



ROCKY MOUNTAIN
ENERGY COMPANY

MPH

August 27, 1982

Mr. Richard Chancellor
District IV Engineer
Department of Environmental Quality
Land Quality Division
30 East Grinnell Street
Sheridan, Wyoming 82801

Dear Mr. Chancellor:

Re: Final Groundwater Stabilization Data for Test
Pattern 1 at Reno Creek R&D ISL Facility-License
SUA-1338, R&D Permit No. TFN 1 4/192

This letter transmits the above referenced information as requested by the Nuclear Regulatory Commission (NRC) and the Wyoming Department of Environmental Quality (WDEQ). Previous restoration activity of Pattern 1 at Reno Creek was documented by Rocky Mountain Energy Company via letters dated January 5, 1982 to Mr. Scarano of the NRC and July 27, 1981 to Mr. Chancellor of the WDEQ.

As requested by the NRC on June 1, 1982, per Amendment No. 4 to Source Material License SUA-1338, included as Annex A of this report is a summary of the pore volumes circulated during leaching and restoration activities.

Six pattern monitor wells and 2 production wells were sampled on a monthly basis for a stipulated 1 year period from the start of the stabilization period which began June 3, 1981. These data are presented in the attached Tables 1-8. Well samples were analyzed for the appropriate control parameters (monitor wells=TDS, Ca, SO₄, U; production wells = TDS, Ca, SO₄, U, pH) on a monthly basis and for all major constituents plus radionuclides on a quarterly frequency. The attached figures illustrate fluctuations in the monitor and production well control parameters for the year. The baseline range is also given for comparative purposes. Four samples were taken from each of the monitor wells for June, 1982 including 2 air lifted samples and 2 bailed samples. These sampling techniques were used because the screens in some of the wells had collapsed, precluding pumping of the samples. Samples from each sampling technique were analyzed by CDM and the Nine Mile Lake lab.

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At the end of the stabilization period, the parameters, pH, TDS, Ca and SO₄ as seen on the figures are within the baseline range with the exception of calcium in monitor wells 3 and 4. There were no cases in any of the production zone monitor wells during the stabilization period where the levels of the indicator parameters exceeded the control limits as defined in Table 1 included with the attached letter from Mr. M. Neumann to Mr. R. Chancellor dated July 2, 1981. There was, however, variability associated with the parameters of Ca and SO₄ in monitor wells M-3 and M-4. From statistical tests of correlation, this variability was not determined to be consistent, that is an increase in calcium did not necessarily correspond to a decrease or increase in sulfate. Furthermore, in all monitor wells including M-3 and M-4, the TDS levels remained within baseline ranges with minimum fluctuation.

Fluctuations in parameters such as calcium, sulfate, iron and vanadium in M-3 and M-4 were observed after January, 1982. This was most likely the result of changing sampling techniques. Screens in these wells had collapsed which prohibited use of a pump so samples were obtained by airlifting and bailing. The conclusion that water quality fluctuations were due to changes in sampling techniques is substantiated by the following factors:

- 1) If the increases associated with fluctuations seen in M-3 and M-4 were due to migration of contaminants from the pattern by natural groundwater movement, then the sequence of ions reported and the projected levels would be different. The report submitted to the DEQ on July 2, 1981 (attached) predicting the potential for and mechanisms of possible groundwater contamination actually predicted much higher levels of calcium and sulfate. Further, monitor wells showing the greatest fluctuations are not in the direction of natural groundwater flow.

- 2) With a natural groundwater movement of 3 ft/year, it is unlikely that natural Pattern 1 migration is responsible for the parameter changes;

- 3) If channeling has occurred, several ions such as chloride, magnesium and sodium should also show elevated levels.

The control limit established for calcium in the upper sand monitor well (USM-1) was exceeded at times during the year of stabilization monitoring. The TDS level, however, remained approximately the same as that determined for the baseline range and well below the TDS levels in the production zone. The increase in calcium levels in USM-1 was therefore most likely the result of the bailing technique used to collect samples rather

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than upward movement of water from the production zone. Bailing the samples from USM-1 was necessary since there is an inadequate quantity of water in the upper sand aquifer for pumping.

Water quality in the Pattern 1 aquifer, as determined by sampling the 4 monitor wells, remained in the same use suitability category (Class IV-A) as was present before mining. The limiting parameters in water quality both before and after mining were radium, and vanadium. The baseline radium concentration within the aquifer, ranged from 11.7 pCi/l to 398 pCi/l before mining. After the stabilization period, the radium concentrations were essentially the same with a range of from 19 pCi/l to 360 pCi/l. The use suitability class for the aquifer, based on radium concentration, was therefore determined to be Class IV (A). This determination was made since the radium concentrations were substantially above the requirements for Use Classes I, II or III. The vanadium values ranged from "not detectable" to 0.17 mg/l before mining and from 0.01 mg/l to 0.39 mg/l during the stabilization period. The upper boundary of these ranges also exceeded the allowable concentration for use Classes II and III (no concentration is given in Chapter 8 for Class I vanadium). It is therefore assumed that based on vanadium, the use category for this aquifer is Class IV(A).

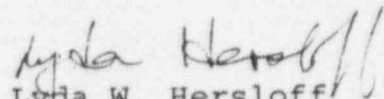
As was stated in the July 2, 1981 letter from Mr. Neumann to Mr. Chancellor, "the water quality within the pattern interior affected during mining should gradually improve with time but it will likely be a very gradual process...Therefore, no substantial improvement or deterioration of water quality, as represented by the production wells, is predicted to occur during the stabilization monitoring period." As was predicted above, Figures 5 and 6, illustrate that the water quality has shown only slight improvement or is stable. The "control limits" established for the Pattern I production wells were developed for the purpose of trend evaluation. Although some fluctuations in calcium and sulfate levels exceeded the "control limits" for the production wells, there does not appear to be any significant upward trend. As chemical equilibrium with surrounding groundwater and the geologic formation occurs, however, affected groundwater within the pattern will become essentially indistinguishable from the surrounding aquifer. Since the time that stabilization monitoring began there have been no known new developments in the restoration processes or technology which could be implemented to further improve the water quality in Pattern I at Reno Creek. Based on that facts that water quality of the monitor wells is similar to

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baseline conditions and that the quality is either stable or improved, we are requesting regulatory agency approval of restoration stabilization.

If you have any questions concerning this information, please contact me (303) 469-8844 at your convenience.

Sincerely,


Lyda W. Hersloff
Project Environmental
Specialist

Attachments

cc: Glen Mooney (WDEQ-LQD)
Tom Mueller (WDEQ-WQD)
Paula Schmitt diel (WDEQ-LQD)
Ken Kalman (NRC)
Fred Ross (NRC)
John Linehan (NRC)
M.R. Neumann
J.A. Yellich
R.E. Iwanicki

Annex A
RENO CREEK PATTERN 1
WATER BALANCE SUMMARY

<u>Operational Mode</u>	<u>Production (Gal.)</u>	<u>Pore¹ Volumes</u>	<u>Injection (Gal.)</u>	<u>Pore Volumes</u>	<u>Net Production (Gal.)</u>
Leaching (2/79-11/79)	10,230,553	7.6	9,121,082	6.8	1,109,471
Recirculation (11/79-12/79)	968,003	0.7	389,391	0.3	578,612
Restoration-Groundwater Sweep (12/79-3/80)	2,923,562	2.2	0	-	2,923,562
Restoration-"Salts" Injection (3/80-5/80)	2,371,328	1.8	1,726,716	1.3	644,612
Restoration-CaOH Injection (6/80-3/81)	4,740,554	3.5	2,558,000	1.9	2,182,554
Restoration-Groundwater Sweep (4/81-5/81)	345,799	0.3	0	-	345,799
RESTORATION TOTALS	11,349,266	8.5	4,674,107	3.5	6,675,139
			TOTAL WATER CONSUMPTION		7,784,610

