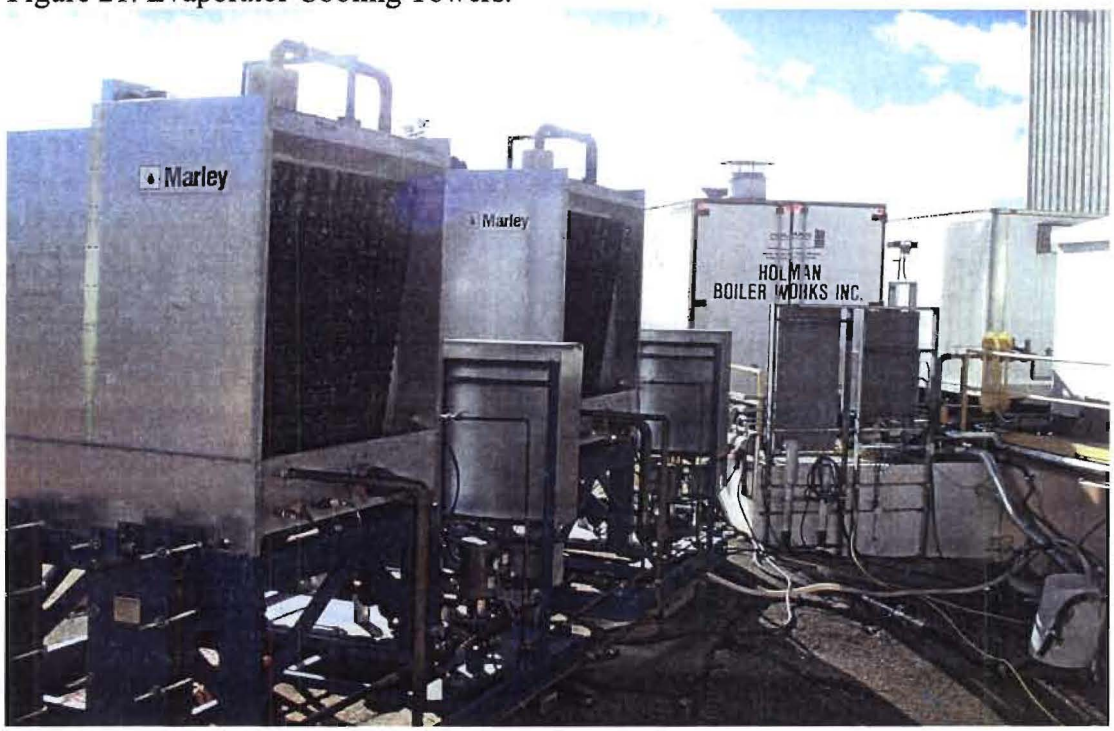

Figure 22. WM-2 and Building 248.

