SOUTHERN UTAH FUEL COMPANY
ACT/041/002
CONVULSION CANYON MINE

ANNUAL REPORT

1988

FOR

DIVISION OF OIL, GAS, & MINING

Southern Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box P • Salina, Utah 84654 • (801) 529-7428
Mine: (801) 637-4880

KEN PAYNE
Vice President &
General Manager

March 27, 1988

RECEIVED
MAR 30 1989
DIVISION OF
OIL, GAS & MINING

Mr. Lowell P. Braxton, Administrator
Mineral Resource Development & Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Dear Mr. Braxton:

RE: ANNUAL REPORT FOR 1988 - SUFCO MINE

The attached annual reports are submitted in compliance with the requirements of UMC 784. These reports include all pertinent data obtained during 1988.

As an ongoing underground operation, Southern Utah Fuel Company has not yet initiated a reclamation phase of the overall mining project. Consequently, there were no Vegetation Data collected or Revegetation Success Monitoring accomplished during 1988.

Sincerely,
SOUTHERN UTAH FUEL COMPANY

Ken Payne
V.P. & General Manager

KAF:jmm

Attachments

xc: Keith Welch

COAL MINING AND RECLAMATION OPERATIONS FOR 1988
(Authority UMC 784)

(Must be submitted to the Division by March 31, 1989)

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
3 Triad Centter, Suite 350
355 West North Temple
Salt Lake City, Utah 84180-1203

(801) 538-5340

RECEIVED
MAR 30 1989
DIVISION OF
OIL, GAS & MINING

Operator: SOUTHERN UTAH FUEL COMPANY

Mine Name: MINE Nº 1

Mailing Address: PO BOX P, SALINA, UT 84654

Company Representative: KEN PAYNE

Permit Number: ACT/041/002

Date of Most Recent Permanent Program Permit: AUGUST 26, 1988

Quantity of Coal Mined (tonnage) 1988: 2,625,424

Attach Updated Mine Sequence Map.

All monitoring activities during the report period must be submitted with this report (including, but not limited to):

A. Summarized Water Monitoring Data

B. Precipitation or Other Climatological Data

C. Subsidence Monitoring Report

D. Vegetation Data (test plots) or Revegetation Success Monitoring (includes interim and final)

E. Permit Stipulation Status

djh
AT57

SOUTHERN UTAH FUEL COMPANY

WATER MONITORING DATA

FOR

1988 ANNUAL REPORT

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 001

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	1	28	17.0	6.77	18
FLOW (CFS)	0.005	0.02	0.01	0.00	18
WATER TEMPERATURE (C)	5	14	6.6	1.96	18
SPEC. COND. (UMHOS/CM) FIELD	340	921	483.4	122.69	18
PH (SU) FIELD	6.6	8	7.4	0.35	18
TURBIDITY (NTU) FIELD	0.05	35.48	4.94	8.34	18
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	220	596	292.9	83.02	18
COMMON IONS					
CALCIUM (CA)	46	108	61.3	16.58	18
MAGNESIUM (MG)	0.96	64.3	20.1	12.54	18
SODIUM (NA)	9	80	19.5	17.54	18
POTASSIUM (K)	0.3	5.1	2.7	2.30	4
ACIDITY AS CACO3	0.01	44	10.99	10.74	18
ALKALINITY AS CACO3 (LAB)	166	260	198.3	25.80	18
BICARBONATE (HCO3) (LAB)	185.4	312	236.5	29.31	18
HARDNESS (CACO3) TOTAL	196	396	238.6	48.93	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	0.1	0.03	0.04	16
SULFATE (SO4)	20	202	40.9	43.97	18
CHLORIDE (CL)	1	60.4	20.8	12.14	18
NUTRIENTS					
NITRATE (NO3-N)	0.02	0.99	0.41	0.21	18
TOTAL PHOSPHATE (PO4)	0.03	0.72	0.12	0.16	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.03	0.08	0.06	0.01	18
BORON (B) TOTAL	0.02	0.23	0.073	0.05	17
IRON (FE) TOTAL	0.01	1.13	0.13	0.25	18
IRON (FE) DISS	0.009	0.2	0.024	0.04	18
MANGANESE (MN) TOTAL	0.002	0.03	0.012	0.01	18
MANGANESE (MN) DISS	0.001	0.01	0.009	0.00	18

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 001

STATION LOCATION - EAST SPRING

SAMPLE DATE	06/21/83	08/16/83	10/12/83	06/21/84	08/09/84	10/11/84	06/13/85	08/14/85	10/22/85	06/04/86	08/13/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	21	16	9	19	28	7	21	23	1	14	18
FLOW (CFS)	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
WATER TEMPERATURE (C)	6	14	9	7	7	6	6	6	6	5.5	6
SPEC. COND. (UMHOS/CM) FIELD	420	430	340	390	450	360	921	432	455	461	438
PH (SU) FIELD	7.3	7.1	7.1	7.2	7.25	7.35	6.8	7.5	7.45	7.55	7.5
TURBIDITY (NTU) FIELD	2.7	0.8	7	10.2	2.4	0.27	1.2	5	35.48	0.84	0.05
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	238	260	220	250	290	286	596	280	266	242	220
COMMON IONS											
CALCIUM (CA)	50.4	49.6	48	64.4	60	46	49.6	51.2	60	49.6	57.6
MAGNESIUM (MG)	21.12	23.04	18.24	10.8	19.2	32.4	64.3	18.5	13.2	23	17.3
SODIUM (NA)	12	11.5	9	14	40	10.7	80	45	10.7	11.81	13.51
POTASSIUM (K)			0.3	0.5			5.1	4.9			
ACIDITY AS CACO3	3.5	13	14	44	15	14	7.6	18.9	13.7	<0.01	2.5
ALKALINITY AS CACO3 (LAB)	186	204	166	190	210	168	256	180	260	193	190
BICARBONATE (HCO3) (LAB)	227	249	202.5	231.8	256.2	205	312	219.6	268.4	235	231.8
HARDNESS (CACO3) TOTAL	214	220	196	206	230	250	396	205	205	220	216
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
SULFATE (SO4)	28	32	28	25	26	27	202	27	20	29	22
CHLORIDE (CL)	28	22	14	18.4	18.2	16	60.4	21.6	19.9	23	20.1
NUTRIENTS											
NITRATE (NO3-N)	<0.02	0.38	0.39	0.19	0.43	0.99	0.09	0.41	0.44	0.39	0.38
TOTAL PHOSPHATE (PO4)	0.16	0.09	0.07	0.05	0.12	0.72	0.18	0.05	0.03	0.24	0.03
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.07	0.06	0.071	0.06	0.06	0.05	0.03	0.05	0.07	0.06	0.07
BORON (B) TOTAL	0.03	0.03	0.024	0.021	0.053	0.09		0.05	0.23	0.038	0.088
IRON (FE) TOTAL	0.01	0.01	0.01	0.04	0.16	0.2	1.13	0.06	0.28	0.02	0.11
IRON (FE) DISS	0.01	0.01	0.009	0.01	<0.01	0.02	<0.01	<0.01	0.2	<0.01	<0.01
MANGANESE (MN) TOTAL	0.003	0.002	0.015	0.02	<0.01	0.01	0.03	<0.02	0.02	<0.01	<0.01
MANGANESE (MN) DISS	0.002	0.001	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCD - 001