¹One Pore Volume=1,350,000 gallons

REN CREEK, PATTERN 1

MONITOR WELL - M-1

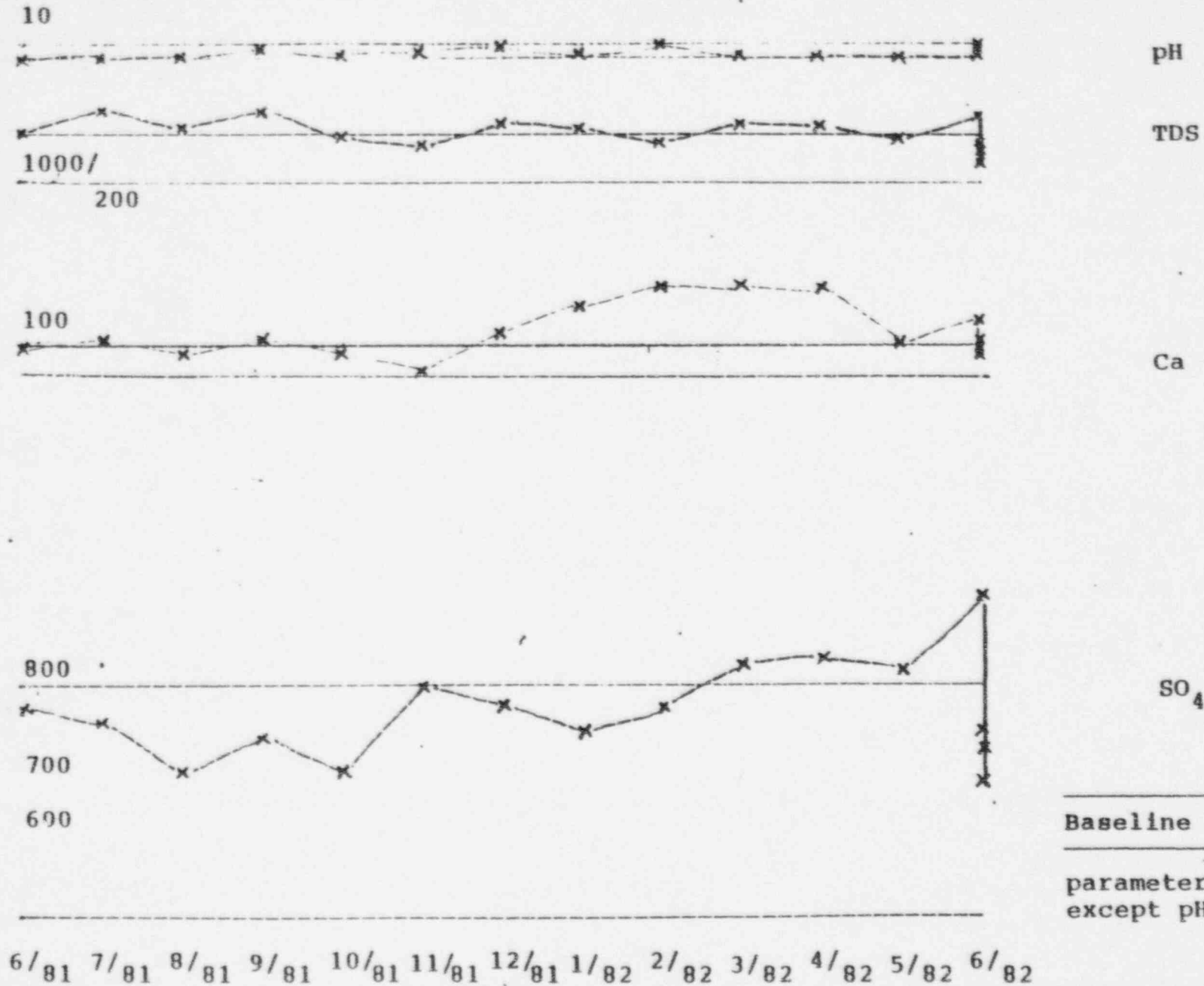
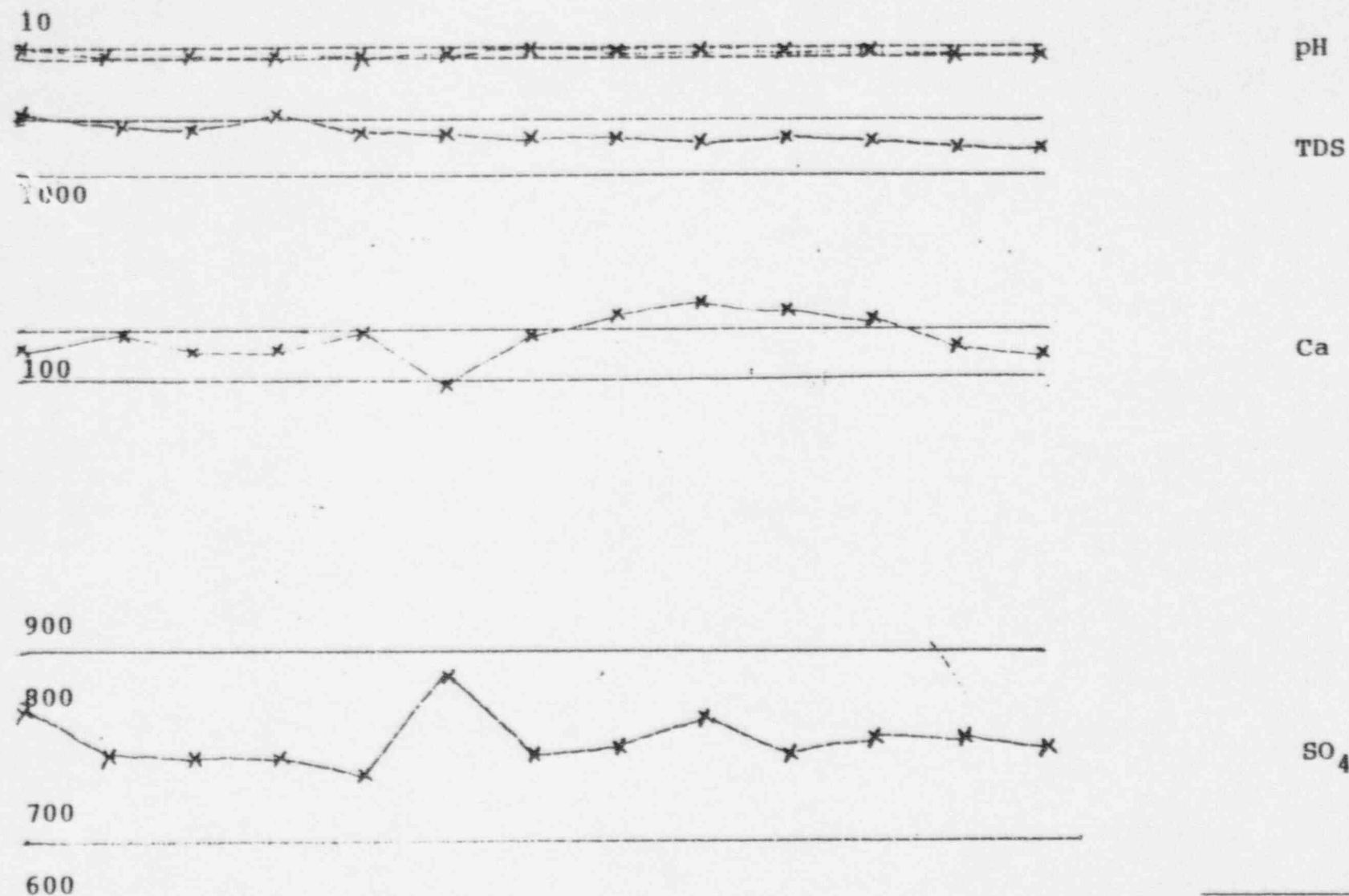