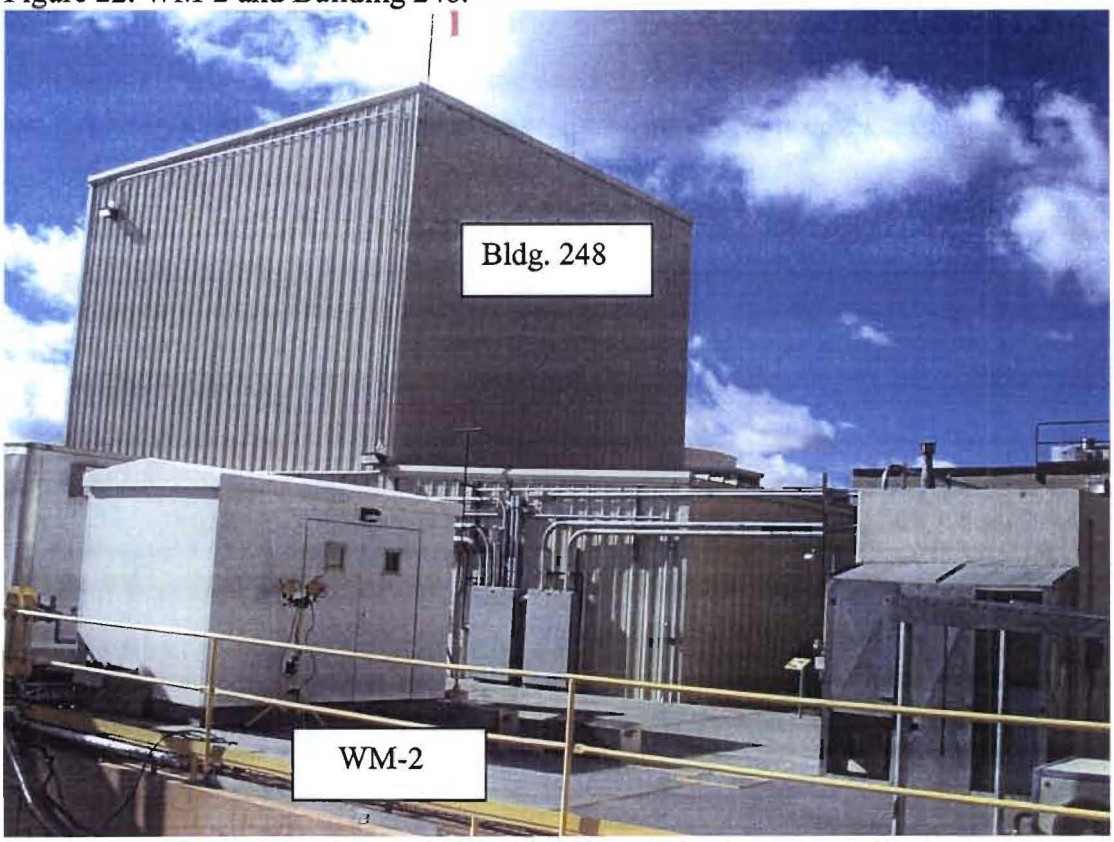

Figure 23.Looking West at the Remote Handling Room.

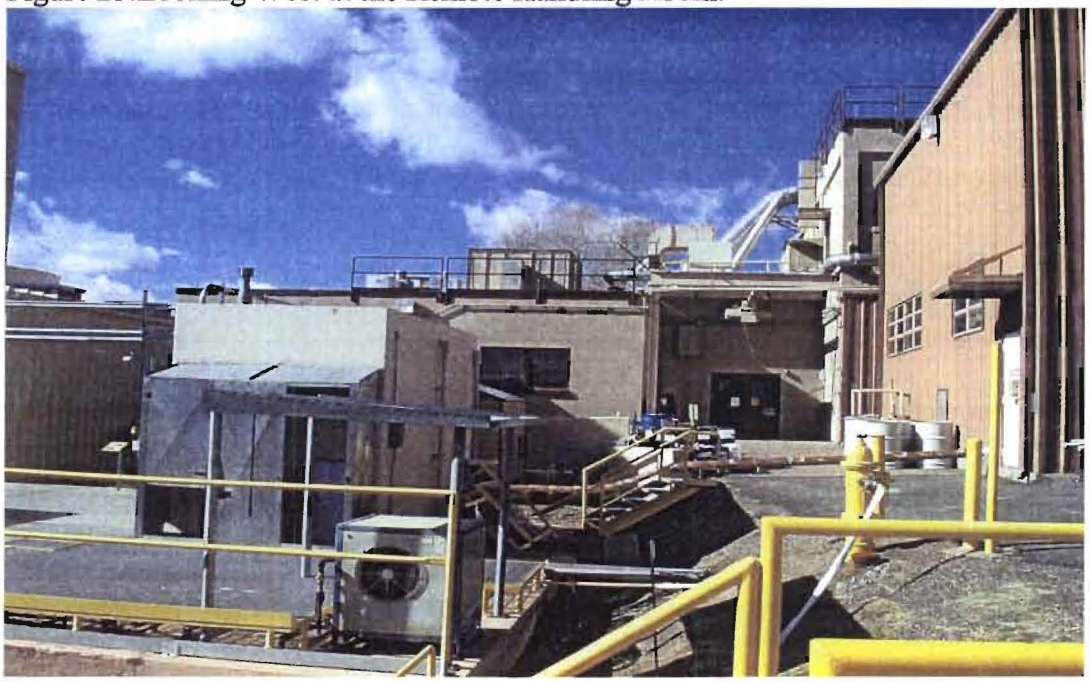

Figure 24. Empty TUFF Tanks.