STATION LOCATION - EAST SPRING

SAMPLE DATE	10/09/86	06/18/87	08/05/87	10/28/87	06/07/88	08/09/88	10/05/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)	10	17	22	13	22	26	19
FLOW (CFS)	0.01	0.01	0.01	0.01	0.006	0.005	0.0056
WATER TEMPERATURE (C)	6	6	6.5	5	5.5	6	6
SPEC. COND. (UMHOS/CM) FIELD	467	489	570	450	556	513	560
PH (SU) FIELD	8	7.6	7.8	7.9	7	7.40	6.6
TURBIDITY (NTU) FIELD	0.17	2.43	0.72	14.8	1.85	0.12	2.8
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.	268	270	302	280	286	328	390
COMMON IONS							
CALCIUM (CA)	52.8	72	51.9	59.6	76	96.00	108.00
MAGNESIUM (MG)	20.2	9.6	19.38	21.93	12	0.96	16.80
SODIUM (NA)	9.2	12.76	13.52	14.29	14.48	15.08	13.66
POTASSIUM (K)							
ACIDITY AS CACO3	2.5	4	6	<0.01	<0.01	26.00	13.00
ALKALINITY AS CACO3 (LAB)	192	190	178	194	190	188	235
BICARBONATE (HCO3) (LAB)	185.4	233	217	236	232	229	287
HARDNESS (CACO3) TOTAL	216	220	236	240	240	244	340
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
CARBONATE AS CO3		<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
SULFATE (SO4)	23	25	25	42	21	22	112
CHLORIDE (CL)	1	23	26.1	25.4	25.8	2.0	10.0
NUTRIENTS							
NITRATE (NO3-N)	0.41	0.52	0.46	0.74	0.37	0.50	0.33
TOTAL PHOSPHATE (PO4)	0.12	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TRACE ELEMENTS							
BARIUM (BA) TOTAL	0.07	0.06	0.06	0.08	0.06	0.08	0.07
BORON (B) TOTAL	0.05	0.09	0.13	0.06	0.15	0.09	0.020
IRON (FE) TOTAL	0.04	0.02	0.03	0.1	0.07	<0.03	<0.03
IRON (FE) DISS	<0.01	<0.01	<0.01	<0.01	<0.03	<0.03	<0.03
MANGANESE (MN) TOTAL	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MANGANESE (MN) DISS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 006

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	4	26	18.8	5.82	18
FLOW (CFS)	0.21	2.08	0.90	0.57	16
WATER TEMPERATURE (C)	1	18	12.6	5.07	18
SPEC. COND. (UMHOS/CM) FIELD	490	1300	720.6	154.61	18
PH (SU) FIELD	7.1	8.4	8.0	0.32	18
TURBIDITY (NTU) FIELD	20.97	640	86.44	143.12	17
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	316	850	459.7	112.86	18
COMMON IONS					
CALCIUM (CA)	50.4	156	75.4	27.03	18
MAGNESIUM (MG)	0.1	108	32.1	22.67	18
SODIUM (NA)	29.69	80	47.61	12.95	18
POTASSIUM (K)	3.5	3.8	3.6	0.12	4
ACIDITY AS CACO3	0.01	72	11.06	16.49	18
ALKALINITY AS CACO3 (LAB)	210	341	283.2	34.63	18
BICARBONATE (HCO3) (LAB)	256	416	336.6	50.17	18
HARDNESS (CACO3) TOTAL	246	610	322.6	81.55	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	43.2	3.36	10.21	18
SULFATE (SO4)	62	405	102.3	77.05	18
CHLORIDE (CL)	3.9	36.4	21.5	10.37	18
NUTRIENTS					
NITRATE (NO3-N)	0.01	0.86	0.11	0.20	18
TOTAL PHOSPHATE (PO4)	0.02	1.12	0.19	0.28	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.09	0.57	0.15	0.10	18
BORON (B) TOTAL	0.06	0.8	0.14	0.17	17
IRON (FE) TOTAL	0.06	24.6	2.12	5.58	18
IRON (FE) DISS	0.01	0.23	0.04	0.05	18
MANGANESE (MN) TOTAL	0.03	0.73	0.12	0.15	18
MANGANESE (MN) DISS	0.01	0.09	0.04	0.02	17

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 006

STATION LOCATION - SOUTH FORK OF NORTH FORK OF QUITCHUPAH CREEK

SAMPLE DATE	06/21/83	08/16/83	10/12/83	06/21/84	08/09/84	10/11/84	06/13/85	08/14/85	10/22/85	06/03/86	08/13/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	19	16	16	16	26	10	21	24	4	25	25
FLOW (CFS)	2.08	1.39	0.58	1.57	1.27	0.8	1.57	0.64	0.49	1.84	0.58
WATER TEMPERATURE (C)	16	17	10	11	18	6	14	13	1	16	17
SPEC. COND. (UMHOS/CM) FIELD	710	680	750	760	1300	680	490	708	719	635	622
PH (SU) FIELD	9	7.6	7.9	7.7	7.8	8.1	8	8.4	8.2	8.35	8.4
TURBIDITY (NTU) FIELD	53	640	32	180	74	26		63.12	20.97	50	25.81
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	424	432	490	490	850	520	316	460	484	366	340
COMMON IONS											
CALCIUM (CA)	60	56	68	91.6	64	64	58.8	60	77.6	50.4	54.4
MAGNESIUM (MG)	35.52	33.6	37.92	18.72	108	55.5	23.8	32.2	36.5	33.1	34.6
SODIUM (NA)	59	52.5	55	66	47.8	60.3	40	80	49.8	38.03	39.82
POTASSIUM (K)			3.5	3.6			3.8	3.5			
ACIDITY AS CACO3	<0.01	13	24	72	17	16	8.8	13.9	13.7	<0.01	1.2
ALKALINITY AS CACO3 (LAB)	328	308	320	341	315	320	210	286	270	259	250
BICARBONATE (HCO3) (LAB)	400.2	370.9	390.4	416	384.3	390.4	256	348.9	329.4	279	275.7
HARDNESS (CACO3) TOTAL	298	280	328	307	610	390	246	284	346	264	278
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	<0.01	2.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	14.4
SULFATE (SO4)	74	62	87	66	405	95	75	85	87	95	69
CHLORIDE (CL)	36	4	34	36.4	29.4	34	14.2	28	24.5	20.3	17.2
NUTRIENTS											
NITRATE (NO3-N)	<0.02	<0.01	0.06	0.01	0.02	0.09	0.42	0.03	0.05	0.06	0.03
TOTAL PHOSPHATE (PO4)	0.2	0.11	0.1	0.1	0.14	0.77	1.12	0.28	0.02	0.03	0.02
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.15	0.18	0.14	0.15	0.14	0.12	0.57	0.11	0.12	0.16	0.12
BORON (B) TOTAL	0.06	0.1	0.09	0.085	0.1	0.15		0.12	0.06	0.089	0.8
IRON (FE) TOTAL	0.81	5.4	0.25	0.07	1.3	0.06	24.6	0.06	0.56	0.62	0.57
IRON (FE) DISS	0.03	0.09	0.04	0.01	0.07	0.23	0.03	<0.01	<0.01	<0.01	<0.01
MANGANESE (MN) TOTAL	0.065	0.045	0.08	0.04	0.09	0.09	0.73	0.03	0.09	0.07	0.05
MANGANESE (MN) DISS	0.042	0.015	0.07	0.03		0.07	<0.01	<0.02	0.05	0.02	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 006