Figure 2

RENO CREEK, PATTERN 1

MONITOR WELL - M-2



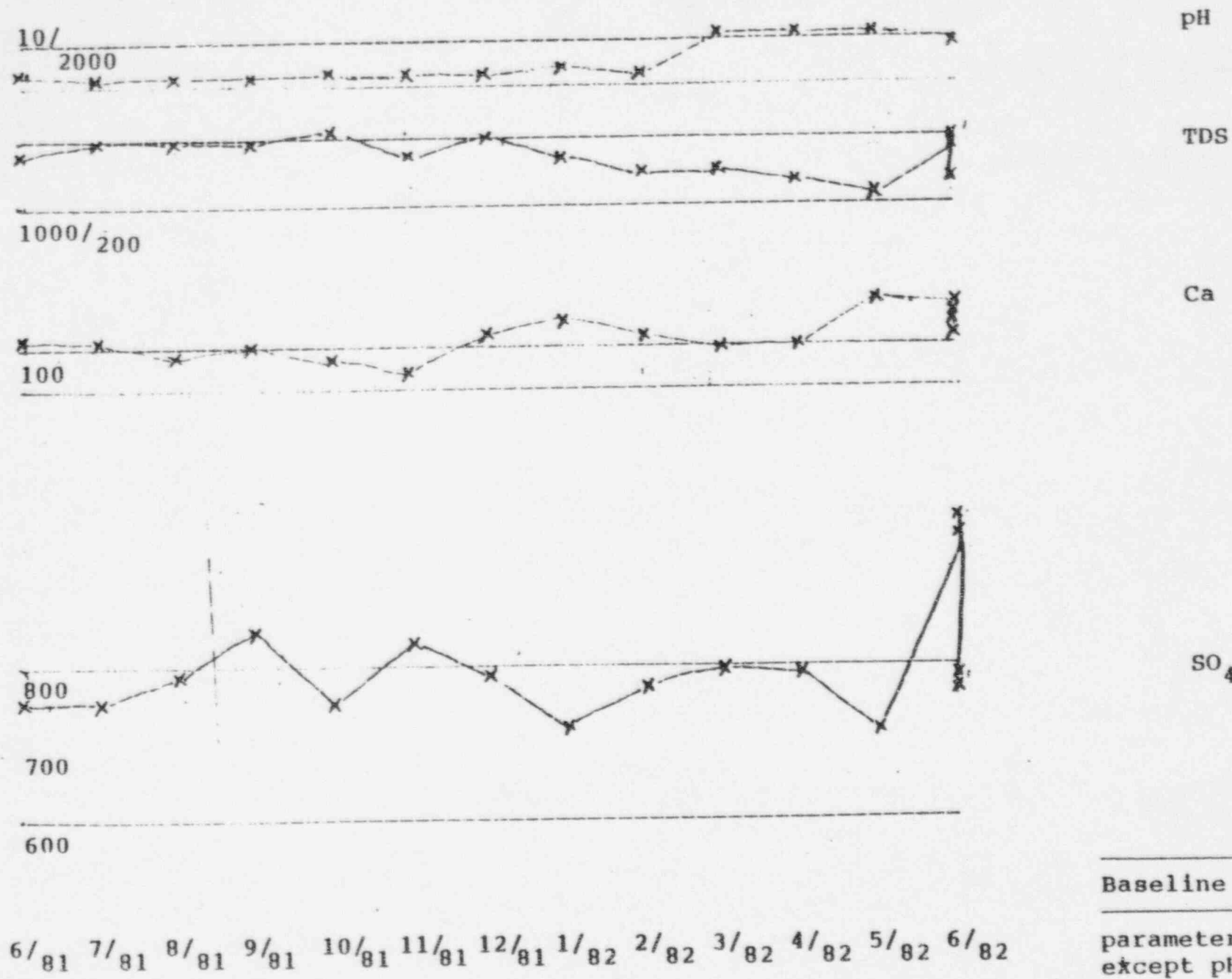
Baseline Range

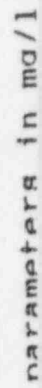
parameters in mg/l
except pH

6/81 7/81 8/81 9/81 10/81 11/81 12/81 1/82 2/82 3/82 4/82 5/82 6/82

Figure 3

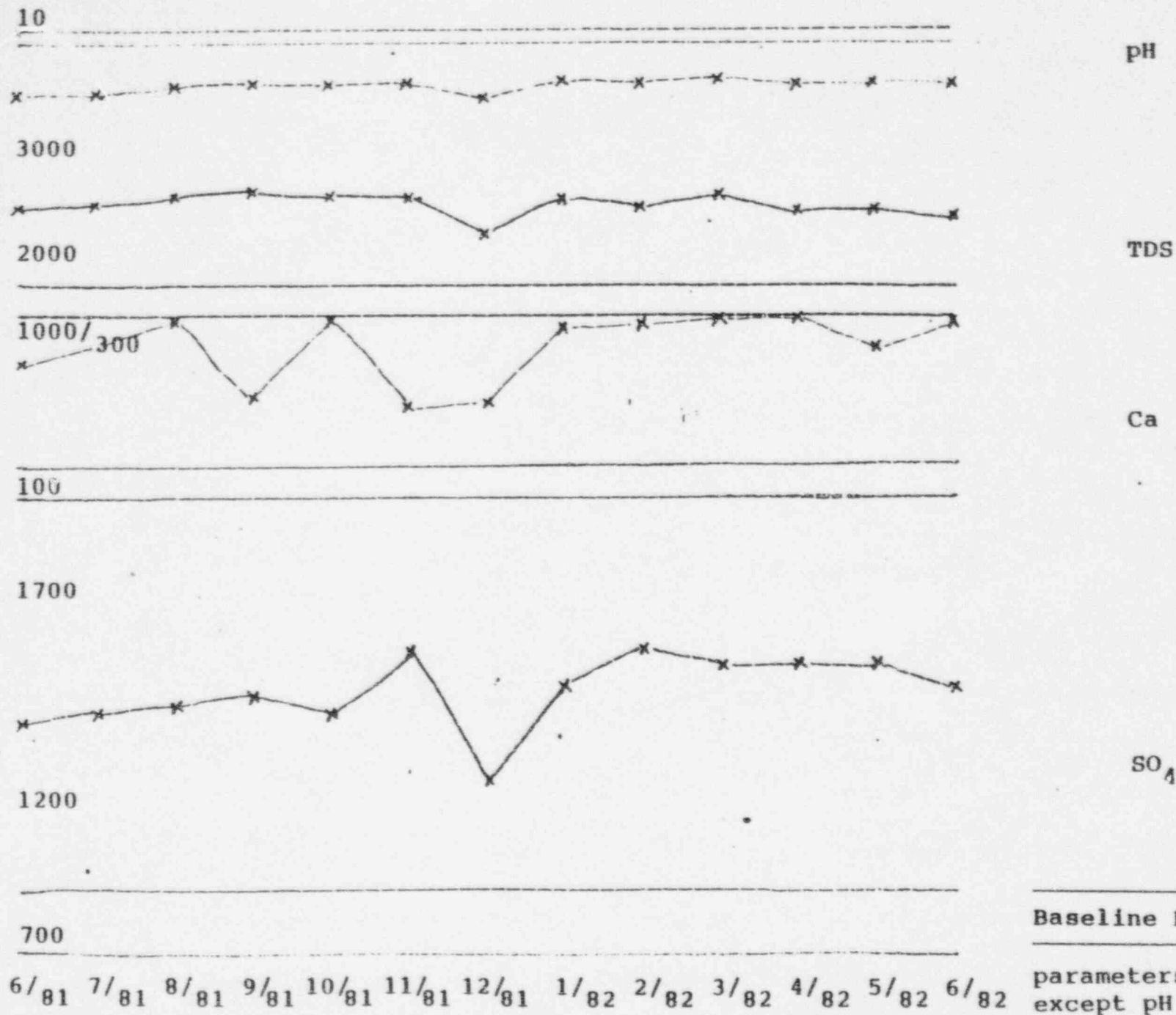
RENO CREEK, PATTERN. 1
MONITOR WELL - M-3