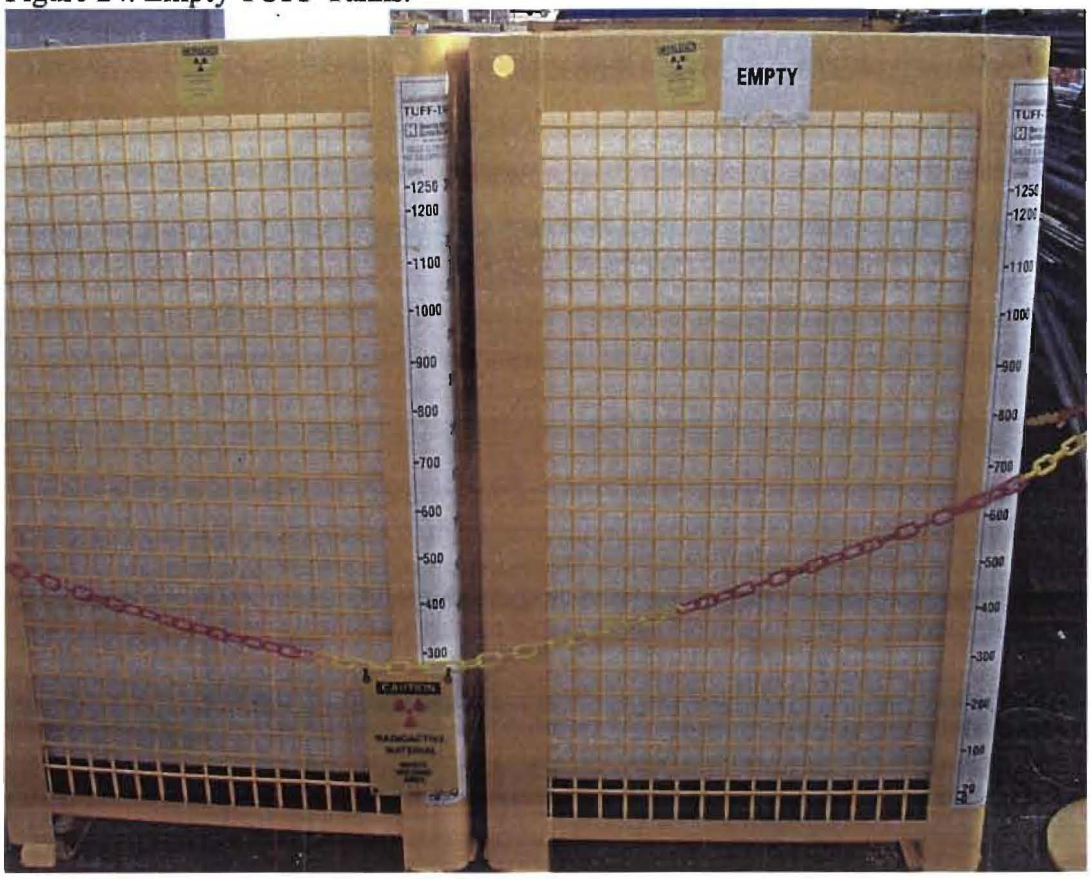

Figure 25. Waste Containers.

Figure 26. Low-Level Waste Drums.

Figure 27. Effluent Tank.