STATION LOCATION - SOUTH FORK OF NORTH FORK OF QUITCHUPAH CREEK

SAMPLE DATE	10/09/86	06/18/87	08/05/87	10/28/87	06/07/88	08/09/88	10/05/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)	15	19	26	14	19	25	18
FLOW (CFS)	0.4	0.88	0.4	0.25	0.92	0.25	0.21
WATER TEMPERATURE (C)	6	10	18	5	16	17.5	15.5
SPEC. COND. (UMHOS/CM) FIELD	742	666	717	635	715	659	782
PH (SU) FIELD	8.2	8	8.2	8.2	7.9	8.25	7.1
TURBIDITY (NTU) FIELD	56.67	23	29.3	42.9	22	55.7	75
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.	446	406	438	418	388	430	577
COMMON IONS							
CALCIUM (CA)	64.8	84	54.8	62.63	114.4	115.20	156.00
MAGNESIUM (MG)	33.6	18.7	31.29	33.53	<0.10	2.88	8.40
SODIUM (NA)	55.2	34.72	34.12	43.53	29.69	32.59	38.81
POTASSIUM (K)							
ACIDITY AS CACO3	2.5	<0.01	2	<0.01	<0.01	12.00	3.00
ALKALINITY AS CACO3 (LAB)	282	258	247	286	259	247	312
BICARBONATE (HCO3) (LAB)	256.2	315	301	348	316	301	381
HARDNESS (CACO3) TOTAL	302	288	280	295	286	300	425
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
CARBONATE AS CO3	43.2	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
SULFATE (SO4)	80	77	75	80	73	83	174
CHLORIDE (CL)	3.9	15	13.7	17.4	11.3	32.5	15.0
NUTRIENTS							
NITRATE (NO3-N)	0.03	0.08	0.09	0.86	0.03	0.15	<0.02
TOTAL PHOSPHATE (PO4)	0.09	<0.04	<0.04	<0.04	0.05	0.09	0.12
TRACE ELEMENTS							
BARIUM (BA) TOTAL	0.14	0.1	0.09	0.09	0.11	0.12	0.11
BORON (B) TOTAL	0.1	0.11	0.16	0.09	0.09	0.10	0.070
IRON (FE) TOTAL	1.01	0.26	0.2	0.64	0.3	0.68	0.75
IRON (FE) DISS	0.02	<0.01	<0.01	<0.01	<0.03	<0.03	<0.03
MANGANESE (MN) TOTAL	0.11	0.07	0.08	0.11	0.09	0.09	0.15
MANGANESE (MN) DISS	0.06	0.05	0.05	0.09	0.05	0.03	0.08

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCD - 007

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	0	28	16.8	5.88	18
FLOW (CFS)	0.16	12.86	2.36	3.31	18
WATER TEMPERATURE (C)	0.5	21	11.8	5.55	18
SPEC. COND. (UMHOS/CM) FIELD	390	1384	569.6	211.07	18
PH (SU) FIELD	7.3	8.4	8.0	0.27	18
TURBIDITY (NTU) FIELD	0.9	940	219.5	306.09	18
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	204	904	353.1	149.52	18
COMMON IONS					
CALCIUM (CA)	40.27	144	66.42	24.88	18
MAGNESIUM (MG)	0.1	188	28.6	40.57	18
SODIUM (NA)	11.03	60	31.2	12.12	18
POTASSIUM (K)	2	6.9	4.5	2.40	4
ACIDITY AS CACO3	0.01	52	10.81	13.42	18
ALKALINITY AS CACO3 (LAB)	166	404	241.4	52.30	18
BICARBONATE (HCO3) (LAB)	200	493	291.1	65.71	18
HARDNESS (CACO3) TOTAL	186	720	268.0	119.19	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	12	0.87	2.84	17
SULFATE (SO4)	20	475	74.6	101.83	18
CHLORIDE (CL)	3.5	86	17.9	18.08	18
NUTRIENTS					
NITRATE (NO3-N)	0.01	2.03	0.28	0.52	18
TOTAL PHOSPHATE (PO4)	0.02	1.64	0.22	0.41	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.06	1.25	0.30	0.26	18
BORON (B) TOTAL	0.02	0.67	0.13	0.14	17
IRON (FE) TOTAL	0.04	29.6	3.83	7.15	18
IRON (FE) DISS	0.01	0.12	0.03	0.03	18
MANGANESE (MN) TOTAL	0.01	1.46	0.15	0.33	18
MANGANESE (MN) DISS	0.003	0.13	0.021	0.03	16