RENO CREEK, PATTERN 1

PRODUCTION WELL - 1



Baseline Range

parameters in mg/l
except pH

RENO CREEK, PATTERN 1

PRODUCTION WELL - 2

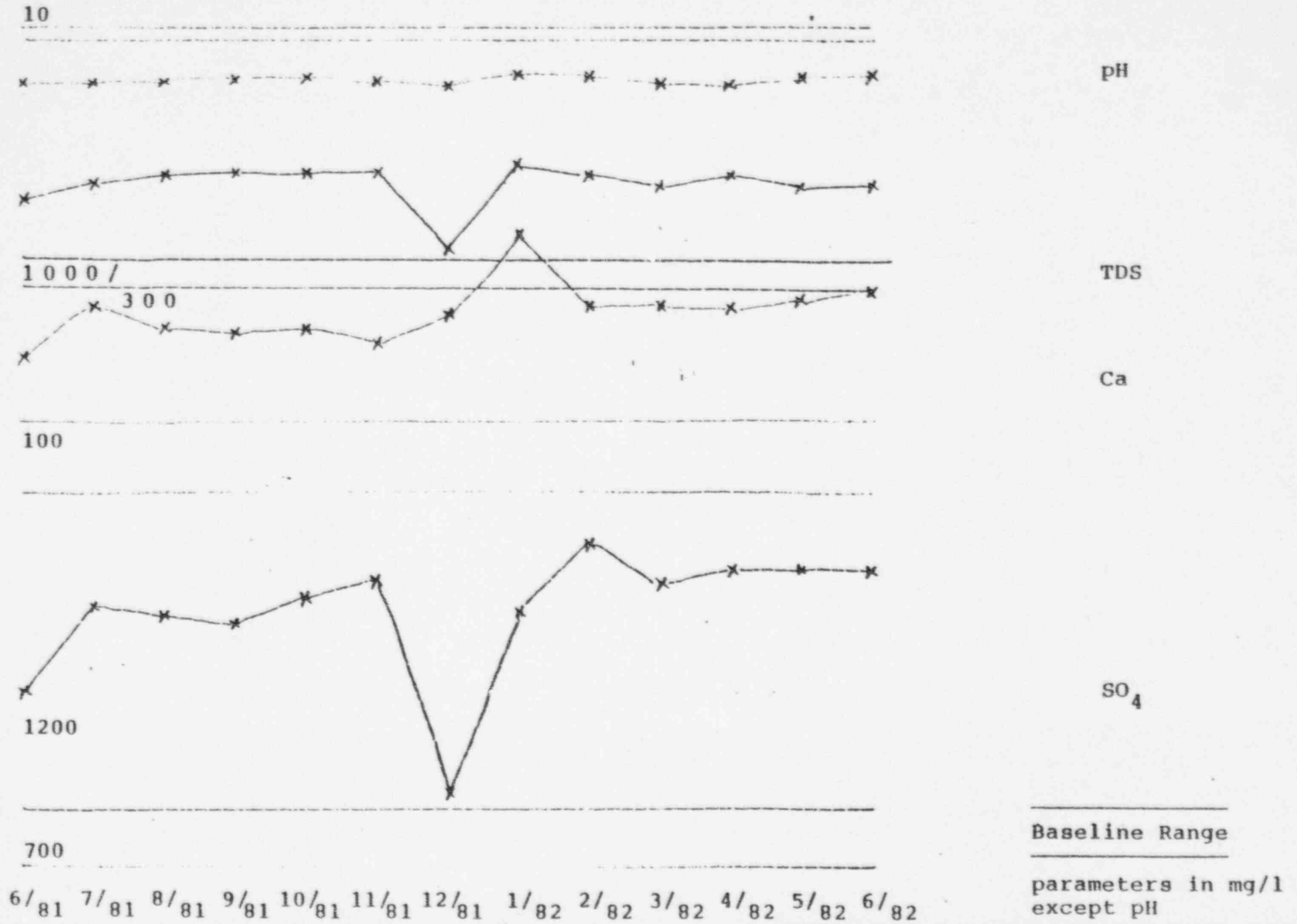


TABLE 1

Parameter	Baseline Range	CDM	NMEL	7/23/81	8/14/81	9/02/81	10/6/81	11/3/81	12/1/81	NMEL	1/25/82	CDM	NMEL	2/26/82	3/15/82	4/19/82	5/12/82	NMEL	CDM	Control Limit
Field																				
pH	7.9-8.6		4.8	2600	5.1	5.3	5.3	5.3	4.4	5.4	---	---	---	5.2	5.3	5.1	5.3	5.3	4.6	3.81
Conductivity	1400-2000		2600	2750	3556	3011	2800	2800	2250	3000	---	---	---	3000	2500	2700	2600	2900	2800	
Major Constituents																				
Bicarbonate	13-98	0	10	Trace	Trace	Trace	8	15	8	16	9	270	300	21	22	19	26	9	0	
Carbonate	0-75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Alkalinity (CaCO ₃ eq)	11-80	0	Trace	Trace	Trace	Trace	8	15	8	13	7	7	17	17	18	16	21	7	0	
Calcium	80-120	230	248	271	309	206	309	196	204	292	270	270	300	300	307	314	299	306	280	267
Chloride	8-18	12	54	67	53	45	57	58	37	52	51	51	60	57	57	54	59	52	45	
Magnesium	15-29	42	40	62	63	90	72	60	55	72	70	70	77	67	72	72	66	58	66	
Potassium	10-20	44	52	48	49	49	49	52	51	40	37	37	94	94	97	94	40	40	33	
Sodium	210-323	300	360	345	354	346	291	294	320	368	290	290	290	290	288	286	296	287	230	
Sulfate	700-900	1370	1430	1466	1485	1528	1459	1662	1257	1555	1600	1600	1666	1607	1625	1621	1550	1550	1600	1673
TDS	1124-1492	2410	2500	2580	2640	2700	2660	2800	2180	2600	2470	2470	2500	2640	2640	2454	2430	2350	2400	2771
Anion/cation		99									94			99	101	101	95	99	87	
Minor Constituents																				
Ammonia as N	0.1-0.5	0.9	--							---	---	1.0							1.4	
Nitrate as N	0.1-0.5	0.05	--							---	---	0.05							0.05	
Nitrite as N	0.1	0.05	--							---	---	0.05							0.05	
Aluminum	0.10-0.28	5.1	4.2	3.7						5.0	5.8	5.8							5.1	
Arsenic	0.01-0.03	0.005	0.005							0.41	0.2	0.005							0.020	
Barium	0.1	0.2	--							---	---	0.2							0.2	
Boron	0.11-2.6	0.1	--							---	---	0.3							0.1	
Cadmium	0.01	0.01	0.017							0.03	0.02	0.005							0.008	
Chromium	0.01	0.02	0.25							---	---	0.03							0.010	
Copper	0.01	0.02	0.01							---	---	0.010							0.006	
Fluoride	ND-0.22	0.4	--							---	---	0.1							0.6	
Iron	0.01-0.21	28	37.1	35.5	40.1	36	40	40	38	57	46	46	42	43	43	49	41	40	35	
Lead	0.01	0.005	0.08							0.01	0.005	0.005							0.005	
Manganese	0.01-0.03	0.76	1.19							---	---	1.03							1.1	
Mercury	0.0001	0.0001	--							---	---	0.0001							0.0001	
Molybdenum	ND-0.08	0.005	0.03							0.05	0.006	0.006							0.007	
Nickel	0.01	0.10	0.07							0.07	0.06	0.06							0.06	
Selenium	ND-0.05	0.005	--							---	---	0.005							0.005	
Vanadium	0.05-0.38	0.15	0.33	0.31	0.78	0.56	0.48	0.72	0.42	0.59	0.56	0.56	0.14	0.21	0.36	0.36	0.36	0.35	0.79	
Zinc	0.1	0.06	0.04							0.03	0.045	0.045							0.046	
Silica (SiO ₂)		98	101							90	---	---							67	
Radiochemistry																				
Uranium as U ₃₀₈	0.15-1.05	1.1	1.166	2.05	1.79	1.79	1.77	1.54	1.46	1.57	1.65	1.65	1.690	0.616	1.635	1.579	1.370	1.2	5.0	
Radium - 226	160-680	680	1019	1050				1179	1113		1000	1000						860		
Thorium - 230	0.4-0.4	38	7.5	10.9				11.4	60		35	35						42		

* Units in mg/l (ppm) except pH (std. unit), conductivity (umhos/cm) and Ra-226, Th-230 (pCi/l).

