Quivira Mining Company

40-8905

04008905480E

August 1, 1990

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Mr Mary Konwinski
Uranium Recovery Field Office
U. S. Nuclear Regulatory Commission
Box 25325
Denver, Colorado 80225

Re: Annual Review, Groundwater Corrective Action Plan
Ambrosia Lake Facility
License SUA-1473, Docket No. 40-8905

Dear Mr. Konwinski:

The attached is the annual review of Quivira Mining Company's Corrective Action Plan (CAP) for its Ambrosia Lake facility. This review is being submitted in accordance with license condition #34 of the above referenced license. This plan reviews the hydrologic effects on the different geologic units resulting from the approved corrective measures implemented on each unit.

If you have any questions or need further information please contact me at (405) 842-1773.

Sincerely,

Bill Ferdinand

Bill Ferdinand, Manager
Radiation Safety, Licensing
& Regulatory Compliance

Attachments

xc: R. Chavez
M. Freeman
R. Ohrbom (NMEID)
J. Stauter (KM)
H. Whitacre
file

DESIGNATED ORIGINAL

Certified By Mary C. Hood

WM-2-3

90-0710

6305 Waterford Boulevard, Suite 325, Oklahoma City, Oklahoma 73118 • (405) 848-1190 • FAX (405) 848-1208

ANNUAL CORRECTIVE ACTION PLAN REVIEW

In accordance with Ambrosia Lake's NRC source material SUA-1473, condition #34, paragraph d, the licensee is to review and submit on or before August 1 of each year, the Corrective Action Plans (CAP) effect on the different aquifers. This reports reviews the those effects and the progress of Ambrosia Lake's CAP.

I. REVIEW OF CORRECTIVE ACTION PROGRAM

The Corrective Action Plan (CAP) at the Ambrosia Lake facility was formally approved by NRC as amendment #15 on May 14, 1990. This program requires the operation of Quivira's Section 30 and Section 30 West mine dewatering and maintenance programs and the alluvium interceptor trench. These programs allow for the interception, collection and removal of contaminated fluids from the affected geologic units. These corrective programs are in place and operating.

For the year through June 30, the Section 30 and 30 West mines have pumped a total of 86.1 and 99.1 million gallons of water respectively. It is estimated using the 1989 ventilation hole survey information as a basis of contamination interception and collection that approximately 0.49 million gallons of water was collected from the Tres Hermanos B formation and with 3.2 million gallons collected from the Dakota formation. During this same time period, the interceptor trench has recovered approximately 13.0 million gallons attributable from tailings impoundment #1 seepage and 13.0 million gallons collected from water being sweep back towards the interceptor trench from the NPDES discharge creek.

The CAP also requires semiannual monitoring of specified alluvial, Tres Hermanos A and B and Dakota wells with an annual progress report on or before August 1 of each year. A complete set of monitoring and analytical results for the

1st half of 1990 has been collected in accordance with license condition #34, paragraphs A and B. These results are attached in Appendix A.

As expected, due to the short time interval between the last submittals to NRC on December 22, 1989 and March 30, 1990, negligible changes in water quality have occurred. Therefore, it is felt that the ground water information submitted within these reports including contamination delineation are still applicable.

Although not required by the CAP, Quivira is continuing to pump water from its dewatering trench located on the west side of tailings impoundment #2. Built in May 1989, the trench has eliminated all standing water in tailings impoundment #2 and is providing some dewatering of the tailings. Since pumping begin in late May 1989, a total of 27.96 million gallons of fluids have been pumped from the trench. For the year through June 30, a total 6.57 million gallons have been pumped from the dewatering trench and subsequently disposed at the Section 4 lined evaporation ponds.

II. REVIEW OF CHLORIDE CONCENTRATIONS - MONITOR WELLS MW-20\MW-29

As requested within the May 14, 1990, amendment #15 corrective active plan approval letter, Quivira has reviewed past chloride values from the Section 4 evaporation ponds monitor wells including monitor wells MW-20 and MW-29.

The area in which the Section 4 evaporation ponds are located, was once the drainage for discharges from various mines and heap leach operations. The drainage flowed diagonally from the northeast to the southwest section corners of Section 4. Attached in Appendix B is Figure 1 which shows the typical drainage on the U.S.G.S map prior to the construction of the

lined evaporation ponds. Figure 2 shows the same map with the "as built" location of the evaporation ponds.

The area in which monitor well MW-29 is situated is upstream of the Section 4 evaporation ponds. This is shown on Figure 3 and is also included in Appendix B. This well was installed to determine upstream water quality flowing down dip into the Section 4 area. The chloride values being seen within this well are due in part to previous mine discharges and chlorides naturally associated with the shales and clays in the area. The chlorides are not from the Section 4 lined evaporation ponds.

Although the chloride values are elevated as compared to other wells within the area, the chloride values are not uncommon for alluvial wells. The high occurrence of intermixing lenses of shales and clays throughout the alluvium probably cause the elevated chloride concentrations as the shales were originally deep sea deposits that contain elevated concentrations of salts, including sodium chloride. Although a majority of the salts have been washed from the material, residues still remain within the shales and clays.

Monitor well [illegible] s initially completed in August 1980 with the first monitoring data collected the next month. The initial chloride concentration was 324 mg/l. The most recent concentration indicates a value of 243 mg/l. As shown on the attached graph in Appendix C, the plot indicates a decreasing linear [illegible]. Other constituents including sulfates, [illegible] and depth to water are also slightly decreasing with time. These historical graphs are attached in Appendix C.

As can be seen, the high chloride values within this well are not associated with Quivira's evaporation ponds but rather

from previous mine discharges and natural geochemical actions associated with the shales\clays.

Quivira has examined the historical analytical data along with the geology of the area and concludes that the elevated chloride levels in monitor well MW-20 are probably caused by geochemical process associated with the shales and clays of the area. The elevated levels are not caused by a leak within a pond liner.

Located on the berm between evaporation ponds 19 and 20, if a pond liner leak had occurred, the chloride values within monitor well would be much higher than their current two year average of 164 mg/l. Historically, the average chloride concentrations within ponds 19 and 20 respectively are approximately 37,000 and 34,600 mg/l.

In conjunction with any pond liner leak, other parameters such as sulfates and TDS would also be greatly elevated because of the high concentrations of these parameters within the ponds. The sulfates concentrations within evaporation ponds 19 and 20 are 144,000 mg/l and 165,000 mg/l respectively while TDS are 280,000 mg/l and 270,000 mg/l. Monitor well MW-20 sulfates and TDS concentrations on the other hand have remained relatively constant with a historical average of 2,600 and 4,400 mg/l. Because of the high sulfates and TDS concentration within evaporation ponds 19 and 20, a leak would clearly be identified by high sulfates and TDS in monitor well MW-20. This is clearly not the case. Attached in Appendix D are graphs of the historical chloride, sulfate, TDS, and pH values for monitor well MW-20 and the lined evaporation ponds.

In addition to much higher chlorides, sulfates, and TDS concentrations, a drastic lowering of the pH and increase in the depth to water would be expected. However, such is not

the case as the historical pH values for evaporation ponds 19 and 20 are 1.0 and 0.9 respectively while monitor well MW-20 has been constantly neutral or around 7. The depth to water has remained relatively constant for monitor well MW-20. The historical graphs of MW-20 for pH and depth to water are included in Appendix D. Also included are the historical pH values of solutions within the lined evaporation ponds.

Since the elevated chloride concentrations cannot be attributed to pond liner leaks, Quivira has previously performed various test to try and explain the sometimes fluctuating and elevated chloride concentrations that have historically occurred.

The first test that was performed was a stratification test. It was suspected that perhaps the wells contained stratified zones of concentrations. Using a special bailer to obtain water samples at various depths, two wells were selected and sampled. The results of the sampling are presented below.

Stratification Sampling
(mg/l)

Well	Comments	Chlorides
MW-27	Normal Bail	140
	3 Foot Depth	140
	6 Foot Depth	130
	9 Foot Depth	130
MW-29	Normal Bail	320
	3 Foot Depth	320
	6 Foot Depth	320
	9 Foot Depth	320

As shown, the results indicate that the wells are not stratified nor do the sampling procedures employed bias the analytical results.

Because most Section 4 wells have less than 10 feet of water with little recharge capacity, a second test was performed to find whether the fluctuating and elevated chloride concentrations resulted from collection of samples from static well water versus "formation" water being drawn into the well. Another set of two wells were selected and bailed dry several times before collecting a sample. These results were compared to samples collected from the same wells from static well water. The comparison results are presented below.

Formation Water Sampling
(mg/l)

Well	Comments	Chlorides
MW-10	Bailed Dry 2 Times	84
	Normal Bail	76
MW-19	Bailed Dry 3 Times	26
	Normal Bail	33

As indicated, the analytical results compared very favorably indicating that due to the limited recharge capacity of the alluvium, the chloride elevations and periodic fluctuations were not the result of sampling technique.

Finally, to assure that cross-contamination was not occurring resulting from the leaching of chlorides from the bailer, 200 ml of deionized water was poured into the bailer and agitated. The deionized water was analyzed for chlorides and the results indicated that less than 0.5 mg/l was leached from the bailer.