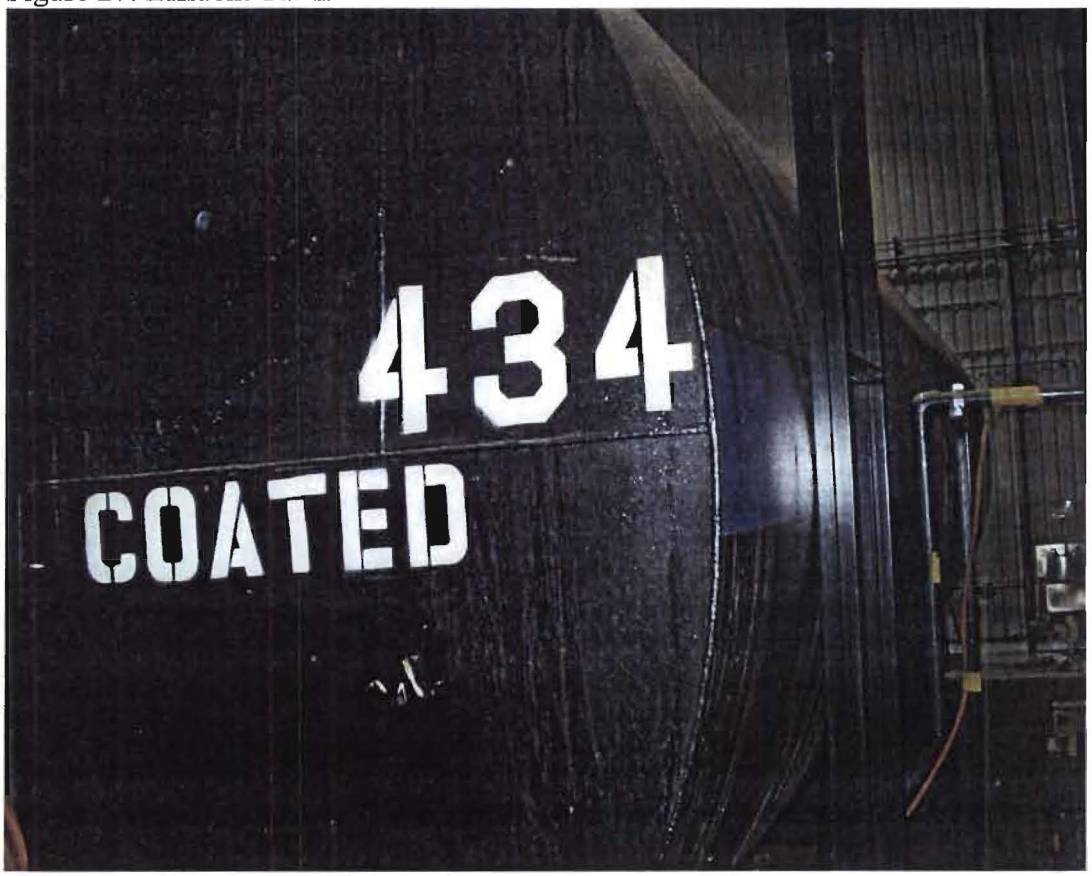

Figure 28. Decontamination Sink.

Figure 29. Soil Contamination Area Sign at NPDES Outfall 051.

Figure 30. Effluent Extension Pipe.

Figure 31. Mortandad Canyon.