TABLE 2

Parameter*	Baseline Range	6/03/81	6/03/81	7/23/81	8/14/81	9/02/81	10/6/81	11/3/81	12/1/81	1/25/82	3/25/82	4/20/82	5/12/82	6/09/82	17M	Control Limit
pH	7.9-8.6	4.7	4.6	4.6	4.9	5.0	5.0	4.9	4.4	5.4	---	---	5.2	4.8	5.2	4.5
Conductivity	1400-2000	2500	2700	2700	3278	3111	3000	3000	2000	3150	---	---	3200	2900	3100	3000
Major Constituents																
Bicarbonate	11-98	0	11	7.6	Trace	0	5	14	8	14	7	13	6	5	0	0
Carbonate	0-75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alkalinity (CaCO ₃ eq)	11-18	0	0	0	Trace	0	4	11	7	11	6	10	5	4	0	0
Calcium	18-120	230	210	282	256	244	249	232	271	381	260	282	289	302	280	267
Chloride	8-18	12	44	89	57	61	66	78	40	65	60	70	69	64	66	66
Magnesium	15-29	41	62	61	73	85	69	47	37	77	74	72	72	64	73	72
Potassium	10-20	43	61	61	58	57	61	67	38	50	47	136	54	53	47	47
Sodium	210-323	290	339	354	358	343	300	330	266	256	290	294	297	304	250	250
Sulfate	700-900	1400	1312	1607	1573	1548	1644	1697	956	1591	1600	1685	1742	1730	1800	1673
TDS	1124-1492	2340	2340	2560	2640	2680	2700	2780	1600	2820	2640	2545	2526	2545	2500	2771
Anion/cation	103										94	99	95	97	81	
Minor Constituents																
Ammonia as N	0.1-0.5	0.7	---	---	---	---	---	---	---	---	1.1	---	---	---	1.2	1.2
Nitrate as N	0.1-0.5	0.05	---	---	---	---	---	---	---	---	0.05	---	---	---	0.05	0.05
Nitrite as N	0.1	0.05	---	---	---	---	---	---	---	---	0.05	---	---	---	0.05	0.05
Aluminum	0.10-0.28	5.3	3.7	---	---	---	---	---	---	4.9	5.8	---	---	---	5.3	5.3
Arsenic	0.01-0.03	0.005	---	---	---	---	---	---	---	---	0.005	---	---	---	0.008	0.008
Barium	0.1	0.2	---	---	---	---	---	---	---	0.13	0.2	---	---	---	0.2	0.2
Boron	0.11-2.6	0.1	---	---	---	---	---	---	---	---	0.3	---	---	---	0.2	0.2
Cadmium	0.01	0.01	0.015	---	---	---	---	---	---	0.01	0.005	---	---	---	0.008	0.008
Chromium	0.01	0.02	0.24	---	---	---	---	---	---	0.03	0.02	---	---	---	0.008	0.008
Copper	0.01	0.02	0.01	---	---	---	---	---	---	---	0.010	---	---	---	0.005	0.005
Fluoride	ND-0.22	0.4	---	---	---	---	---	---	---	---	0.1	---	---	---	0.5	0.5
Iron	0.01-0.21	30.2	35.1	40.7	34	34	38	38	20	59	46	50	51	40	42	42
Lead	0.01	0.005	0.10	---	---	---	---	---	---	0.01	0.005	---	---	---	0.005	0.005
Manganese	0.01-0.03	0.78	0.82	---	---	---	---	---	---	---	1.03	---	---	---	1.2	1.2
Mercury	0.0001	0.0001	---	---	---	---	---	---	---	---	0.0001	---	---	---	0.0004	0.0004
Molybdenum	ND-0.08	0.005	0.03	---	---	---	---	---	---	0.05	0.006	---	---	---	0.005	0.005
Nickel	0.01	0.05	0.06	---	---	---	---	---	---	0.08	0.06	---	---	---	0.05	0.05
Selenium	ND-0.05	0.005	---	---	---	---	---	---	---	---	0.005	---	---	---	0.005	0.005
Vanadium	0.05-0.34	0.13	0.10	0.12	0.11	0.09	0.14	0.07	0.12	0.04	0.56	0.18	0.07	0.05	0.12	0.12
Zinc	0.1	0.07	0.04	---	---	---	---	---	---	0.04	0.045	---	---	---	0.057	0.057
Silica (SiO ₂)	---	---	99	---	---	---	---	---	---	91	---	---	---	---	65	65
Radiochemistry																
Uranium as U ₃₀	0.15-1.05	1.1	0.919	1.12	1.12	1.02	1.09	0.89	0.61	0.88	0.96	1.000	1.669	1.025	0.83	5.0
Radium - 226	160-686	500	786	998	---	---	---	1053	859	980	---	---	---	---	1200	1200
Thorium - 230	0.4-0.6	33	5.2	1.7	---	---	---	2.3	9.9	11	---	---	---	---	14	14

* Units in mg/l (ppm) except pH (std. units), conductivity (umhos/cm) and Ra-226, Th-230 (pCi/l).

** Same baseline range as RC-PI.

61/81

TABLE 3

KEND CREEK
Pattern 1
MONITOR WELL M-1

PARAMETER*	BASELINE RANGE	NH ₄ 8/10/81	CTH 6/10/81	NH ₄ 7/07/81	NH ₄ 8/25/81	NH ₄ 9/03/81	NH ₄ 10/06/81	NH ₄ 11/3/81	NH ₄ 12/2/81	CTH 1/27/82	Control Limit
Field											
pH	7.8-8.3	7.42	--	7.70	7.88	8.05	7.65	7.97	8.15	7.94	---
Conductivity	1220-1570	1831	--	1793	1849	1806	1760	1795	1600	1800	---
Major Constituents											
Bicarbonate	57-122		126	137	142	74	134	147	83	142	---
Carbonate	0-58	0	0	0	0	0	0	0	0	0	---
Alkalinity (CaCO ₃ eq)	67-100		103	112	116	61	110	120	68	116	---
Calcium	79-99	98	80	102	91.8	108	92	82	108	124	286
Chloride	13-21	18.4	11	25	11.3	16	20	15	14	17	10
Magnesium	13-22	22	19	19	23	21	20	17	20	21	20
Potassium	7.0-11.2	8.1	5.9	7.3	7.4	7.6	7.5	6.8	6.9	7.0	5.4
Sodium	201-208	308	250	259	242	251	244	268	278	190	250
Sulfate	486-776	766	732	731	671	713	671	774	751	723	1606
TDS	1006-1292	1300	1230	1460	1340	1440	1280	1220	1360	1320	2858
Anion/Cation			95							108	

Minor Constituents

Ammonia as N	0.01-0.18	--	0.2								0.2
Nitrate as N	0.10-0.24	--	0.05								0.05
Nitrite as N	0.1	--	0.05								0.05
Aluminum	0.10-0.18	0.07	--								0.5
Arsenic	0.01-0.03	0.001	0.005								0.005
Barium	0.1	--	0.2								0.2
Boron	0.10-0.26	--	0.1								0.1
Cadmium	0.01	0.001	0.01								0.01
Chromium	0.01	0.003	0.02								0.01
Copper	0.01	0.003	0.05								0.005
Fluoride	0.10-0.67	--	0.2								0.1
Iron	0.01-0.24	0.03	0.05	0.04		0.05	0.09	0.05	0.04		0.40
Lead	0.01	0.11	0.005								0.01
Manganese	0.01-0.07	0.07	0.05								0.005
Mercury	0.0001	--	0.0001								0.0001
Molybdenum	0.01	0.18	0.005								0.008
Nickel	0.01	0.05	0.05								0.03
Selenium	0.01-0.02	--	0.005								0.005
Vanadium	0.05-0.17	0.42	0.048	0.03	0.08	0.01	0.05	0.01	0.04		0.01
Zinc	0.1	0.004	0.32								0.006
Silica SiO ₂		10.9	--							10.7	---

Radiochemistry

Uranium as U	0.023-0.102	0.055	0.043	0.064	0.010	0.071	0.041	0.020	0.050	0.020	1.1
Radium-226	3 8 109-398	310							254	360	
Thorium-230	0.6-1.0	0.1							1.0	0.1	

* Units expressed in mg/l (ppm) except conductivity (umhos/cm) and radionuclides (pCi/l).

**Balled Sample

***Airlifted Sample

28/16

TABLE 3

PARAMETER*	BASELINE RANGE	NHL 2/26/82	NHL 3/15/82	NHL 4/20/82	NHL 5/19/82	NHL 6/16/82	NHL 6/16/82	CDM 6/16/82	CDM 6/16/82	Control Limit
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Field

pH	7.8-8.3	8.20	7.9	7.9	7.8**	8.1**	8.2***	7.9**	7.9***	
Conductivity	1220-1570	1800	1530	1600	1760	1825	1800	1800	1700	

Major Constituents

Bicarbonate	57-122	148	179	165	137	131	146	120	130	
Carbonate	0-68	0	0	0	0	0	0	0	0	
Alkalinity (CaCO ₃ eq)	47-100	121	147	135	112	107	120	100	110	
Calcium	79-99	133	130	135	109	115	102	98	95	286
Chloride	14-21	18	18	18	20	16	16	11	11	
Magnesium	13-22	19	18	19	20	20	20	20	20	
Potassium	7.0-11.2	8.1	6.3	6.5	6.8	6.4	6.5	4.8	5.1	
Sodium	201-208	265	273	270	259	264	264	230	230	
Sulfate	486-776	753	802	810	798	887	725	700	660	1606
TDS	1006-1292	1240	1335	1340	1280	1400	1240	1200	1100	2858
Anion/Cation		103	100	100	96	98	105	99	102	

Minor Constituents

Ammonia as N	0.01-0.18							0.2	0.2	
Nitrate as N	0.10-0.24							0.05	0.05	
Nitrite as N	0.1							0.05	0.05	
Aluminum	0.10-0.18							0.9	3.3	
Arsenic	0.01-0.03							0.009	0.007	
Barium	0.1							0.2	0.2	
Boron	0.10-0.26							0.1	0.1	
Cadmium	0.01							0.005	0.005	
Chromium	0.01							0.013	0.008	
Copper	0.01							0.009	0.008	
Fluoride	0.10-0.67							0.2	0.2	
Iron	0.01-0.24	0.01	0.14	0.08	0.33	0.87	1.97	0.75	2.4	
Lead	0.01							0.11	0.025	
Manganese	0.01-0.07							0.070	0.080	
Mercury	0.0001							0.0003	0.0002	
Molybdenum	0.01							0.008	0.009	
Nickel	0.01							0.03	0.03	
Selenium	0.01-0.02							0.005	0.005	
Vanadium	0.05-0.17	0.01	0.01	0.05	0.065	0.03	0.03	0.037	0.043	
Zinc								0.15	0.062	
Silica (SiO ₂)								15	11	