In conclusion, the only plausible explanation for the elevated chloride concentrations for this well seems to be the naturally occurring geochemical reactions occurring within the shales and clays. Since evaporation ponds 19 and 20 abut and partially overlay the outcropping of Mancos shale and Tres Hermanos B sandstone as shown on a photocopy of Tres Hermanos B outcroppings as attached in Appendix D, it would seem that the elevated chloride levels are in fact probably due to shale contact in this region.

APPENDIX A

MONITORING RESULTS

SECTION 1

NRC COMPLIANCE MONITORING PROGRAM ALLUVIAL WELLS

ANALYTICAL RESULTS

1ST HALF, 1990

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Depth To Water (ft)	Total Depth (ft)	Spec. Conduct.	Temp. (c)	pH	Ag (mg/l)	Al (mg/l)	Anions (mg/l)	As (mg/l)	B (mg/l)	Ba (mg/l)	Be (mg/l)	Ca (mg/l)	Cations (mg/l)	CaCO3 (mg/l)	Cd (mg/l)
5-03	07-Mar-90	10.0	41.7	3160	10.0	6.8	-0.01			0.002		-0.01	-0.01				-0.005
31-61	31-Jan-90	21.8	27.2														
31-61	26-Feb-90	22.0	27.2														
31-61	08-Mar-90	21.9	27.2	8800	13.5	6.3	-0.01			0.015		-0.01	-0.01				-0.005
31-61	21-Mar-90	21.9	27.2														
31-61	23-Apr-90	21.9	27.2														
31-61	23-May-90	21.9	27.2														
32-59	31-Jan-90	9.4	39.5														
32-59	26-Feb-90	9.4	39.5														
32-59	09-Mar-90	9.0	39.5	3000	10.0	6.8	-0.01			-0.001		-0.01	-0.01				0.008
32-59	21-Mar-90	9.0	39.5														
32-59	23-Apr-90	8.9	39.5														
32-59	23-May-90	8.7	39.5														
MW-24	09-Mar-90	43.7	50.3	3100	12.5	7.3	-0.01			-0.001		0.01	-0.01				-0.005

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Cl (mg/l)	CN (mg/l)	Co (mg/l)	CO3 (mg/l)	Cr (mg/l)	Cu (mg/l)	F (mg/l)	Fe (mg/l)	HCO3 (mg/l)	Hg (mg/l)	K (mg/l)	Mg (mg/l)	Mn (mg/l)	Mo (mg/l)	Na (mg/l)	Ni (mg/l)	NH3 (mg/l)	NO3 (mg/l)
5-03	07-Mar-90	583	-0.01			-0.01					-0.0002				0.02		-0.01		-0.1
31-61	31-Jan-90																		
31-61	26-Feb-90																		
31-61	08-Mar-90	1360	-0.01			-0.01					-0.0002				0.02		-0.01		0.3
31-61	21-Mar-90																		
31-61	23-Apr-90																		
31-61	23-May-90																		
32-59	31-Jan-90																		
32-59	26-Feb-90																		
32-59	09-Mar-90	492	-0.01			-0.01					-0.0002				0.02		-0.01		-0.1
32-59	21-Mar-90																		
32-59	23-Apr-90																		
32-59	23-May-90																		
MW-24	09-Mar-90	79	0.01			-0.01					-0.0002				0.03		-0.01		64.6

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Pb (mg/l)	Pb-210 (pCi/l)	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Sb (mg/l)	Se (mg/l)	SO4 (mg/l)	TDS (mg/l)	Th-230 (pCi/l)	TOC (mg/l)	TSS (mg/l)	Unat (mg/l)	V (mg/l)	Zn (mg/l)	Tl (mg/l)	GROSS ALPHA (pCi/l)	GROSS BETA (pCi/l)
5-03	07-Mar-90	-0.02	7.3	1.0	0.7	0.020	0.003	1790	3770	5.7			0.1420			-0.01	150	49
31-61	31-Jan-90																	
31-61	26-Feb-90																	
31-61	08-Mar-90	-0.02	54.0	11.0	10.0	0.082	0.003	4440	10900	52.9			0.2710			-0.01	870	360
31-61	21-Mar-90																	
31-61	23-Apr-90																	
31-61	23-May-90																	
32-59	31-Jan-90																	
32-59	26-Feb-90																	
32-59	09-Mar-90	-0.02	3.7	1.0	1.8	0.020	-0.001	1740	3670	2.6			0.3560			-0.01	260	100
32-59	21-Mar-90																	
32-59	23-Apr-90																	
32-59	23-May-90																	
MW-24	09-Mar-90	-0.02	32.0	3.3	1.0	0.021	-0.001	2350	3950	6.2			0.0270			-0.01	86	53

SECTION 2

NRC COMPLIANCE MONITORING PROGRAM TRB WELLS

ANALYLTICAL RESULTS

1ST HALF, 1990

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Depth To Water (ft)	Total Depth (ft)	Spec. Conduct.	Temp. (c)	pH	Ag (mg/l)	Al (mg/l)	Anions (mg/l)	As (mg/l)	B (mg/l)	Ba (mg/l)	Be (mg/l)	Ca (mg/l)	Cations (mg/l)	CaCO3 (mg/l)	Cd (mg/l)
31-66	27-Feb-90	111.6	124.7	14900	11.0	5.7	-0.01			0.022		-0.01	-0.01				0.006
31-67	05-Jun-90	21.0	96.5	4900	13.0	6.6	-0.01			0.003		-0.01	-0.01				0.005
36-01TR	27-Feb-90	56.1	58.9	5000	12.0	6.3	-0.01			-0.001		0.04	-0.01				-0.005
36-02	27-Feb-90	39.3	58.8	9300	12.0	6.5	-0.01			0.004		-0.01	-0.01				0.005
19-VH2	24-Apr-90			3450	17.0	6.8	-0.01	-0.01		0.004	0.29	0.03	-0.01	308			-0.005

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Cl (mg/l)	CN (mg/l)	Co (mg/l)	CO3 (mg/l)	Cr (mg/l)	Cu (mg/l)	F (mg/l)	Fe (mg/l)	HCO3 (mg/l)	Hg (mg/l)	K (mg/l)	Mg (mg/l)	Mn (mg/l)	Mo (mg/l)	Na (mg/l)	Ni (mg/l)	NH3 (mg/l)	NO3 (mg/l)
31-66	27-Feb-90	5720	-0.01			-0.01					0.0003				-0.01		0.17		-0.1
31-67	05-Jun-90	744	-0.01			-0.01					-0.0003				0.01		-0.01		-0.1
36-01TR	27-Feb-90	1450	-0.01			-0.01					0.0003				-0.01		0.02		-0.1
36-02	27-Feb-90	2990	-0.01			-0.01					0.0003				-0.01		0.02		-0.1
19-VH2	24-Apr-90	46	-0.01	-0.010	-1.0	-0.01	-0.01	0.2	0.08	294	-0.0002	10.3	162	0.09	0.01	610	0.02	0.2	15.0

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Pb (mg/l)	Pb-210 (pCi/l)	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Sb (mg/l)	Se (mg/l)	SO4 (mg/l)	TDS (mg/l)	Th-230 (pCi/l)	TOC (mg/l)	TSS (mg/l)	Unat (mg/l)	V (mg/l)	Zn (mg/l)	Tl (mg/l)	GROSS ALPHA (pCi/l)	GROSS BETA (pCi/l)
31-66	27-Feb-90	-0.02	6.3	7.0	11.0	0.023	0.002	4500	16500	5.1			0.1420			0.02	300	170
31-67	05-Jun-90	-0.02	12.0	1.0	7.3	0.004	-0.001	3010	6680	6.1			0.0070			-0.01	59	60
36-01TR	27-Feb-90	-0.02	121.0	21.0	4.8	-0.003	-0.001	3090	6430	66.0			0.0530			-0.01	560	320
36-02	27-Feb-90	-0.02	19.0	4.3	2.1	0.022	0.002	3320	13000	10.0			0.0910			0.01	27	60
19-VH2	24-Apr-90	-0.02	10.0	1.1	5.4	0.006	0.001	2620	4090	0.0	48.0		0.0120		0.03	-0.01	54	43

SECTION 3

NRC COMPLIANCE MONITORING PROGRAM TRA WELLS

ANALYTICAL RESULTS

1ST HALF, 1990

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Depth To Water (ft)	Total Depth (ft)	Spec. Conduct.	Temp. (c)	pH	Ag (mg/l)	Al (mg/l)	Anions (mg/l)	As (mg/l)	B (mg/l)	Ba (mg/l)	Be (mg/l)	Ca (mg/l)	Cations (mg/l)	CaCO3 (mg/l)	Cd (mg/l)
33-01TRA	06-Mar-90	166.9	181.5	2450	10.0	7.2	-0.01			-0.001		0.01	-0.01				-0.005
31-01	09-Mar-90	204.1	251.9	1410	14.0	7.5	-0.01			-0.001		0.02	-0.01				-0.005