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 007

STATION LOCATION - UPPER NORTH FORK OF QUITCHUPAH CREEK

SAMPLE DATE	06/21/83	08/16/83	10/12/83	06/21/84	08/09/84	10/11/84	06/13/85	08/14/85	10/22/85	06/02/86	08/13/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	19	16	12	18	28	9	21	16	0	20	18
FLOW (CFS)	12.86	1.15	0.6	5.86	0.8	1.53	4.94	0.64	0.21	7.55	0.55
WATER TEMPERATURE (C)	14	15	12	7	21	5	10	13	0.5	14	17
SPEC. COND. (UMHOS/CM) FIELD	390	540	580	450	580	500	1384	508	677	428	474
PH (SU) FIELD	8.4	8	7.6	7.85	7.7	8	7.8	8.2	8.05	8.4	8.2
TURBIDITY (NTU) FIELD	100	940	550	880	200	80	22	76.32	77.42	690	38.71
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	204	320	377	295	375	380	904	322	388	258	228
COMMON IONS											
CALCIUM (CA)	53.6	48	56	80	44	60	100	44.8	60	58.4	42.4
MAGNESIUM (MG)	13.92	28.8	29.28	2.4	36	44.4	188	23	27.4	16.8	22.6
SODIUM (NA)	12.5	37.5	41	24	36.3	35.6	41	60	42.4	16.39	31.37
POTASSIUM (K)			2.1	2			6.9	6.8			
ACIDITY AS CACO3	<0.01	5	28	52	17	19	22	13.1	21	<0.01	1.2
ALKALINITY AS CACO3 (LAB)	220	244	278	232	260	270	404	238	290	182	212
BICARBONATE (HCO3) (LAB)	258.6	292.8	339.2	283	317.2	329.4	493	290.4	353.8	200	258.6
HARDNESS (CACO3) TOTAL	192	240	262	210	260	335	720	208	264	216	200
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	<0.01	2.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
SULFATE (SO4)	28	40	48	28	39	46	475	36	47	88	31
CHLORIDE (CL)	12	16	20	6.4	16.8	17	86	19.7	22.8	4.1	13.9
NUTRIENTS											
NITRATE (NO3-N)	<0.02	0.08	0.02	0.06	0.08	1.39	2.03	0.09	<0.01	0.15	0.05
TOTAL PHOSPHATE (PO4)	0.92	0.03	0.05	0.06	0.18	0.49	0.18	0.09	0.03	1.64	0.02
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.35	0.71	0.32	0.33	0.23	0.21	0.06	0.17	0.22	1.25	0.22
BORON (B) TOTAL	0.02	0.1	0.095	0.09	0.151	0.08		0.06	0.14	0.161	0.67
IRON (FE) TOTAL	10.3	12.9	3.39	0.06	3.04	2.06	0.66	0.31	1.84	29.6	0.38
IRON (FE) DISS	0.08	0.11	0.12	0.01	<0.01	0.03	0.04	<0.01	0.03	<0.01	<0.01
MANGANESE (MN) TOTAL	0.285	0.012	0.21	0.01	0.07	0.07	0.14	<0.02	0.1	1.46	<0.01
MANGANESE (MN) DISS	0.003	0.01		0.01		0.03	0.13	<0.02	0.03	<0.01	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 007

STATION LOCATION - UPPER NORTH FORK OF QUITCHUPAH CREEK

SAMPLE DATE	10/09/86	06/18/87	08/05/87	10/27/87	06/07/88	08/09/88	10/05/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)	15	16	23	13	20	22	17
FLOW (CFS)	0.39	1.71	0.27	0.22	2.89	0.16	0.21
WATER TEMPERATURE (C)	15	8	19	3	12	19	8
SPEC. COND. (UMHOS/CM) FIELD	618	432	535	580	468	490	619
PH (SU) FIELD	8.2	8.2	8.2	8	8.2	8.05	7.3
TURBIDITY (NTU) FIELD	51.67	209	19.9	1.8	7.8	0.9	5.5
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.	370	268	274	376	236	310	470
COMMON IONS							
CALCIUM (CA)	59.2	65.6	40.27	67.25	85.6	86.40	144.00
MAGNESIUM (MG)	24	10	19.61	26.95	<0.10	0.48	1.20
SODIUM (NA)	39.5	16.44	23.15	34.41	11.03	26.41	32.35
POTASSIUM (K)							
ACIDITY AS CACO3	1.2	2	2	<0.01	<0.01	8.00	3.00
ALKALINITY AS CACO3 (LAB)	248	196	166	258	188	200	260
BICARBONATE (HCO3) (LAB)	278.2	239	202	314	229	244	317
HARDNESS (CACO3) TOTAL	248	206	186	280	214	218	365
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
CARBONATE AS CO3	12	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
SULFATE (SO4)	124	33	29	75	20	31	125
CHLORIDE (CL)	4.4	5.7	10.4	14.5	3.5	33.0	16.0
NUTRIENTS							
NITRATE (NO3-N)	0.1	0.21	0.14	0.34	0.11	0.10	0.04
TOTAL PHOSPHATE (PO4)	0.09	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TRACE ELEMENTS							
BARIUM (BA) TOTAL	0.22	0.21	0.16	0.2	0.2	0.19	0.18
BORON (B) TOTAL	0.12	0.09	0.13	0.07	0.06	0.07	0.030
IRON (FE) TOTAL	0.52	2.31	0.04	0.51	0.91	0.04	0.05
IRON (FE) DISS	<0.01	<0.01	<0.01	<0.01	<0.03	<0.03	<0.03
MANGANESE (MN) TOTAL	0.04	0.08	<0.01	0.03	0.06	<0.01	0.02
MANGANESE (MN) DISS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02

ALALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO -021

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	12	15	13.5	1.50	2
FLOW (CFS)	1.1	2.05	1.58	0.48	2
WATER TEMPERATURE (C)	9	12	10.6	0.96	9
SPEC. COND. (UMHOS/CM) FIELD	540	1087	868.4	136.53	18
PH (SU) FIELD	7.1	8.1	7.5	0.25	18
TURBIDITY (NTU) FIELD	0.02	8.7	1.39	1.90	18
TOTAL SUSP. SOLIDS	1	7	2.6	1.92	14
TOTAL DISS. SOLIDS MEAS.	350	802	580.6	108.27	18
COMMON IONS					
CALCIUM (CA)	56.8	160	92.2	23.25	17
MAGNESIUM (MG)	11.5	93.6	45.9	15.29	18
SODIUM (NA)	26	148.4	47.2	25.94	18
POTASSIUM (K)	2.6	5.5	4.0	1.21	5
ACIDITY AS CACO3	0.01	44	12.74	12.44	18
ALKALINITY AS CACO3 (LAB)	236	310	255.1	16.18	18
BICARBONATE (HCO3) (LAB)	288	378.2	312.9	21.73	18
HARDNESS (CACO3) TOTAL	305	618	420.3	59.95	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	0.1	0.03	0.03	17
SULFATE (SO4)	40	410	220.7	74.39	18
CHLORIDE (CL)	10.9	61.2	19.9	12.66	17
NUTRIENTS					
NITRATE (NO3-N)	0.01	1.16	0.21	0.33	18
TOTAL PHOSPHATE (PO4)	0.01	0.66	0.17	0.21	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.04	0.079	0.05	0.01	18
BORON (B) TOTAL	0.02	1.33	0.43	0.29	18
IRON (FE) TOTAL	0.01	0.62	0.09	0.14	18
IRON (FE) DISS	0.01	0.1	0.03	0.03	18
MANGANESE (MN) TOTAL	0.01	0.08	0.02	0.02	18
MANGANESE (MN) DISS	0.01	0.02	0.01	0.00	18