Radiochemistry

Uranium as U ²³⁸	0.023-0.102	0.062	0.056	0.43	0.014	0.012	0.025	0.03	0.056	1.1
Radium-226	3 R 109-308							140	300	
Thorium-230	0.6-1.0							3.9	12	

TABLE 4

RINO CREEK
Pattern 1
MINI-ME M-2

PARAMETER*	BASELINE RANGE	NH/L 6/17/81	NH/L 7/07/81	NH/L 8/14/81	NH/L 9/02/81	NH/L 10/06/81	NH/L 11/03/81	NH/L 12/02/81	NH/L 1/25/82	CDM 1/25/82	NH/L 2/06/82	NH/L 3/15/82	NH/L 4/20/82	NH/L 5/19/82	NH/L 6/10/82	CDM 6/10/82	Control Limit
pH	7.9-8.2	8.15	7.96	7.92	7.95	7.89	7.98	8.25	8.02	---	8.10	8.0	8.0	7.9	7.8	8.0	
Conductivity	1250-1760	1585	1895	1848	1824	1800	1860	900	1825	---	1800	1620	1640	1780	1820	1800	
Major Constituents																	
Bicarbonate	56-121	96	105	88	84	103	101	51	107	85	113	113	112	105	104	95	
Carbonate	0-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Alkalinity (CaCO ₃ eq)	46-99	86	86	72	69	84	83	42	88	70	93	93	92	86	85	78	
Calcium	88-119	84	116	106	106	118	86	114	129	100	133	130	125	109	104	98	278
Chloride	6-22	16	14	13	11	15	13	13	14	8	16	18	18	17	16	7	
Magnesium	15-28	22	22	19	21	22	18	23	21	21	19	19	20	21	22	20	
Potassium	7.0-11.3	8.5	7.5	7.3	7.6	7.8	6.8	7.2	7.3	5.4	8.3	6.8	6.9	7.0	6.5	4.8	
Sodium	220-290	336	278	308	251	250	264	266	202	250	254	268	258	249	283	230	
Sulfate	640-860	791	740	734	736	718	831	742	749	780	784	743	760	763	751	710	1644
TDS	1103-1192	1440	1380	1340	1440	1340	1320	1300	1305	1212	1280	1300	1280	1240	1240	1200	2744
Anion/Cation		95							102	99	102	105	103	102	105	101	

Minor Constituents

Ammonia as N	0.10-0.85	0.2							---	0.2						0.2	
Nitrate as N	0.10-0.26	0.05							---	0.05						0.05	
Nitrite as N	0.1	0.05							---	0.05						0.05	
Aluminum	0.10-0.49	0.01							0.01	0.5						0.5	
Arsenic	0.01-0.03	0.001							---	0.005						0.015	
Barium	0.1	0.2							0.01	0.2						0.2	
Boron	0.10-1.49	0.1							---	0.1						0.1	
Cadmium	0.01	0.01							0.01	0.005						0.005	
Chromium	0.01	0.01							0.03	0.01						0.005	
Copper	0.01	0.01							---	0.005						0.005	
Fluoride	0.10-0.57	0.2							0.10	0.1						0.2	
Iron	0.01-0.17	0.06							0.15	0.10						0.02	
Lead	0.01	0.05							0.01	0.005						0.005	
Manganese	0.01-0.09	0.04							0.56	0.060						0.05	
Mercury	0.0001	0.0001							---	0.0001						0.0003	
Molybdenum	MD-0.05	0.15							0.06	0.006						0.008	
Nickel	0.01	0.01							0.03	0.03						0.02	
Selenium	0.01-0.02	0.005							---	0.005						0.005	
Vanadium	0.05-0.17	0.07							0.01	0.014						0.005	
Zinc	0.1	0.01							0.01	0.010						0.005	
Silica SiO ₂		0.02							10.2	---						12	

Radiochemistry

Uranium as U ₃₀	0.007-0.027	0.069	0.008	0.175	0.015	0.010	0.045	0.005	0.018	0.029	0.044	0.033	0.034	0.032	0.016	0.015	1.027
Radium-226	3.8	11.7-23.9	25					22	19	19						20	
Thorium-230	0.6-2.6	-0.2						0.0	0.0	0.0						0.7	

* Units expressed in mg/l (ppm) except conductivity (umhos/cm) and radionuclides (pCi/l).

**Railed Sample

***Air-lifted Sample

28/15

BEING CREEK
Pattern I
MONITOR WELL M-3

TABLE 5

PARAMETER*	RANGE	NMCL 6/17/81	NMCL 7/9/81	NMCL 8/25/81	NMCL 9/9/81	NMCL 10/6/81	NMCL 11/3/81	NMCL 12/2/81	NMCL 1/25/82	CDM 1/25/82	Control Limit
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Field

pH
Conductivity

Major Constituents

Bicarbonate Carbonate	48-102 0-32	8.95 1941	8.58 1869	8.39 2244	8.51 1972	8.67 1750	8.66 1900	8.69 900	9.09 1875	---	---
Alkalinity (CaCO ₃ eq)	39-84										
Calcium	88-113	120	80	72	81	77	92	48	69	31	286
Chloride	10-19	16	14	11.3	11	15	14	13	15	8	
Magnesium	17-29	21	20	23	18	21	18	21	16	15	
Potassium	8-14	9.2	8.0	8.6	8.4	9.1	7.2	7.8	8.2	6.2	
Sulfate	220-272	324	283	272	270	268	283	286	235	260	1657
Fluoride	625-821	778	824	811	863	775	852	808	743	810	3104
TDS	1063-1466	1380	1440	1420	1480	1500	1380	1460	1340	1260	
Anion/Cation		98								99	

Minor Constituents

Ammonia as N	ND-0.74	---	0.2							0.2	
Nitrate as N	ND-0.5	---	0.05							0.05	
Nitrite as N	0.1	---	0.05							0.05	
Aluminum	0.1-0.6	0.01							0.06	0.5	
Arsenic	0.01-0.02	0.002	0.005						---	0.005	
Barium	0.1	---	0.02						0.79	0.2	
Boron	0.10-0.36	---	0.1						---	0.1	
Cadmium	0.01	0.01	0.01						0.01	0.005	
Chromium	0.01	0.02	0.02						0.02	0.01	
Copper	0.01	0.01	0.05						---	0.005	
Fluoride	0.10-0.23	---	0.2						0.1	0.1	
Iron	0.10-0.13	0.29	0.07						0.13	0.64	
Lead	0.01	0.05	0.005						0.01	0.005	
Manganese	0.01-0.02	0.02	0.05						0.11	0.03	
Mercury	0.0001	---	0.0001						---	0.0001	
Molybdenum	ND-0.09	0.06	0.005						0.08	0.006	
Nickel	0.01	0.01	0.05						0.02	0.03	
Selenium	0.01-0.02	---	0.005						---	0.005	
Vanadium	0.05-0.14	0.03	0.058						0.01	0.017	
Zinc	0.1	0.01	0.01						0.01	0.006	
Silica SiO ₂									7.7	---	

Radiochemistry

Uranium as U ₃₀	0.205-0.750	0.142	0.11	0.128	0.119	0.096	0.114	0.096	0.119	0.138	0.235	1.75
Radium-226	3 8 67-207	95							140	73		
Thorium-230	0.6-0.9	0.2							0.9	0.2		

* Units expressed in mg/l (ppm) except conductivity (umhos/cm) and radionuclides (pCi/l).