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Cl (mg/l)	CN (mg/l)	Co (mg/l)	CO3 (mg/l)	Cr (mg/l)	Cu (mg/l)	F (mg/l)	Fe (mg/l)	HCO3 (mg/l)	Hg (mg/l)	K (mg/l)	Mg (mg/l)	Mn (mg/l)	Mo (mg/l)	Na (mg/l)	Ni (mg/l)	NH3 (mg/l)	NO3 (mg/l)
33-01TRA	06-Mar-90	31	-0.01			-0.01					-0.0002				0.02		-0.01		-0.1
31-01	09-Mar-90	15	-0.01			-0.01					-0.0002				0.02		-0.01		0.1

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Pb (mg/l)	Pb-210 (pCi/l)	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Sb (mg/l)	Se (mg/l)	SO4 (mg/l)	TDS (mg/l)	Th-230 (pCi/l)	TOC (mg/l)	TSS (mg/l)	Unat (mg/l)	V (mg/l)	Zn (mg/l)	Tl (mg/l)	GROSS ALPHA (pCi/l)	GROSS BETA (pCi/l)
33-01TRA	06-Mar-90	-0.02	5.9	0.7	2.7	0.022	0.001	1720	2640	3.6			0.0054			-0.01	35	14
31-01	09-Mar-90	-0.02	6.2	2.3	3.9	0.005	-0.001	1020	1540	2.6			0.0040			-0.01	24	25

SECTION 4

NRC COMPLIANCE MONITORING PROGRAM DAKOTA WELLS

ANALYTICAL RESULTS

1ST HALF, 1990

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Depth To Water (ft)	Total Depth (ft)	Spec. Conduct.	Temp. (c)	pH	Ag (mg/l)	Al (mg/l)	Anions (mg/l)	As (mg/l)	B (mg/l)	Ba (mg/l)	Be (mg/l)	Ca (mg/l)	Cations (mg/l)	CaCO3 (mg/l)	Cd (mg/l)
17-01KD	05-Apr-90	680.0	810.5	1490	21.5	9.9	-0.01			-0.001		0.01	-0.01				-0.005
30-02KD	02-Apr-90	302.9	314.6	4400	14.0	7.9	-0.01			0.001		-0.01	-0.01				-0.005
30-48KD	03-Apr-90	336.9	340.0	5500	16.0	6.7	-0.01			-0.001		-0.01	-0.01				-0.005
32-45KD	02-Apr-90	252.1	282.1	1430	13.7	10.0	0.01			-0.001		0.08	-0.01				-0.005
36-06	02-Mar-90	180.2	199.2	8000	13.3	3.7	-0.01			0.142		0.02	0.05				0.020

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Cl (mg/l)	CN (mg/l)	Co (mg/l)	CO3 (mg/l)	Cr (mg/l)	Cu (mg/l)	F (mg/l)	Fe (mg/l)	HCO3 (mg/l)	Hg (mg/l)	K (mg/l)	Mg (mg/l)	Mn (mg/l)	Mo (mg/l)	Na (mg/l)	Ni (mg/l)	NH3 (mg/l)	NO3 (mg/l)
17-01KD	05-Apr-90	22	0.01			-0.01					-0.0002				0.04		-0.01		0.3
30-02KD	02-Apr-90	1490	-0.01			-0.01					0.0002				0.04		0.05		-0.1
30-48KD	05-Apr-90	743	-0.01			-0.01					-0.0002				-0.01		-0.01		-0.1
32-45KD	02-Apr-90	268	0.01			0.01					0.0003				0.08		0.02		-0.1
36-06	02-Mar-90	1280	-0.01			0.03					0.0003				-0.01		0.52		0.4

QUIVIRA MINING COMPANY
AMBROSIA LAKE FACILITY

Well ID	Date	Pb (mg/l)	Pb-210 (pCi/l)	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Sb (mg/l)	Se (mg/l)	SO4 (mg/l)	TDS (mg/l)	Th-230 (pCi/l)	TOC (mg/l)	TSS (mg/l)	Unat (mg/l)	V (mg/l)	Zn (mg/l)	Tl (mg/l)	GROSS ALPHA (pCi/l)	GROSS BETA (pCi/l)
17-01KD	05-Apr-90	-0.02	2.9	1.0	1.1	0.017	0.014	718	1110	0.4			0.0010			-0.01	0	5
30-02KD	02-Apr-90	-0.02	5.1	1.6	1.5	0.004	-0.001	272	1650	1.5			0.0045			0.03	14	44
30-48KD	05-Apr-90	-0.02	2.9	1.0	1.1	0.023	0.001	2680	5490	0.8			0.0160			-0.01	53	53
32-45KD	02-Apr-90	-0.02	19.0	6.1	3.8	-0.003	-0.001	594	638	13.0			0.0420			-0.01	140	92
36-06	02-Mar-90	-0.02	8.6	28.0	7.9	0.120	0.032	7520	12200	1620.0			2.0700			0.01	3800	840

APPENDIX B

SECTION 4 DRAINAGE AREA AND MONITOR WELL LOCATIONS

FIGURE 1

Drainage Area Prior To Construction of Section 4 Evaporation Ponds

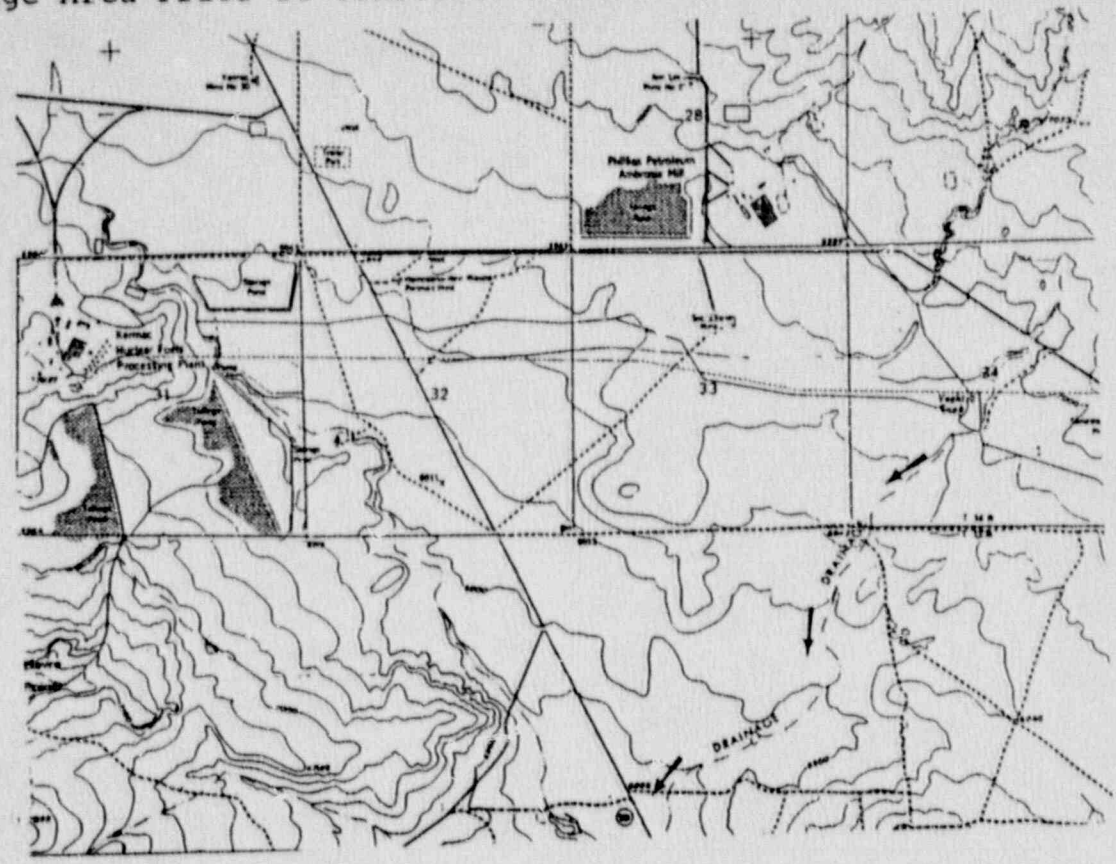


FIGURE 2

Location of Section 4 Evaporation Ponds "As Built"