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 021

STATION LOCATION - MINE DISCHARGE INTO NORTH FORK OF QUITCHUPAH CREEK

SAMPLE DATE	06/22/83	08/31/83	10/12/83	06/20/84	08/08/84	10/10/84	06/13/85	08/14/85	10/22/85	06/05/86	08/12/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)			12							15	
FLOW (CFS)											
WATER TEMPERATURE (C)	10	10	10	11	10					11	
SPEC. COND. (UMHOS/CM) FIELD	710	750	910	890	650	540	910	880	792	860	846
PH (SU) FIELD	7.3	7.1	7.2	7.3	7.4	7.9	7.35	7.25	7.4	7.6	7.4
TURBIDITY (NTU) FIELD	8.7	0.6	0.95	1	2.6	2.5	0.93	0.5	0.19	0.48	1.05
TOTAL SUSP. SOLIDS					4	2	2	4	3	6	2
TOTAL DISS. SOLIDS MEAS.	448	469	599	570	420	350	592	576	570	570	546
COMMON IONS											
CALCIUM (CA)	70.4	79.2	92	89.6	96	59	102.4	94.4	104		56.8
MAGNESIUM (MG)	42.72	40.8	47.52	51.84	42	38	42	41.8	44.2	38.9	60
SODIUM (NA)	33.5	26	40	33.9	34.1	30.4	56	60	35	148.4	37.74
POTASSIUM (K)		3.6	2.9	2.6			5.5	5.3			
ACIDITY AS CACO3	5.5	40	22	44	9	12	14.5	17.5	22.9	2.4	2.5
ALKALINITY AS CACO3 (LAB)	266	262	250	264	310	250	254	258	260	257	262
BICARBONATE (HCO3) (LAB)	324.5	319.6	305	322.1	378.2	305	305	314.8	317.2	350	319.6
HARDNESS (CACO3) TOTAL	354	368	428	420	415	305	430	410	444	384	392
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
SULFATE (SO4)	132	128	240	218	237	40	223	199	205	246	212
CHLORIDE (CL)	24	26	14	13	11	26	14	15.6	10.9		16
NUTRIENTS											
NITRATE (NO3-N)	<0.02	<0.02	0.04	<0.01	0.1	1.16	0.01	0.05	0.14	1.04	<0.01
TOTAL PHOSPHATE (PO4)	0.54	0.41	0.35	0.5	0.1	0.15	0.02	0.02	<0.01	0.01	0.05
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.06	0.06	0.079	0.07	0.05	0.05	0.04	0.04	0.06	0.05	0.05
BORON (B) TOTAL	0.45	0.04	0.05	0.065	0.552	0.39	0.02	0.36	0.35	0.513	1.33
IRON (FE) TOTAL	0.03	0.03	0.11	0.18	0.12	0.18	0.02	<0.01	0.05	0.62	0.1
IRON (FE) DISS	0.03	0.03	0.02	0.05	0.1	0.01	<0.01	<0.01	0.09	<0.01	<0.01
MANGANESE (MN) TOTAL	0.014	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	0.02	0.05	0.08
MANGANESE (MN) DISS	0.014	0.01	0.01	0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	0.02

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 021

STATION LOCATION - MINE DISCHARGE INTO NORTH FORK OF QUITCHUPAH CREEK

SAMPLE DATE	10/10/86	06/18/87	08/11/87	10/28/87	06/08/88	08/24/88	10/05/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)							
FLOW (CFS)	2.05					1.10	
WATER TEMPERATURE (C)	12				12	9	
SPEC. COND. (UMHOS/CM) FIELD	907	1080	1005	912	983	920	1087
PH (SU) FIELD	7.6	7.6	7.5	8.1	7.8	7.60	7.60
TURBIDITY (NTU) FIELD	0.02	0.91	0.74	0.5	1.8	1.06	0.45
TOTAL SUSP. SOLIDS	7	<1.00	1	1	<1.00	<1.00	<1.00
TOTAL DISS. SOLIDS MEAS.	572	702	712	642	700	610	802
COMMON IONS							
CALCIUM (CA)	93.6	120	94	96.29	160	69.20	91.20
MAGNESIUM (MG)	41.8	36.4	47.15	46.49	11.5	60.24	93.60
SODIUM (NA)	41.2	44.36	44.96	43.98	45.77	48.90	45.35
POTASSIUM (K)							
ACIDITY AS CACO3	10	<0.01	12	<0.01	<0.01	11.00	4.00
ALKALINITY AS CACO3 (LAB)	240	240	253	243	238	236	248
BICARBONATE (HCO3) (LAB)	292.8	293	309	296	290	288	303
HARDNESS (CACO3) TOTAL	408	452	432	434	447	424	618
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
SULFATE (SO4)	187	279	258	255	294	210	410
CHLORIDE (CL)	40	12.8	12.7	12.9	14.3	61.2	14.6
NUTRIENTS							
NITRATE (NO3-N)	0.14	0.1	0.24	0.38	0.08	0.16	<0.02
TOTAL PHOSPHATE (PO4)	0.66	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TRACE ELEMENTS							
BARIUM (BA) TOTAL	0.06	0.05	0.04	0.04	0.04	0.05	0.05
BORON (B) TOTAL	0.44	0.58	0.51	0.49	0.67	0.50	0.480
IRON (FE) TOTAL	<0.01	0.03	<0.01	0.02	0.08	<0.03	<0.03
IRON (FE) DISS	<0.01	<0.01	<0.01	<0.01	<0.03	<0.03	<0.03
MANGANESE (MN) TOTAL	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MANGANESE (MN) DISS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

2.05 1.10 1.15

ALALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 022

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	ERR	ERR	ERR	ERR	0
FLOW (CFS)	0	0	0.00	0.00	17
WATER TEMPERATURE (C)	ERR	ERR	ERR	ERR	0
SPEC. COND. (UMHOS/CM) FIELD	ERR	ERR	ERR	ERR	0
PH (SU) FIELD	ERR	ERR	ERR	ERR	0
TURBIDITY (NTU) FIELD	ERR	ERR	ERR	ERR	0
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	ERR	ERR	ERR	ERR	0
COMMON IONS					
CALCIUM (CA)	ERR	ERR	ERR	ERR	0
MAGNESIUM (MG)	ERR	ERR	ERR	ERR	0
SODIUM (NA)	ERR	ERR	ERR	ERR	0
POTASSIUM (K)	ERR	ERR	ERR	ERR	0
ACIDITY AS CACO3	ERR	ERR	ERR	ERR	0
ALKALINITY AS CACO3 (LAB)	ERR	ERR	ERR	ERR	0
BICARBONATE (HCO3) (LAB)	ERR	ERR	ERR	ERR	0
HARDNESS (CACO3) TOTAL	ERR	ERR	ERR	ERR	0
HYDROXIDE AS OH	ERR	ERR	ERR	ERR	0
CARBONATE AS CO3	ERR	ERR	ERR	ERR	0
SULFATE (SO4)	ERR	ERR	ERR	ERR	0
CHLORIDE (CL)	ERR	ERR	ERR	ERR	0
NUTRIENTS					
NITRATE (NO3-N)	ERR	ERR	ERR	ERR	0
TOTAL PHOSPHATE (PO4)	ERR	ERR	ERR	ERR	0
TRACE ELEMENTS					
BARIUM (BA) TOTAL	ERR	ERR	ERR	ERR	0
BORON (B) TOTAL	ERR	ERR	ERR	ERR	0
IRON (FE) TOTAL	ERR	ERR	ERR	ERR	0
IRON (FE) DISS	ERR	ERR	ERR	ERR	0
MANGANESE (MN) TOTAL	ERR	ERR	ERR	ERR	0
MANGANESE (MN) DISS	ERR	ERR	ERR	ERR	0