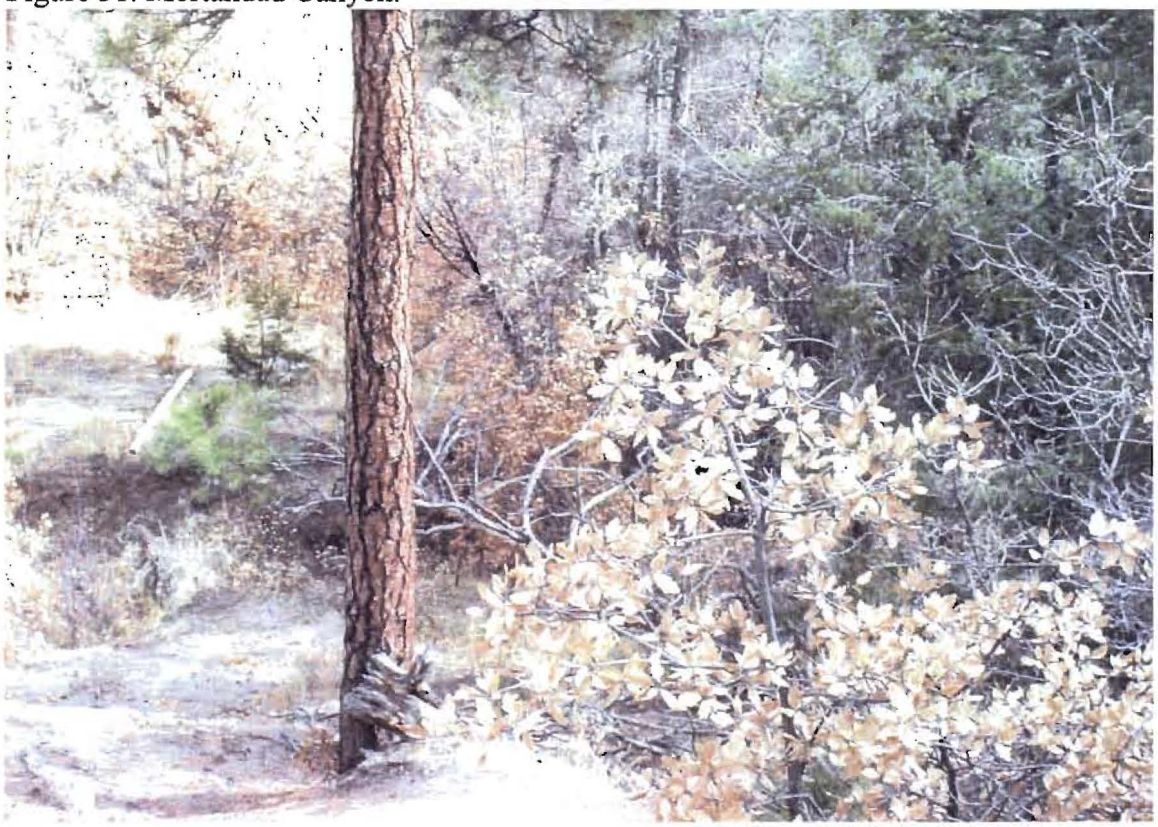

Figure 32. Mortandad Canyon.

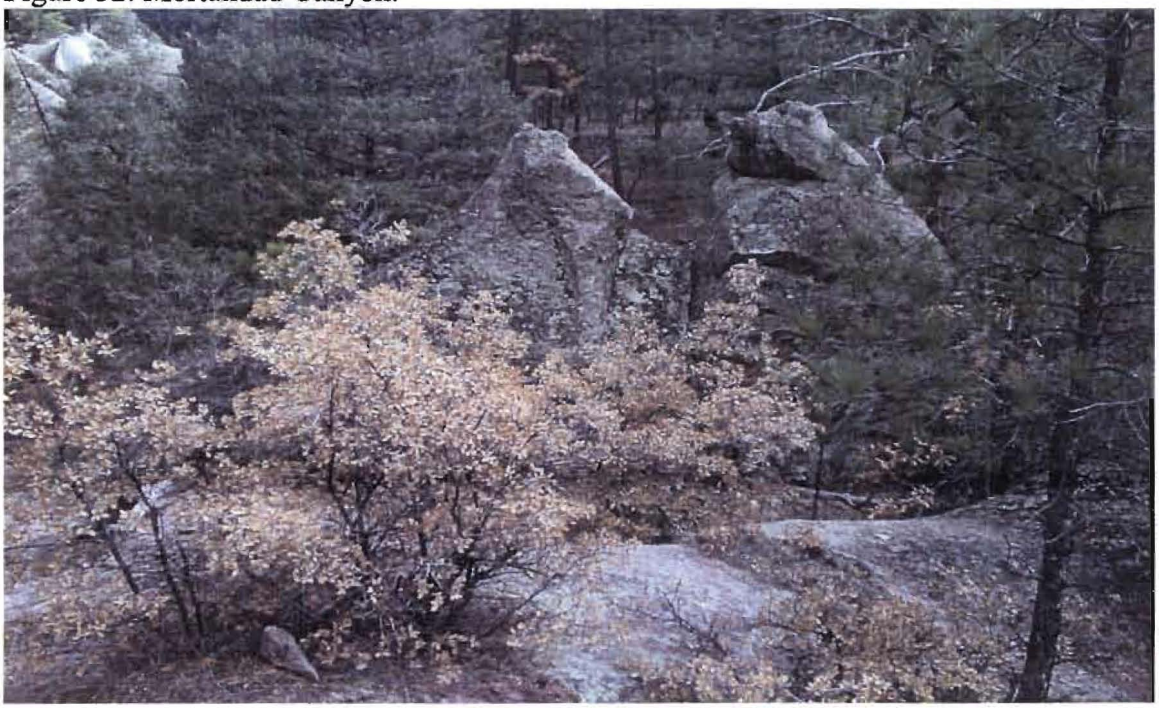

Figure 33. Mortandad Canyon.

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