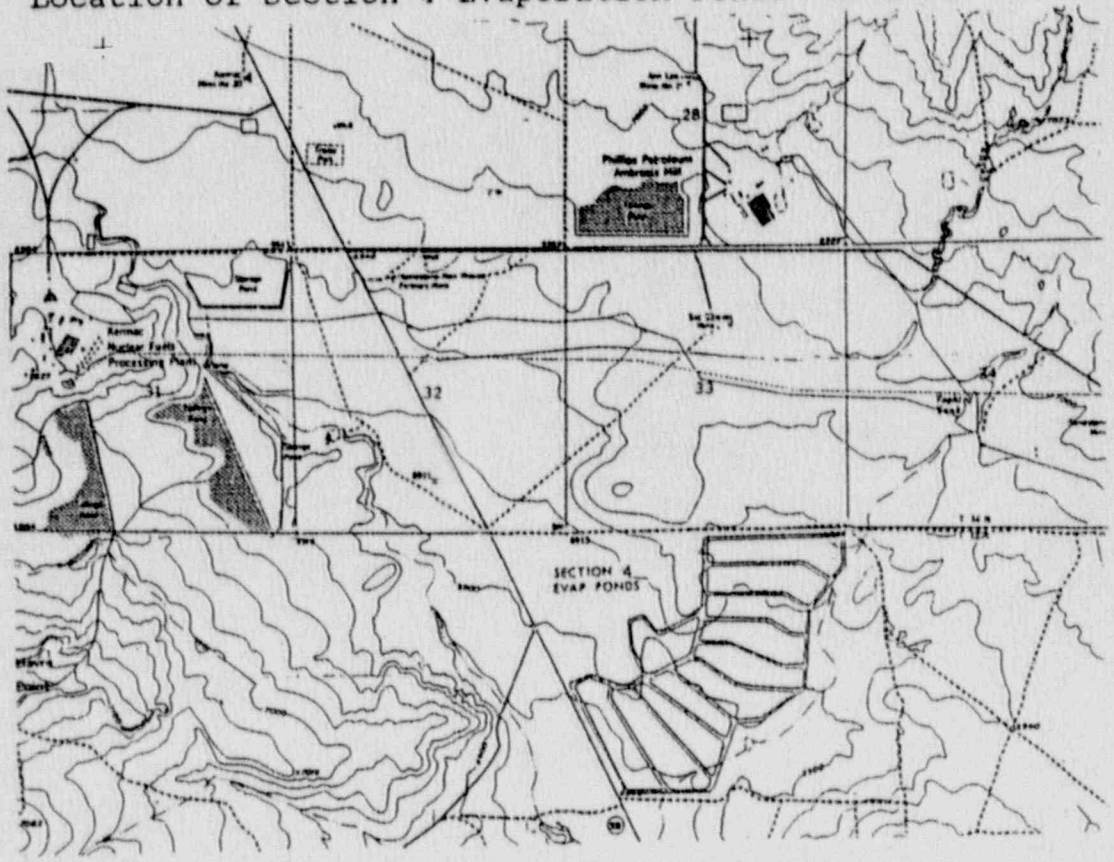
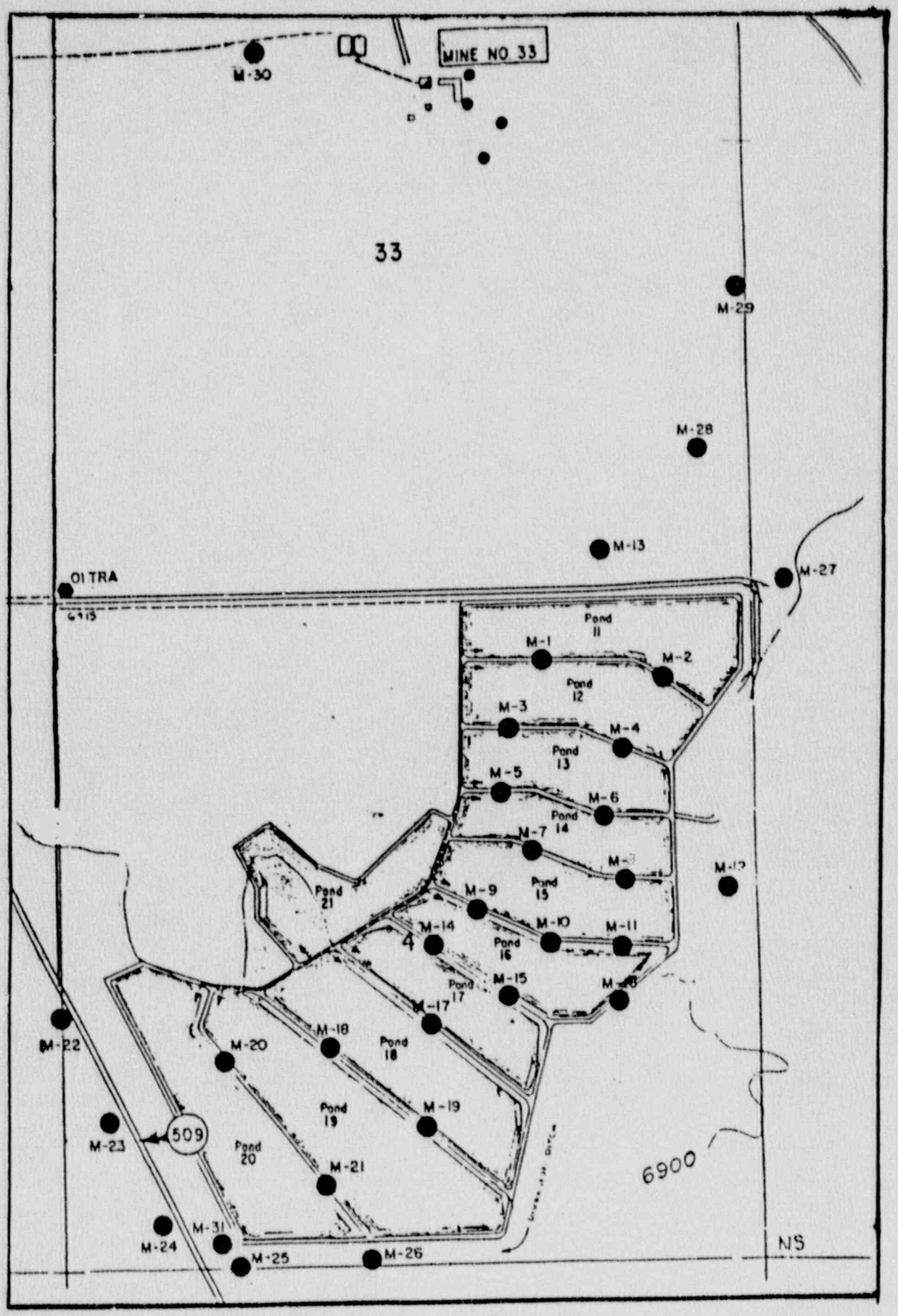


FIGURE 3

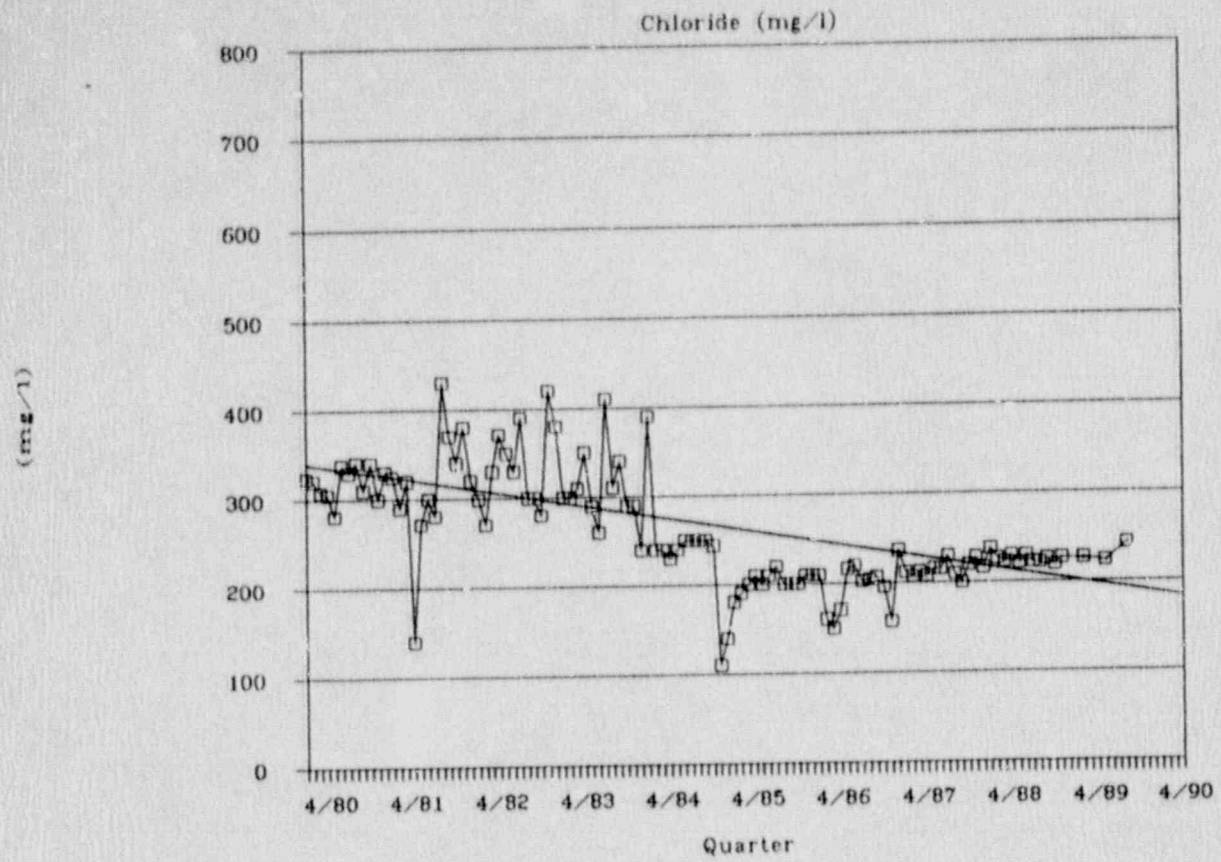

MINE NO 33
M-30
33
M-29
M-28
M-13
M-27
OLTRA
Pond 11
M-1
M-2
Pond 12
M-3
M-4
Pond 13
M-5
M-6
Pond 14
M-7
Pond 15
M-9
M-10
M-11
Pond 16
M-14
4
Pond 17
M-15
M-17
M-18
Pond 18
M-20
Pond 19
M-19
M-22
M-23
509
Pond 20
M-21
6900
M-24
M-31
M-25
M-26
NS