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 022

STATION LOCATION - MUD SPRING CANYON ABOVE MINE

SAMPLE DATE	06/21/83	08/16/83	10/12/83	06/21/84	08/09/84	10/10/84	06/12/85	08/14/85	10/22/85	06/05/86	08/13/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)											
FLOW (CFS)	0	0	0	0	0	0	0	0	0	0	0
WATER TEMPERATURE (C)											
SPEC. COND. (UMHOS/CM) FIELD											
PH (SU) FIELD											
TURBIDITY (NTU) FIELD											
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.											
COMMON IONS											
CALCIUM (CA)											
MAGNESIUM (MG)											
SODIUM (NA)											
POTASSIUM (K)											
ACIDITY AS CACO3											
ALKALINITY AS CACO3 (LAB)											
BICARBONATE (HCO3) (LAB)											
HARDNESS (CACO3) TOTAL											
HYDROXIDE AS OH											
CARBONATE AS CO3											
SULFATE (SO4)											
CHLORIDE (CL)											
NUTRIENTS											
NITRATE (NO3-N)											
TOTAL PHOSPHATE (PO4)											
TRACE ELEMENTS											
BARIUM (BA) TOTAL											
BORON (B) TOTAL											
IRON (FE) TOTAL											
IRON (FE) DISS											
MANGANESE (MN) TOTAL											
MANGANESE (MN) DISS											

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCD - 022

STATION LOCATION - MUD SPRING CANYON ABOVE MINE

SAMPLE DATE	10/09/86	06/18/87	08/05/87	10/27/87	06/07/88	08/09/88	10/04/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)							
FLOW (CFS)	0	0	0	0	0	0	0
WATER TEMPERATURE (C)							
SPEC. COND. (UMHOS/CM) FIELD							
PH (SU) FIELD							
TURBIDITY (NTU) FIELD							
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.							
COMMON IONS							
CALCIUM (CA)							
MAGNESIUM (MG)							
SODIUM (NA)							
POTASSIUM (K)							
ACIDITY AS CACO3							
ALKALINITY AS CACO3 (LAB)							
BICARBONATE (HCO3) (LAB)							
HARDNESS (CACO3) TOTAL							
HYDROXIDE AS OH							
CARBONATE AS CO3							
SULFATE (SO4)							
CHLORIDE (CL)							
NUTRIENTS							
NITRATE (NO3-N)							
TOTAL PHOSPHATE (PO4)							
TRACE ELEMENTS							
BARIUM (BA) TOTAL							
BORON (B) TOTAL							
IRON (FE) TOTAL							
IRON (FE) DISS							
MANGANESE (MN) TOTAL							
MANGANESE (MN) DISS							

ALALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 030

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	ERR	ERR	ERR	ERR	0
FLOW (CFS)	0	0	0.00	0.00	17
WATER TEMPERATURE (C)	ERR	ERR	ERR	ERR	0
SPEC. COND. (UMHOS/CM) FIELD	ERR	ERR	ERR	ERR	0
PH (SU) FIELD	ERR	ERR	ERR	ERR	0
TURBIDITY (NTU) FIELD	ERR	ERR	ERR	ERR	0
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	ERR	ERR	ERR	ERR	0
COMMON IONS					
CALCIUM (CA)	ERR	ERR	ERR	ERR	0
MAGNESIUM (MG)	ERR	ERR	ERR	ERR	0
SODIUM (NA)	ERR	ERR	ERR	ERR	0
POTASSIUM (K)	ERR	ERR	ERR	ERR	0
ACIDITY AS CACO3	ERR	ERR	ERR	ERR	0
ALKALINITY AS CACO3 (LAB)	ERR	ERR	ERR	ERR	0
BICARBONATE (HCO3) (LAB)	ERR	ERR	ERR	ERR	0
HARDNESS (CACO3) TOTAL	ERR	ERR	ERR	ERR	0
HYDROXIDE AS OH	ERR	ERR	ERR	ERR	0
CARBONATE AS CO3	ERR	ERR	ERR	ERR	0
SULFATE (SO4)	ERR	ERR	ERR	ERR	0
CHLORIDE (CL)	ERR	ERR	ERR	ERR	0
NUTRIENTS					
NITRATE (NO3-N)	ERR	ERR	ERR	ERR	0
TOTAL PHOSPHATE (PO4)	ERR	ERR	ERR	ERR	0
TRACE ELEMENTS					
BARIUM (BA) TOTAL	ERR	ERR	ERR	ERR	0
BORON (B) TOTAL	ERR	ERR	ERR	ERR	0
IRON (FE) TOTAL	ERR	ERR	ERR	ERR	0
IRON (FE) DISS	ERR	ERR	ERR	ERR	0
MANGANESE (MN) TOTAL	ERR	ERR	ERR	ERR	0
MANGANESE (MN) DISS	ERR	ERR	ERR	ERR	0

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCD - 030

STATION LOCATION - EAST SPRING CANYON ABOVE MINE

SAMPLE DATE	06/21/83	08/16/83	10/12/83	06/21/84	08/09/84	10/10/84	06/12/85	08/14/85	10/22/85	06/05/86	08/13/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)											
FLOW (CFS)	0	0	0	0	0	0	0	0	0	0	0
WATER TEMPERATURE (C)											
SPEC. COND. (UMHOS/CM) FIELD											
PH (SU) FIELD											
TURBIDITY (NTU) FIELD											
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.											
COMMON IONS											
CALCIUM (CA)											
MAGNESIUM (MG)											
SODIUM (NA)											
POTASSIUM (K)											
ACIDITY AS CACO3											
ALKALINITY AS CACO3 (LAB)											
BICARBONATE (HCO3) (LAB)											
HARDNESS (CACO3) TOTAL											
HYDROXIDE AS OH											
CARBONATE AS CO3											
SULFATE (SO4)											
CHLORIDE (CL)											
NUTRIENTS											
NITRATE (NO3-N)											
TOTAL PHOSPHATE (PO4)											
TRACE ELEMENTS											
BARIUM (BA) TOTAL											
BORON (B) TOTAL											
IRON (FE) TOTAL											
IRON (FE) DISS											
MANGANESE (MN) TOTAL											
MANGANESE (MN) DISS											