***Airlifted Sample

28/11

TABLE 5

PARAMETER*	RANGE	NHML 2/26/82	NHML 3/15/82	NHML 4/20/82	NHML 5/19/82	NHML 6/04/82	NHML 6/04/82	CDM 6/04/82	CDM 6/04/82	Control Limit
Field										
pH	8.2-10.8	8.76	11.3**	11.3	11.3**	10.6**	8.3***	8.8**	8.1***	8.6
Conductivity	1300-2000	1900	1950	1950	1990	1775	1950	1700	1900	1650
Major Constituents										
Bicarbonate	68-102	31	27 (OH)	30 (OH)	37 (OH)	87	98	47	80	70
Carbonate	0-32	9	119	150	167	Trace	0	9	0	8
Alkalinity (CaCO ₃ eq)	79-86	41						54	66	77
Calcium	88-113	119	112	115	143	140	133	130	120	115
Chloride	10-19	16	16	17	16	0.8	14	9	8	15
Magnesium	17-29	19	14	6	0.5	21	24	15	22	15
Potassium	8-16	7.9	6.7	7.2	8.7	8.3	7.6	6.6	5.9	7.7
Sodium	220-272	240	252	245	245	273	277	210	220	282
Sulfate	625-821	794	817	808	740	986	1015	790	805	875
TDS	1063-1466	1240	1240	1290	1100	1400	1440	1200	1200	1657
Anion/Cation		101	89	87	92	97	95	96	96	3104

Minor Constituents

Ammonia as N	ND-0.74							2.6	0.3	
Nitrate as N	ND-0.5							0.05	0.05	
Nitrite as N	0.1							0.05	0.05	
Aluminum	0.1-0.6							1.1	2.4	
Arsenic	0.01-0.02							0.01	0.01	
Barium	0.1							0.2	0.2	
Boron	0.10-0.36							0.1	0.1	
Cadmium	0.01							0.005	0.005	
Chromium	0.01							0.11	0.027	
Copper	0.01							0.011	0.005	
Fluoride	0.10-0.23							0.2	0.2	
Iron	0.10-0.13							1.1	1.3	
Lead	0.01							0.12	0.005	
Manganese	0.01-0.02							0.060	0.030	
Mercury	0.0001							0.0002	0.0002	
Molybdenum	ND-0.09							0.011	0.010	
Nickel	0.01							0.03	0.03	
Selenium	0.01-0.02							0.005	0.005	
Vanadium	0.05-0.14							0.056	0.040	
Zinc	0.1							0.35	0.054	
Silica (SiO ₂)								11	10	

Radiochemistry

Uranium as U ₃ O ₈	0.205-0.750	0.148	0.034	0.041	0.037	0.226	0.312	0.18	0.30	1.75
Radium-226	1.8							98	180	0.145
Thorium-230	0.6-0.9							5.1	5.0	

DEMO CREEK
Pattern I
MONITOR WELL M-4

TABLE 6

PARAMETER*	BASELINE RANGE	NHL 6/10/81	CDM 6/10/81	NHL 7/07/81	NHL 8/25/81	NHL 9/04/81	NHL 10/6/81	NHL 11/3/81	NHL 12/2/81	NHL 1/27/82	CDM 1/27/82	Control Limit
Field												
pH	7.8-9.0	11.48**	--	11.51**	11.30**	11.58**	11.53**	11.59**	11.92**	12.23**	----	
Conductivity	1220-1650	2989	--	1981	2989	2609	2500	2400	2400	2500	----	
%												
Major Constituents												
Bicarbonate	33-102		0	0	45	0	0	98	38	0	0	
Carbonate	0-65		397	300	364	--	417	260	619	494	45	
Alkalinity	27-84		7	500	644	--	695	514	1063	823	562	
(CaCO ₃ eq)												304
Calcium	90-117	149	150	180	177	184	155	136	181	251	180	
Chloride	8-17	42	8	32	1357	113	11	30	37	49	6	
Magnesium	19-29	6	1.6	1.6	1.0	2.5	1.0	1.2	1.0	0.4	0.6	
Potassium	8.0-12.9	16.3	14.0	13.2	15.9	13.0	15.6	13.0	11.7	18.0	12	
Sodium	200-278	297	240	281	247	259	260	279	322	194	220	
Sulfate	670-953	681	635	684	531	663	627	644	669	400	310	1783
TDS	970-1452	1280	1250	1440	1300	1200	1620	1260	1180	1260	1080	3096
Anton/Dutton			98									

6.155

8.1
1650

78
0
80

164
13
2.2
4.5
3.12
9.27
14.78
44

0.05

<0.01

1.20
76

Minor Constituents

Ammonia as N	0.01-0.85	2.5										44
Nitrate as N	0.1-0.8	--	0.05									0.05
Nitrite as N	0.1	--	0.05									0.24
Aluminum	0.1-0.2	0.20	--									0.16
Arsenic	ND-0.01	0.001	0.005									0.0005
Barium	0.1	--	0.2									0.54
Boron	90-117	--	0.1									9.1
Cadmium	0.01	0.01	0.01									0.01
Chromium	0.01	0.02	0.02									0.03
Copper	0.01	0.01	0.05									0.020
Fluoride	0.10-0.14	--	0.2									0.2
Iron	0.10-0.36	0.72	0.29	0.19	0.38	0.45	0.24	0.22	0.14	0.38	1.4	0.069
Lead	0.01	0.04	0.06							0.01	0.030	0.0001
Manganese	0.01-0.04	0.02	0.05									0.05
Mercury	0.0001	--	0.0002									0.03
Molybdenum	ND-0.10	0.04	0.012									0.005
Nickel	0.01	0.05	0.05									0.005
Selenium	0.01-0.02	--	0.005									0.01
Silver	ND-0.05	0.39	0.053	0.03	0.07	0.06	0.08	0.01	0.01	0.01	0.005	0.03
Zinc	0.01	0.03	0.04							0.03	0.058	---
Silica (SiO ₂)		3.4								3.8		

Radiochemistry

Uranium as U ²³⁸	0.27-0.55	0.047	0.009	0.044	0.016	0.015	0.007	0.006	0.016	0.005	0.018	155
Radium-226	38 40-136		12						13		6.9	
Thorium-230	0.6-0.9		0.1						0.0		0.2	

* Units expressed in mg/l (ppm) except conductivity (umhos/cm) and radionuclides (pCi/l).

**Billed Sample

28/12

***Atrified Sample

Calcium	90-117	197	203	217	227	15	7	8
Chloride	8-17	18	16	16	25	15	23	23
Magnesium	19-29	0.7	2.3	1.2	0.5	26	23	5.9
Potassium	8.0-12.9	13.0	7.9	11.8	0.5	7.7	6.6	240
Sodium	200-278	265	269	272	268	306	210	780
Sulfate	670-953	850	708	633	722	984	1050	1300
TDS	970-1652	1260	1160	1280	1320	1420	1200	1783
Anion/Cation	93	92	125	101	98	100	99	3096

Minor Constituents

Ammonia as N	0.01-0.85	0.8	0.4
Nitrate as N	0.1-0.8	0.05	0.05
Nitrate as N	0.1	0.05	0.05
Aluminum	0.1-0.2	4.5	1.5
Arsenic	ND-0.01	0.009	0.009
Barium	0.1	0.2	0.2
Boron	90-117	0.1	0.1
Cadmium	0.01	0.005	0.005
Chromium	0.01	0.031	0.009
Copper	0.01	0.025	0.005
Fluoride	0.01-0.14	0.2	0.2
Iron	0.10-0.34	4.0	0.80
Lead	0.01	0.19	0.023
Manganese	0.01-0.04	0.090	0.080
Mercury	0.0001	0.0002	0.0001
Molybdenum	ND-0.10	0.015	0.009
Nickel	0.01	0.04	0.02
Selenium	0.01-0.02	0.005	0.005
Vanadium	ND-0.05	0.005	0.005
Zinc	0.01	0.23	0.040
Silica (SiO ₂)		8	10

Radiochemistry

Uranium as U ²³⁸	0.27-0.55	0.052	0.060	0.026	1.093	0.377	1.179	0.31	1.2	1.55
Radium-226	3.8	40-136						50	22	
Thorium-230	0.6-0.9							9.0	3.3	

TABLE 7

PARAMETER*	RANGE	BASELINE	NHCL	CMH	NHCL	NHCL	NHCL	NHCL	NHCL	NHCL	CMH	Control Limit
		6/10/81	7/07/81	8/25/81	9/03/81	10/6/81	11/3/81	12/2/81	1/25/82			

Field

pH	11.7-11.2	11.20										
Conductivity	1840-2720	2128	11.67	2075	11.44	11.05	11.2	11.3	11.2	11.1	2000	

Major Constituents

Bicarbonate	0	0	0	0	0	0	45	Fr	0	0		
Carbonate	58-145	380	430	458	478	475	466	480	282	82		
Alkalinity (CaCO ₃ eq)	236-589	633	717	763	797	792	814	815	470	374		207
Calcium	114-150	74	142	109	115	120	79	105	136	98		
Chloride	13-66	29	51	34	18	35	56	43	48	19		
Magnesium	6-20	1.0	1.0	1.1	1.5	1.5	0.2	0.5	0.2	0.2		
Potassium	16-29	9.7	7.9	8.4	8.3	8	7.7	8.0	5.3	5.4		
Sodium	203-245	164	148	116	129	120	110	120	117	100		
Sulfate	25-99	27.9	46	18	47	31	26	35	12	7		137
TDS	1118-1370	660	600	600	840	720	540	620	560	472		994
Anion/Cation												