APPENDIX C

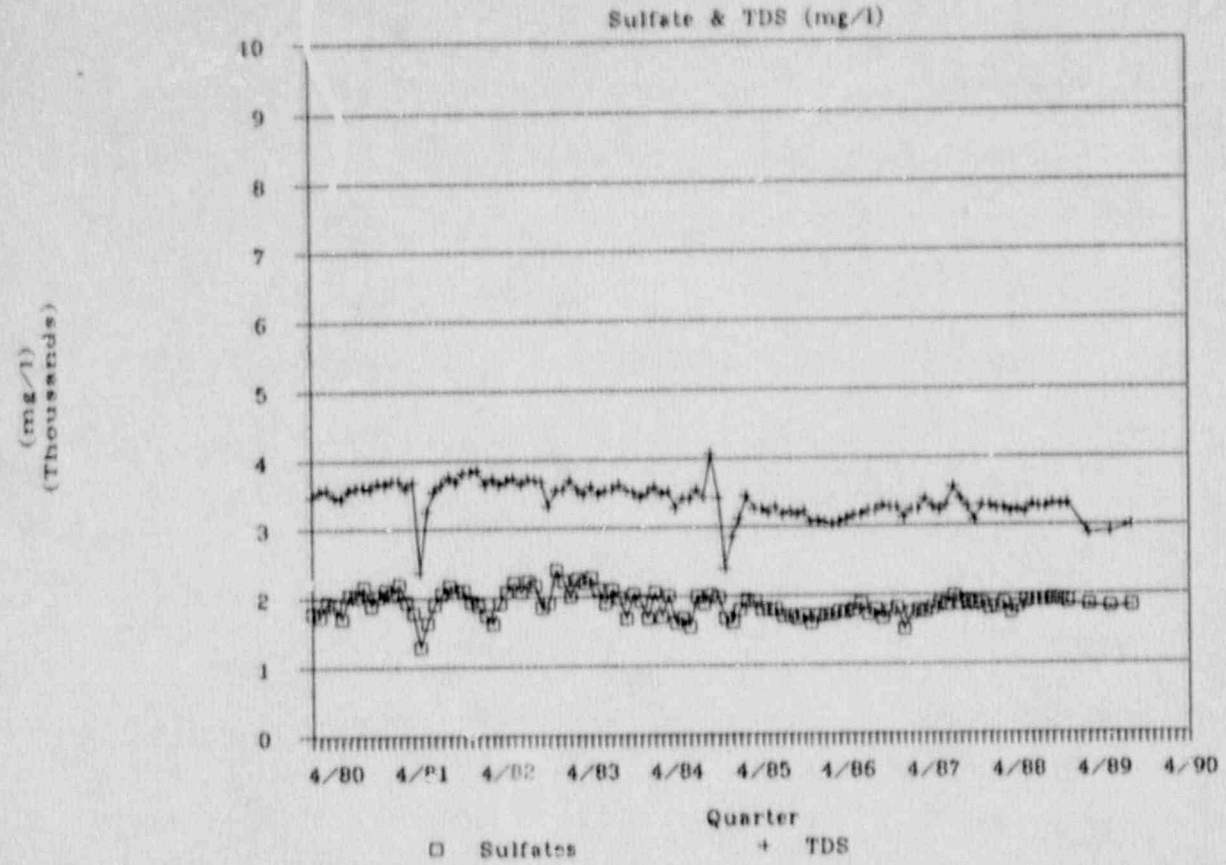
MONITOR WELL MW-29

HISTORICAL CHLORIDE, SULFATE, TDS, pH, AND DEPTH TO WATER VALUES

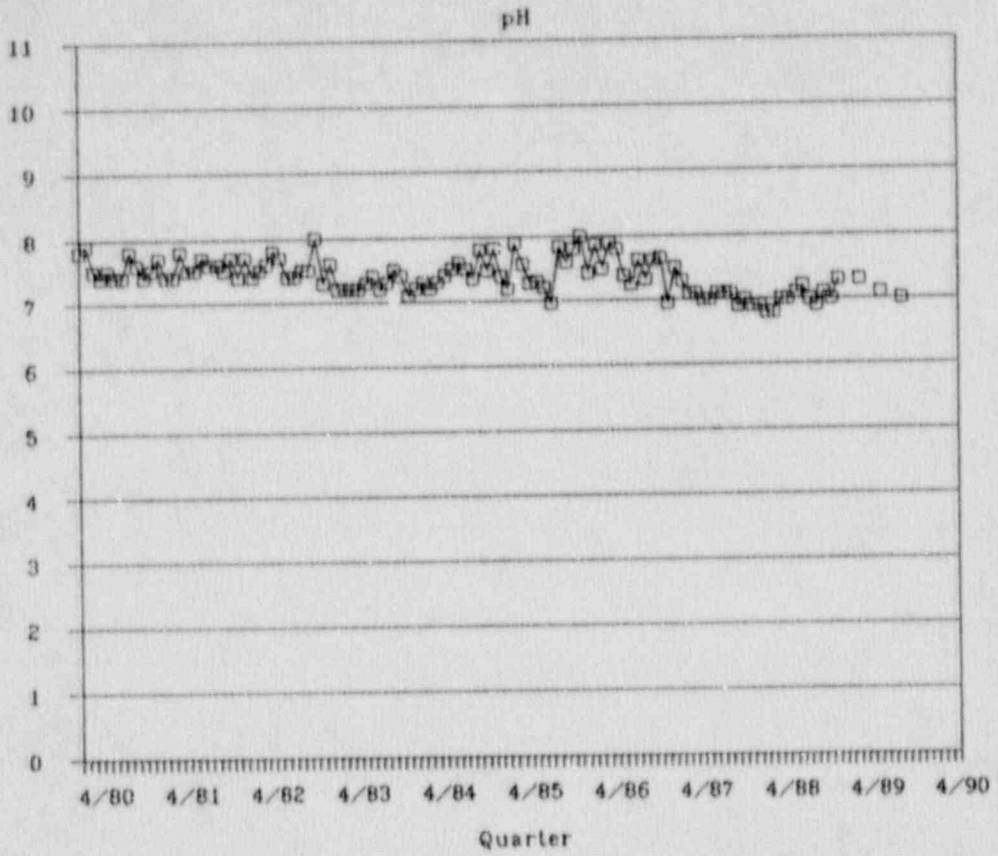
MONITOR WELL MW-29



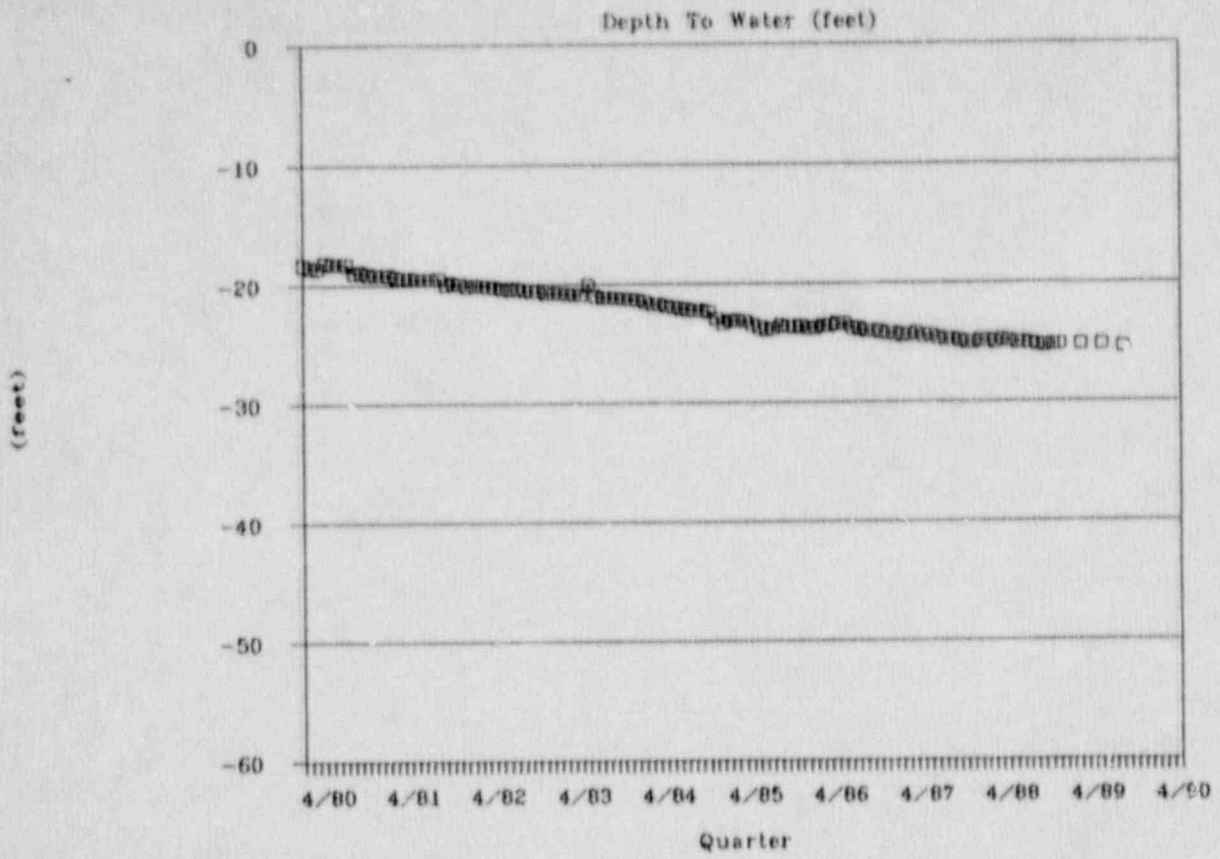
MONITOR WELL MW-29



MONITOR WELL MW-29



MONITOR WELL MW-29

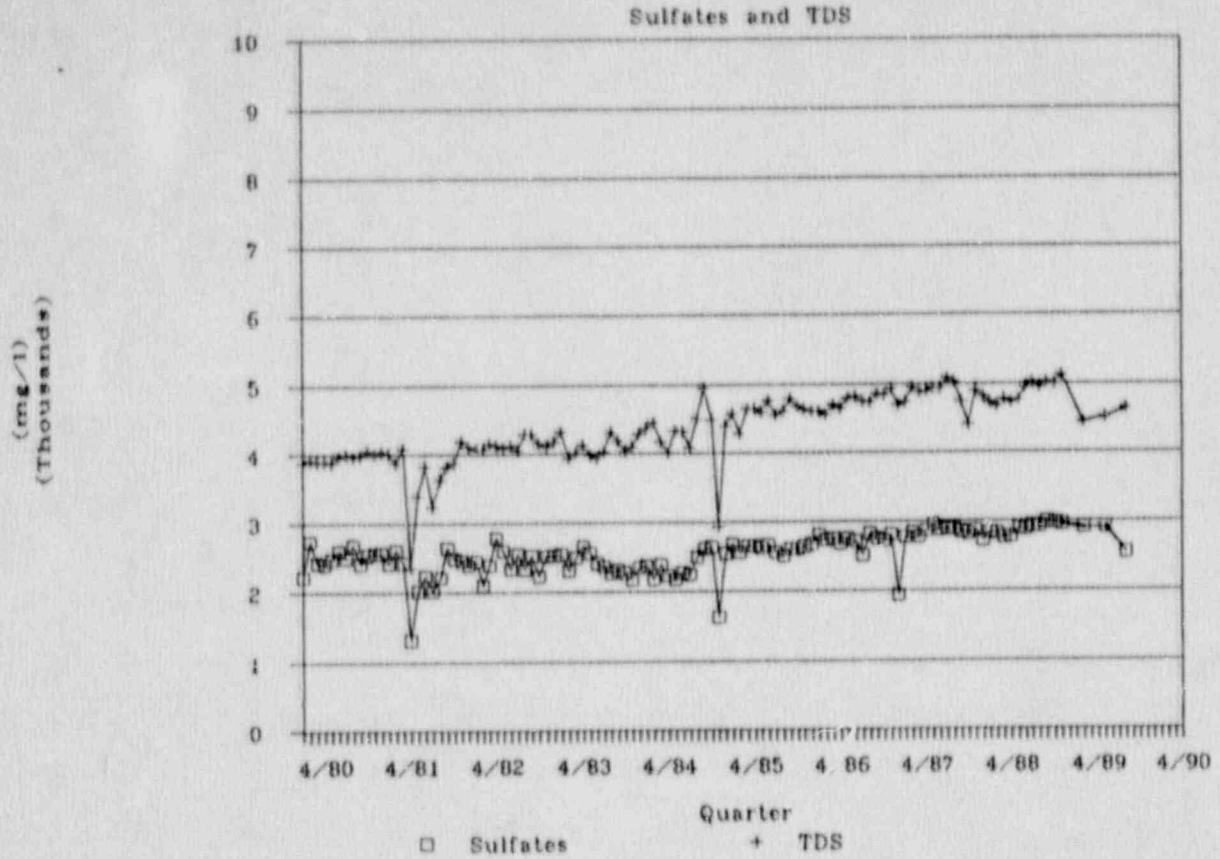


APPENDIX D

MONITOR WELL MW-20 HISTORICAL CONCENTRATION GRAPHS

HISTORICAL SECTION 4 EVAPORATION CONCENTRATIONS

MONITOR WELL MW-20



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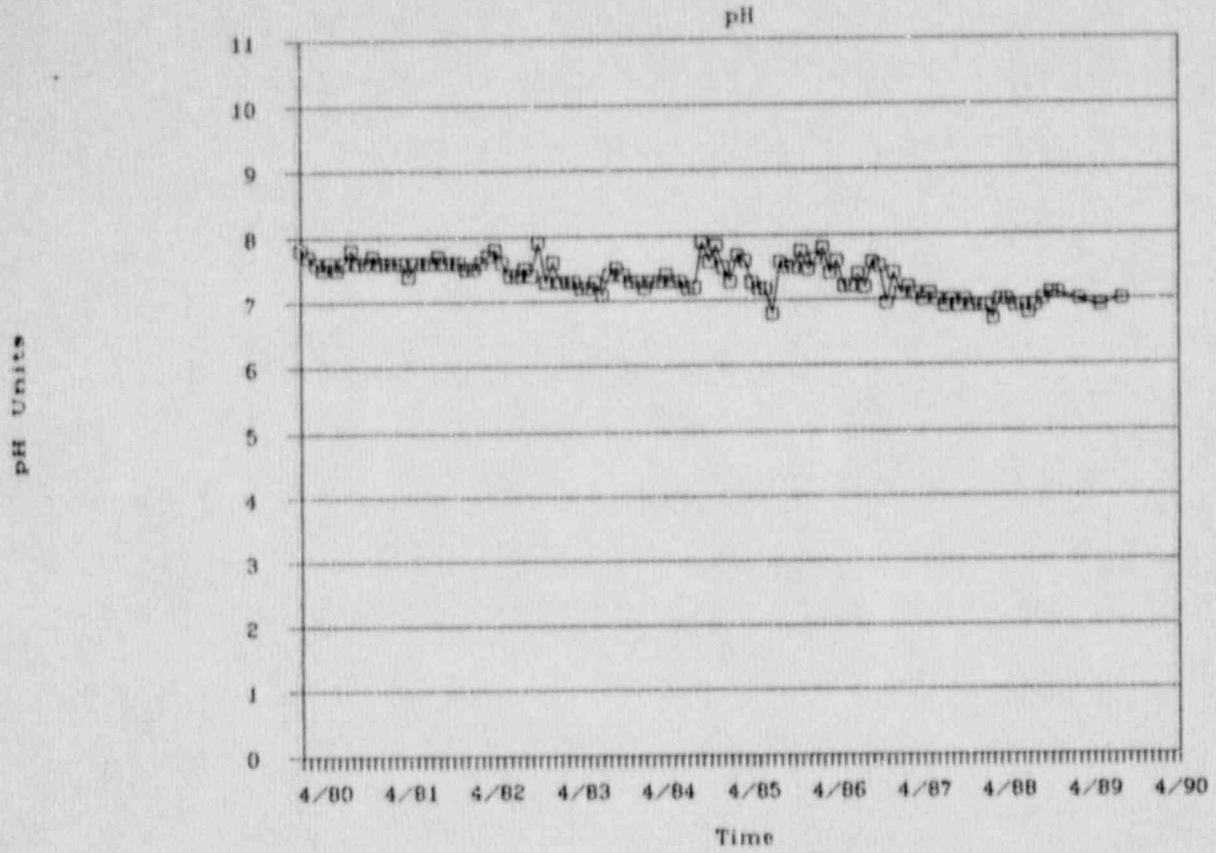
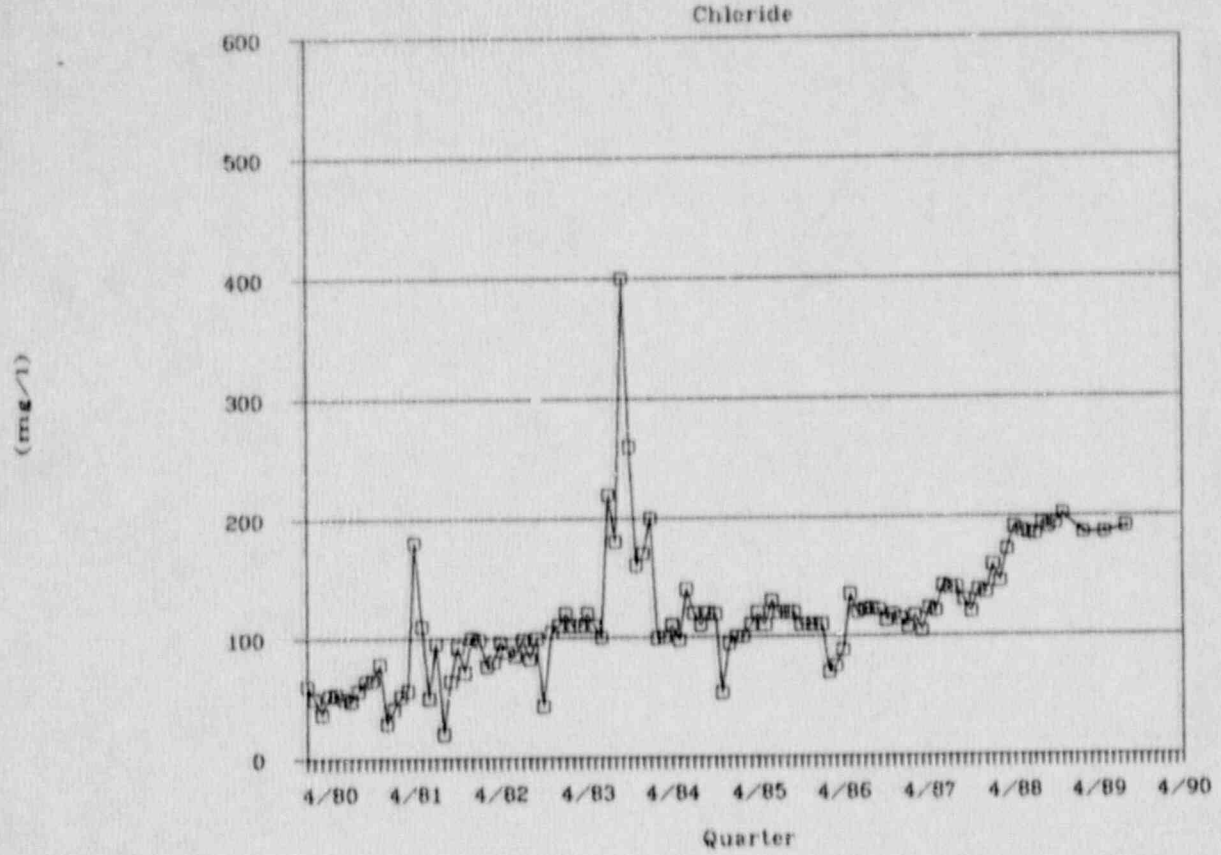
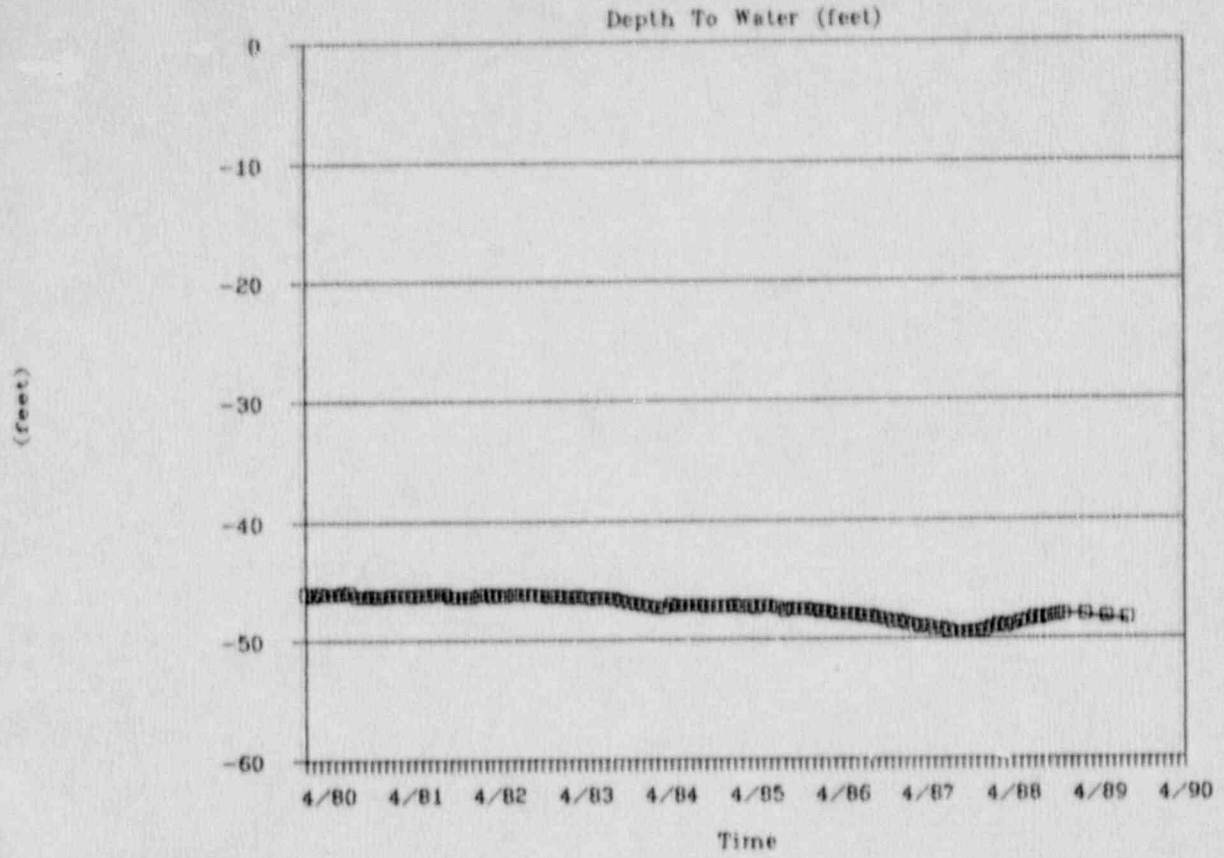


MONITOR WELL MW-20