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 030

STATION LOCATION - EAST SPRING CANYON ABOVE MINE

SAMPLE DATE	10/09/86	06/18/87	08/05/87	10/27/87	06/07/88	08/09/88	10/04/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)							
FLOW (CFS)	0	0	0	0	0	0	0
WATER TEMPERATURE (C)							
SPEC. COND. (UMHOS/CM) FIELD							
PH (SU) FIELD							
TURBIDITY (NTU) FIELD							
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.							
COMMON IONS							
CALCIUM (CA)							
MAGNESIUM (MG)							
SODIUM (NA)							
POTASSIUM (K)							
ACIDITY AS CACO3							
ALKALINITY AS CACO3 (LAB)							
BICARBONATE (HCO3) (LAB)							
HARDNESS (CACO3) TOTAL							
HYDROXIDE AS OH							
CARBONATE AS CO3							
SULFATE (SO4)							
CHLORIDE (CL)							
NUTRIENTS							
NITRATE (NO3-N)							
TOTAL PHOSPHATE (PO4)							
TRACE ELEMENTS							
BARIUM (BA) TOTAL							
BORON (B) TOTAL							
IRON (FE) TOTAL							
IRON (FE) DISS							
MANGANESE (MN) TOTAL							
MANGANESE (MN) DISS							

ALALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCD - 041

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	7	30	19.4	6.73	23
FLOW (CFS)	0.64	6.93	2.48	1.88	23
WATER TEMPERATURE (C)	6	25	15.8	5.77	23
SPEC. COND. (UMHOS/CM) FIELD	670	1544	1049.5	180.16	23
PH (SU) FIELD	7.4	8.45	8.05	0.30	23
TURBIDITY (NTU) FIELD	0.39	677.42	168.03	171.21	23
TOTAL SUSP. SOLIDS	392	1480	715.7	372.05	6
TOTAL DISS. SOLIDS MEAS.	434	896	687.8	112.04	23
COMMON IONS					
CALCIUM (CA)	42.4	132	75.3	26.82	18
MAGNESIUM (MG)	3.84	76.8	49.4	20.29	18
SODIUM (NA)	55	135	95.7	23.59	18
POTASSIUM (K)	3	5.2	3.9	0.94	3
ACIDITY AS CACO3	0.01	72	11.46	17.02	18
ALKALINITY AS CACO3 (LAB)	260	345	291.8	22.81	18
BICARBONATE (HCO3) (LAB)	253.8	420.9	341.2	41.62	18
HARDNESS (CACO3) TOTAL	346	500	400.0	37.00	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	36	3.49	9.05	18
SULFATE (SO4)	81	332	235.8	64.69	18
CHLORIDE (CL)	17.4	74	52.9	12.76	18
NUTRIENTS					
NITRATE (NO3-N)	0.01	0.89	0.22	0.22	18
TOTAL PHOSPHATE (PO4)	0.01	0.69	0.22	0.21	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.02	1.02	0.11	0.23	18
BORON (B) TOTAL	0.18	0.85	0.27	0.15	17
IRON (FE) TOTAL	0.05	15.9	4.55	4.92	18
IRON (FE) DISS	0.01	0.07	0.03	0.02	18
MANGANESE (MN) TOTAL	0.005	0.26	0.088	0.08	18
MANGANESE (MN) DISS	0.002	0.21	0.024	0.05	17

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 041

STATION LOCATION - QUITCHUPAH CREEK ABOVE CONFLUENCE WITH NORTH FORK

SAMPLE DATE	04/20/83	05/05/83	05/17/83	06/07/83	06/20/83	07/14/83	08/16/83	10/12/83	06/20/84	08/10/84	10/10/84
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	15	16	10	17	27	30	20	7	24	18	22
FLOW (CFS)	0.87	4.47	6.93	5.9	3.95	3.33	1.96	1.7	6.4	2.46	3.56
WATER TEMPERATURE (C)	11	10	13	11	22	19	16	6	17	12	13
SPEC. COND. (UMHOS/CM) FIELD	1544	820	730	946	880	1030	1040	1020	990	880	1100
PH (SU) FIELD	7.6	8.4	8.1	8.3	8	8.3	8	7.8	7.5	7.7	7.95
TURBIDITY (NTU) FIELD	100	100	100	100	100	100	480	330	140	66	200
TOTAL SUSP. SOLIDS	392	1480	866	545		533		478			
TOTAL DISS. SOLIDS MEAS.	896	506	572	578	578	666	700	766	630	570	790
COMMON IONS											
CALCIUM (CA)					56		52	67.2	94	94	72
MAGNESIUM (MG)					59.52		64.32	60.48	50.88	73.2	76.8
SODIUM (NA)					61.5		87	85	59.7	78	108
POTASSIUM (K)								3.5	3		
ACIDITY AS CACO3					<0.01		8	22	72	19	18
ALKALINITY AS CACO3 (LAB)					290		296	280	306	345	290
BICARBONATE (HCO3) (LAB)					348.9		356.2	341.6	373.3	420.9	253.8
HARDNESS (CACO3) TOTAL					388		398	420	427	465	500
HYDROXIDE AS OH					<0.01		<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3					<0.01		2.4	<0.01	<0.01	<0.01	<0.01
SULFATE (SO4)					190		224	267	174	110	276
CHLORIDE (CL)					48		48	40	60.7	74	65
NUTRIENTS											
NITRATE (NO3-N)					<0.02		0.14	<0.01	0.21	0.04	0.3
TOTAL PHOSPHATE (PO4)					0.5		0.05	0.06	0.42	0.14	0.15
TRACE ELEMENTS											
BARIUM (BA) TOTAL					0.05		0.04	0.068	0.05	0.04	0.06
BORON (B) TOTAL					0.2		0.18	0.19	0.195	0.196	0.3
IRON (FE) TOTAL					4.6		9.1	4.99	0.06	0.91	15.9
IRON (FE) DISS					0.07		0.02	0.05	0.02	0.06	0.06
MANGANESE (MN) TOTAL					0.085		0.005	0.13	0.01	0.02	0.2
MANGANESE (MN) DISS					0.005		0.002	0.01		0.03	0.03