Minor Constituents

Ammonia as N	ND-0.15	--	3.5									4.8
Nitrate as N	ND-0.2	--	0.05									0.05
Nitrite as N	0.1	--	0.05									0.05
Aluminum	0.78-1.03	14.9		9.6					0.06	4.2		0.007
Arsenic	ND-0.01	0.003										0.1
Barium	0.1	--	0.2						0.69	0.2		0.01
Boron	0.04-1.08	--	0.1									0.005
Cadmium	0.01	0.01	0.01						0.03	0.01		0.01
Chromium	0.01	0.05	0.02									0.010
Copper	0.01	0.08	0.06									0.7
Fluoride	0.29-0.40	--	0.5						0.7	0.1		0.43
Iron	0.03-3.0	0.25	0.28	0.12	0.16	0.05	0.08	0.06	0.01	0.026		1.11
Lead	0.1	0.07	0.032									0.0001
Manganese	ND-0.12	0.02	0.05									0.005
Mercury	0.0001	--	0.0002									0.02
Molybdenum	0.01	0.02	0.05						0.22	0.005		0.005
Nickel	0.01	0.08	0.019						0.02	0.02		0.005
Selenium	ND-0.04	--	0.009									0.23
Vanadium	ND-0.10	0.61	0.55	0.10	0.30	0.09	0.05	0.10	0.02	0.019		10.7
Zinc	0.1	0.31	0.05									
Silica (SiO ₂)		6.9										

Radiochemistry

Uranium as U	0.001-0.003	0.096	0.11	0.040	0.026	0.017	0.021	0.005	0.005	0.015	0.027	1.022
Radium-226	3.8	36									20	
Thorium-230	2.1-27.8	3.7									2.7	

* Units expressed in mg/l (ppm) except conductivity (umhos/cm) and radionuclides (pCi/l).

Billed Sample *Air-lifted Sample

TABLE 7

PARAMETER*	NHL 2/26/82	NHL 3/15/82	NHL 4/20/82	NHL 5/19/82	NHL 6/08/82	NHL 6/08/82	CDM 6/11/82	CDM 6/11/82	Control Limit
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Fluid

pH	11.7-12.2	11.9	12.0	12.2	11.7	11.6**	10.0***	11.5**	10.1***
Conductivity	1840-2700	1950	1800	1900	1975	1075	450	860	400

Major Constituents

Bicarbonate	0	117(OH)	137(OH)	119(OH)	64 (OH)	233	0	81	
Carbonate	58-145	536	500	533	480	278	83	64	67
Alkalinity (CaCO ₃ eq)	236-589	1113	1028	1117	998	570	329	260	180
Calcium	114-150	54	84	118	94	109	12	85	13
Chloride	13-66	28	56	29	33	50	26	20	21
Magnesium	6-20	3.9	0.8	0.6	0.5	0.2	0.1	0.5	0.5
Potassium	16-29	5.6	5.9	8.5	4.5	6.5	4.4	5.2	3.4
Sodium	203-245	134	95	115	117	118	97	93	77
Sulfate	25-99	9	21	19	17	18	12	8	4
TDS	1118-1370	735	760	580	620	580	350	270	220
Anion/Cation								96	98

Minor Constituents

Ammonia as N	ND-0.15							4.4	1.2
Nitrate as N	ND-0.2							0.05	0.05
Nitrite as N	0.1							0.05	0.05
Aluminum	0.78-1.03							3.5	1.1
Arsenic	ND-0.01							0.010	0.011
Boron	0.1							0.2	0.2
Cadmium	0.04-1.08							0.1	0.1
Cadmium	0.01							0.005	0.005
Chromium	0.01							0.011	0.005
Copper	0.01							0.006	0.005
Fluoride	0.29-0.40							0.4	0.6
Iron	0.03-3.0	1.74	0.61	1.69	1.27	0.31	0.11	0.34	0.17
Lead	0.1							0.043	0.005
Manganese	ND-0.12							0.008	0.005
Mercury	0.0001							0.0001	0.0001
Molybdenum	0.01							0.010	0.009
Nickel	0.01							0.03	0.02
Selenium	ND-0.04							0.005	0.005
Vanadium	ND-0.10	0.01	0.70	0.09	0.03	0.12	0.04	0.14	0.005
Zinc	0.1							0.11	0.16
Silica (SiO ₂)								14	12

Radiochemistry

Uranium as U ²³⁸	0.001-0.003	0.019	0.075	0.028	0.023	0.004	0.041	0.009	0.007
Radium-226	2.1-27.8							26	4.8
Thorium-230	0.6-2.1							0.8	0.4

TABLE 8

PARAMETER*	RANGE	BASELINE	NHCL	CDM	NHCL	NHCL	NHCL	NHCL	NHCL	NHCL	CDM	Control Limit
			5/10/81	6/10/81	7/01/81	8/25/81	9/04/81	10/6/81	11/3/81	12/2/81	1/25/82	

Field

pH	7.0-8.7	7.77**	7.77**	7.77**	7.77**	7.77**	7.77**	7.77**	7.77**	7.77**	7.77**	---
Conductivity	300-430	671	671	671	671	671	671	671	671	671	671	---

Major Constituents

Bicarbonate	59-297	398	398	398	398	398	398	398	398	398	398	398
Carbonate	0-129	0	0	0	0	0	0	0	0	0	0	0
Alkalinity (CaCO ₃ eq)	85-258	326	316	236	275	279	287	279	343	327	327	327
Calcium	10-20	26	31	31	29	30	28	32	49	36	36	32
Chloride	17-36	27	24	23	27	25	26	26	23	22	22	22
Magnesium	2.7-9.0	6	5.1	39	5.4	6	7	5	7	6.6	6.6	6.6
Potassium	6-13	5.8	3.6	4.5	5.1	5	5	5	7.4	3.6	3.6	3.6
Sodium	95-110	172	130	173	126	140	135	142	138	130	130	130
Sulfate	11-25	7.9	8.3	10	9.7	12	11	11	8	58	58	137
TDS	320-364	400	440	440	440	450	460	440	520	420	420	987
Anion/Cation		102										97

Minor Constituents

Ammonia as N	ND-0.19	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nitrate as N	ND-0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Nitrite as N	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Aluminum	ND-1.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Arsenic	0.01-0.03	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Barium	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Boron	1.14-1.25	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chromium	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Copper	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fluoride	0.95-1.00	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Iron	ND-3.0	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Lead	0.1	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Manganese	0.01-1.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Mercury	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Molybdenum	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Nickel	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Selenium	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Vanadium	ND-0.07	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Zinc	0.1	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Silica (SiO ₂)		9.7										

Radiochemistry

Uranium as U ₃ O ₈	ND-0.014	0.035	0.001	0.049	0.005	0.012	0.009	0.010	0.008	0.005	0.004	1.029
Radium-226	3.3-31.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.6
Thorium-230	0.6-2.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.3

* Units expressed in mg/l (ppm) except conductivity (umhos/cm) and radionuclides (pCi/l).

**Billed Sample

***Airlifted Sample

28/13

(CaO) 3 #/1	10-20	134	146	96	39	43	31	34	32
Calcium	93	121	129	130		12	21	22	
Chloride	17-36	3.7	2.8	4.4		7.7	6.5	7.0	
Magnesium	2.7-4.0	5.1	5.4	7.0		4.9	3.7	4.0	
Potassium	6-13	113	122	81	143	136	115	99	
Sodium	95-110	10	15	15	13	12	6	6	137
Sulfate	11-25	380	360	400	400	420	420	370	987
MS	320-366	103	119	87	101	108	90	94	
Anton/Cation									

Minor Constituents

Ammonia as N	ND-0.19	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nitrate as N	ND-0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Nitrite as N	0.1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Aluminum	ND-1.45	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Arsenic	0.01-0.03	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Barium	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Boron	1.14-1.25	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Cadmium	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Chromium	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Copper	0.01	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Fluoride	0.95-1.00	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Iron	ND-3.0	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Lead	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Manganese	0.01-1.10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Mercury	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Molybdenum	0.01	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
Nickel	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Selenium	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Vanadium	ND-0.07	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Zinc	0.1	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Silica (SiO ₂)		12	12	12	12	12	12	12	12

Radiochemistry

Uranium as U ²³⁸	ND-0.014	0.149	0.017	0.043	0.044	0.022	0.016	0.006	1.029
Radium-226	3.3-31.2						3.1	6.0	
Thorium-230	0.6-2.3						1.3	2.6	