MONITOR WELL MW-20



SECTION 4 EVAPORATION PONDS
CHLORIDE CONCENTRATIONS
1986-1990

DATE	POND 11 (mg/l)	POND 12 (mg/l)	POND 13 (mg/l)	POND 14 (mg/l)	POND 15 (mg/l)	POND 16 (mg/l)	POND 17 (mg/l)	POND 18 (mg/l)	POND 19 (mg/l)	POND 20 (mg/l)	POND 21 (mg/l)
June 1990	20300	26100	19500	15000	28100		70900	42800	9120	11500	15800
June 1989	51000	14300	18900	13600		2580		17200			
Nov 1988	4720	1970	33300	15900			886000	8210	88600	105000	105000
Aug 1988	67300	80200	18500	34900	59200		46400	9120			
May 1988	28800	61100	8900	13100	25600			6180	84100		113000
Feb 1988	1040	36500	1020		9390	61800	40400				
Nov 1987	5440	33700	28500		8860	67200	11500	69800	52900	57300	51900
Jul 1987	37900	17600	11700	20400	20300		8140				41000
May 1987	21400	10900	6330		9670	73800		59600	41500	32700	29400
Feb 1987	11600	6830	3710	20800	22300	26900	20700	24600	29900	26100	24100
Nov 1986	9200	15000	26000		26000	29000	29000	44000	28000	24000	19000
Jul 1986	31000	32000						38000	22000	21000	20000
May 1986	35000	23000	20000	15000	31000	32000	29000	24000	9400	12000	15000
Feb 1986	22000	14000	11000	19000	37000	23000	21000	23000	4300	22000	12000
Average	24764	26657	15951	18633	25220	39535	116304	30543	36982	34622	40564
Std. Dev.	18171	20743	9451	6345	13911	23456	257156	19657	28493	27984	34237

Note - Blanks indicates no samples due to insufficient water.

SECTION 4 EVAPORATION PONDS
SULFATE CONCENTRATIONS
1986-1990

DATE	POND 11 (mg/l)	POND 12 (mg/l)	POND 13 (mg/l)	POND 14 (mg/l)	POND 15 (mg/l)	POND 16 (mg/l)	POND 17 (mg/l)	POND 18 (mg/l)	POND 19 (mg/l)	POND 20 (mg/l)	POND 21 (mg/l)
June 1990	79900	110000	103000	59800	106000		287000	166000	52600	66300	73200
June 1989	269000	71300	119000	65700		8890		90400			
Nov 1988	15500	8350	158000	66000			231000	35700	258000	261000	287000
Aug 1988	286000	274000	92900	159000	228000		245000	40400			
May 1988	136000	256000	43000	53000	114000			27300	308000		322000
Feb 1988	2330	155000	29100		338000	174000	121000				
Nov 1987	19500	167000	158000		33000	290000	208000	236000	240000	296000	286000
Jul 1987	20900	75400	609000	91700	109000		23100				218000
May 1987	107000	48500	27600		45400	300000		274000	225000	215000	205000
Feb 1987	49000	29300	11400	99700	96300	135000	76600	118000	14500	154000	149000
Nov 1986	39700	84500	179000		126000	167000	164000	231000	171000	163000	113000
Jul 1986	220000	187000						193000	122000	136000	125000
May 1986	224000	144000	158000	109000	247000	251000	250000	127000	31400	58400	109000
Feb 1986	134000	96600	81000	145000	173000	142000	127000	113000	17700	138000	88900
Average	114488	121925	136077	94544	146882	183486	173270	137650	144020	165300	180555
Std. Dev.	95825	76873	146928	35530	87522	89719	80846	79694	105184	75775	83740

Note - Blanks indicates no samples due to insufficient water.

SECTION 4 EVAPORATION PONDS
TDS CONCENTRATIONS
1986-1990

DATE	POND 11 (mg/l)	POND 12 (mg/l)	POND 13 (mg/l)	POND 14 (mg/l)	POND 15 (mg/l)	POND 16 (mg/l)	POND 17 (mg/l)	POND 18 (mg/l)	POND 19 (mg/l)	POND 20 (mg/l)	POND 21 (mg/l)
June 1990	132000	181000	162000	99900	177000		484000	275000	76400	106000	116000
June 1989	458000	121000	193000	108000		16200		154000			
Nov 1988	26100	14300	236000	109000			398000	58700	443000	426000	491000
Aug 1988	482000	485000	150000	272000	417000		426000	69900			
May 1988	221000	432000	66800	92200	189000			45500	513000		551000
Feb 1988	4240	241000	5220		57800	442000	205000				
Nov 1987	34100	270000	251000		57100	464000	454000	404000	390000	465000	450000
Jul 1987	296000	123000	81900	144000	152000		39900				392000
May 1987	164000	75700	41400		69700	434000		459000	379000	329000	312000
Feb 1987	79700	45900	19500	150000	140000	200000	122000	193000	236000	240000	229000
Nov 1986	64500	124000	255000		182000	248000	248000	347000	260000	241000	172000
Jul 1986	343000	288000						306000	189000	204000	218000
May 1986											
Feb 1986	199000	140000	129000	214000	267000	209000	183000	177000	30100	150000	130000
Average	192588	195454	132568	148638	170860	287600	284433	226282	279611	270125	306100
Std. Dev.	154501	137196	86001	59474	103723	153747	151153	135856	155377	118972	148702

Note - Blanks indicates no samples due to insufficient water.

TDS was not samples during May 1986.

SECTION 4 EVAPORATION PONDS
pH CONCENTRATIONS
1986-1990

DATE	POND 11 (mg/l)	POND 12 (mg/l)	POND 13 (mg/l)	POND 14 (mg/l)	POND 15 (mg/l)	POND 16 (mg/l)	POND 17 (mg/l)	POND 18 (mg/l)	POND 19 (mg/l)	POND 20 (mg/l)	POND 21 (mg/l)
June 1990	1.1	1.2	1.0	1.4	1.2		0.3	0.7	1.7	1.5	1.4
June 1989	0.0	1.0	0.7	1.0		3.1		1.3			
Nov 1988	0.6	2.5	0.0	0.4			0.0	0.9	0.0	0.0	0.0
Aug 1988	0.0	0.0	1.1	0.6	0.3		0.5	1.9			
May 1988	0.9	0.5	1.6	1.2	1.0			2.1	0.0		0.0
Feb 1988	2.4	0.5	2.4		1.5	0.0	0.2	0.2	0.4	0.1	0.1
Nov 1987	1.9	0.9	0.8		1.8	0.0	0.0	0.1	0.3	0.0	0.2
Jul 1987	1.2	1.7	1.8	1.6	1.7		2.8				0.8
May 1987	1.6	1.9	2.1		2.0	1.0		0.9	1.2	1.2	1.3
Feb 1987	1.6	1.9	2.2	1.3	1.3	0.7	1.0	0.7	1.0	0.9	1.0
Nov 1986	2.0	1.7	1.2		1.3	1.3	1.4	1.1	1.4	1.3	1.5
Jul 1986	1.0	1.4						1.4	1.8	1.7	1.7
May 1986	0.1	1.1	0.1	1.3	0.1	0.1	0.1	1.2	1.6	1.3	1.2
Feb 1986	1.1	1.3	1.3	1.1	0.7	1.0	1.2	1.1	2.0	1.0	1.4
Average	1.1	1.3	1.3	1.1	1.2	0.9	0.8	1.0	1.0	0.9	0.9
Std. Dev.	0.7	0.6	0.7	0.4	0.6	1.0	0.8	0.6	0.7	0.6	0.6

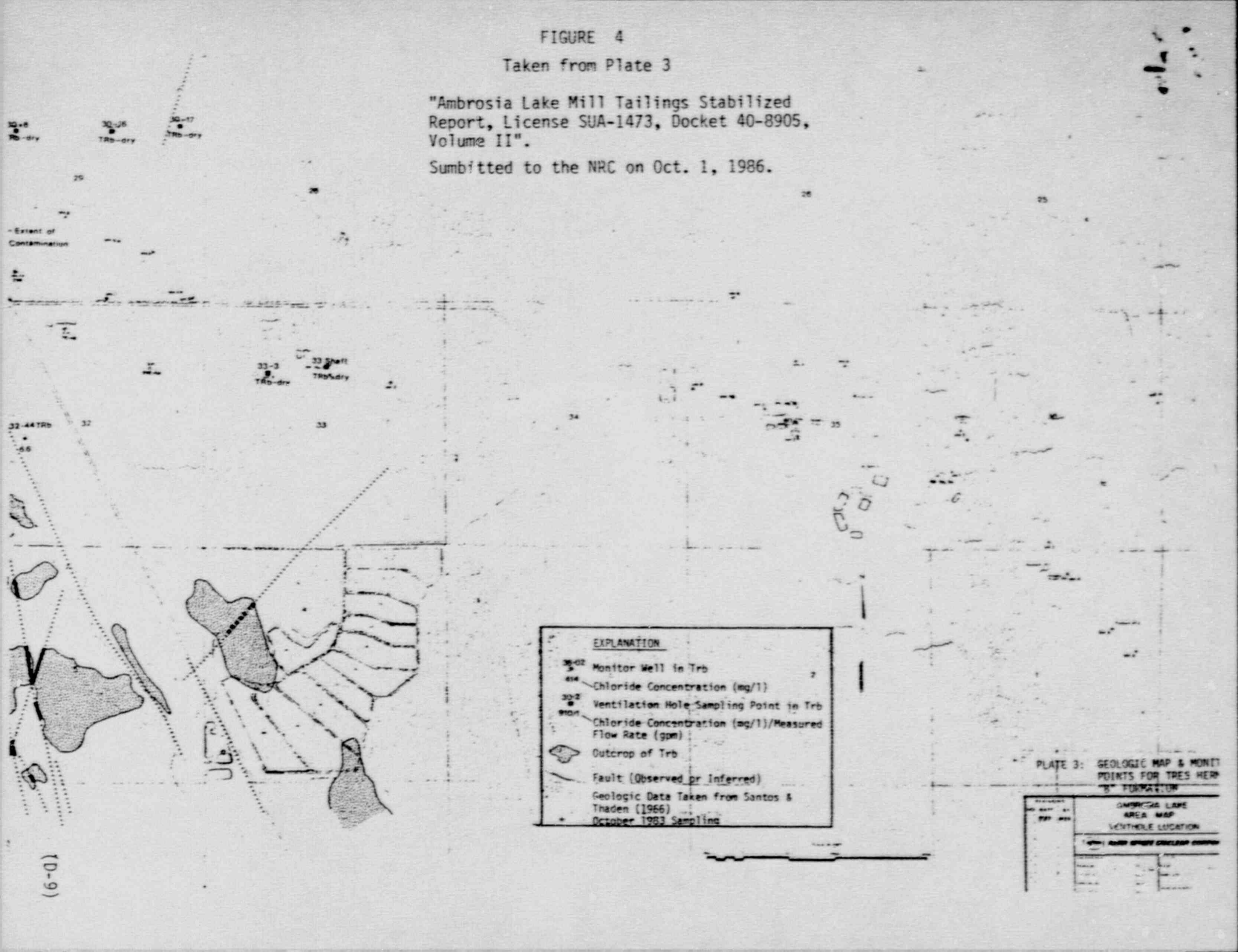
Note - Blanks indicates no samples due to insufficient water.

FIGURE 4

Taken from Plate 3

"Ambrosia Lake Mill Tailings Stabilized Report, License SUA-1473, Docket 40-8905, Volume II".

Sumbitted to the NRC on Oct. 1, 1986.



(6-D)