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 041

STATION LOCATION - QUITCHUPAH CREEK ABOVE CONFLUENCE WITH NORTH FORK

SAMPLE DATE	06/12/85	08/13/85	10/08/85	06/04/86	08/12/86	10/08/86	06/16/87	08/05/87	10/14/87	06/07/88	08/08/88
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	23	29	7	28	21	18	20	21	8	16	28
FLOW (CFS)	3.13	1.03	1.49	1.98	0.93	0.97	1.03	0.77	0.78	2.03	0.64
WATER TEMPERATURE (C)	24	25	6	22	20	17	24	17	9	11	24
SPEC. COND. (UMHOS/CM) FIELD	670	1058	1150	999	1184	1190	1043	1170	1180	1176	1148
PH (SU) FIELD	7.4	8.45	8.15	8.4	8.4	8.2	8.2	8.2	8.2	8.1	8.20
TURBIDITY (NTU) FIELD	0.39	86.84	110	87.93	677.42	533.33	227	54.9	10.5	12.3	169
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	434	728	870	618	782	756	682	712	768	672	751
COMMON IONS											
CALCIUM (CA)	89.2	42.4	73.2	47.2	56	66.4	58.4	48.22	64.45	130.4	132.00
MAGNESIUM (MG)	40.6	66.2	48.24	61.9	62.9	51.4	10	53.39	52.69	15.3	3.84
SODIUM (NA)	55	135	82	82.66	105.72	111.6	95.9	115.08	126	86.97	124.38
POTASSIUM (K)		5.2									
ACIDITY AS CACO3	21.4	8.2	24	<0.01	<1.00	2.5	6	<0.01	<0.01	<0.01	4.00
ALKALINITY AS CACO3 (LAB)	326	260	283	271	266	306	266	288	321	303	261
BICARBONATE (HCO3) (LAB)	398	307.4	345	296	285.5	300.1	324	351	392	370	318
HARDNESS (CACO3) TOTAL	392	382	384	376	402	380	370	360	380	390	346
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10
CARBONATE AS CO3	<0.01	4.8	<0.01	<0.01	19.2	36	<0.01	<0.01	<0.01	<0.10	<0.10
SULFATE (SO4)	81	294	261	225	315	226	332	222	260	218	259
CHLORIDE (CL)	17.4	67.9	50	57.2	57.3	39	48.3	50.1	66	48.4	63.5
NUTRIENTS											
NITRATE (NO3-N)	0.89	0.18	0.22	0.07	0.55	0.39	0.09	0.47	0.2	<0.02	0.06
TOTAL PHOSPHATE (PO4)	0.08	<0.01	0.53	0.06	0.69	0.47	<0.04	0.05	0.33	<0.04	0.27
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.09	0.02	0.32	0.04	0.08	0.06	0.03	0.02	1.02	0.03	0.03
BORON (B) TOTAL		0.21	0.32	0.203	0.85	0.22	0.24	0.39	0.28	0.2	0.25
IRON (FE) TOTAL	0.06	0.05	9.36	0.97	14.7	9.88	3.15	0.21	4.49	0.31	2.91
IRON (FE) DISS	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.03	<0.03
MANGANESE (MN) TOTAL	0.21	<0.02	0.15	0.02	0.26	0.19	0.08	<0.01	0.08	0.02	0.07
MANGANESE (MN) DISS	0.21	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 041

STATION LOCATION - QUITCHUPAH CREEK ABOVE CONFLUENCE WITH NORTH FORK

SAMPLE DATE	10/04/88
PHYSICAL PARAMETERS	
AIR TEMPERATURE (C)	22
FLOW (CFS)	0.73
WATER TEMPERATURE (C)	15.5
SPEC. COND. (UMHOS/CM) FIELD	1190
PH (SU) FIELD	7.7
TURBIDITY (NTU) FIELD	79
TOTAL SUSP. SOLIDS	
TOTAL DISS. SOLIDS MEAS.	795
COMMON IONS	
CALCIUM (CA)	112.00
MAGNESIUM (MG)	38.40
SODIUM (NA)	123.91
POTASSIUM (K)	
ACIDITY AS CACO3	<0.10
ALKALINITY AS CACO3 (LAB)	294
BICARBONATE (HCO3) (LAB)	359
HARDNESS (CACO3) TOTAL	440
HYDROXIDE AS OH	<0.10
CARBONATE AS CO3	<0.10
SULFATE (SO4)	310
CHLORIDE (CL)	51.0
NUTRIENTS	
NITRATE (NO3-N)	0.13
TOTAL PHOSPHATE (PO4)	0.06
TRACE ELEMENTS	
BARIUM (BA) TOTAL	0.02
BORON (B) TOTAL	0.210
IRON (FE) TOTAL	1.16
IRON (FE) DISS	<0.03
MANGANESE (MN) TOTAL	0.03
MANGANESE (MN) DISS	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCD - 042

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	7	30	20.0	6.97	23
FLOW (CFS)	1.15	20.88	5.88	5.43	23
WATER TEMPERATURE (C)	4	24	13.3	5.35	23
SPEC. COND. (UMHOS/CM) FIELD	500	1340	749.1	191.82	23
PH (SU) FIELD	7	8.4	8.0	0.36	23
TURBIDITY (NTU) FIELD	0.65	1155	179.7	291.19	23
TOTAL SUSP. SOLIDS	150	3083	1173.8	933.59	6
TOTAL DISS. SOLIDS MEAS.	328	868	499.1	131.97	23
COMMON IONS					
CALCIUM (CA)	43.2	160	80.0	32.57	18
MAGNESIUM (MG)	5.76	75.4	32.68	16.29	18
SODIUM (NA)	25.35	86	46.09	15.30	18
POTASSIUM (K)	1.8	8.8	5.1	3.01	4
ACIDITY AS CACO3	0.01	57	10.20	13.71	18
ALKALINITY AS CACO3 (LAB)	160	346	217.4	40.50	18
BICARBONATE (HCO3) (LAB)	195.2	442	260.2	56.76	18
HARDNESS (CACO3) TOTAL	244	644	336.3	93.69	18
HYDROXIDE AS OH	0.01	24	2.28	6.39	17
CARBONATE AS CO3	0.01	0.1	0.03	0.03	18
SULFATE (SO4)	3	345	176.6	92.10	18
CHLORIDE (CL)	10.3	96.5	24.5	18.59	18
NUTRIENTS					
NITRATE (NO3-N)	0.01	2.85	0.27	0.64	18
TOTAL PHOSPHATE (PO4)	0.01	1.05	0.22	0.31	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.05	0.53	0.17	0.14	18
BORON (B) TOTAL	0.1	1.04	0.30	0.21	17
IRON (FE) TOTAL	0.03	48.3	4.42	11.03	18
IRON (FE) DISS	0.01	0.2	0.03	0.04	18
MANGANESE (MN) TOTAL	0.004	0.64	0.101	0.19	18
MANGANESE (MN) DISS	0.003	0.04	0.013	0.01	17

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCD - 042

STATION LOCATION - NORTH FORK OF QUITCHUPAH CREEK ABOVE CONFLUENCE WITH SOUTH FORK

SAMPLE DATE	04/20/83	05/05/83	05/17/83	06/07/83	06/20/83	07/14/83	08/16/83	10/12/83	06/20/84	08/10/84	10/10/84
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	18	17	10	16	27	30	20	7	23	18	22
-FLOW (CFS)	3.33	16.26	10.05	20.88	17.21	8.16	3.63	2.7	8.18	3	2.82
WATER TEMPERATURE (C)	9	5.5	12	6	15	12	15	4	13	12	13
SPEC. COND. (UMHOS/CM) FIELD	931	512	640	599	500	656	660	800	590	570	675
PH (SU) FIELD	8.4	7.6	8.4	8.4	8.2	8.3	8	7.8	7.6	7.7	8
TURBIDITY (NTU) FIELD	100	100	100	100	100	100	940	100	560	90	99.9
TOTAL SUSP. SOLIDS	858	1398	966	588		3083		150			
TOTAL DISS. SOLIDS MEAS.	454	332	412	378	342	426	422	540	375	570	520
COMMON IONS											
CALCIUM (CA)					56		43.2	64	71.6	56	70
MAGNESIUM (MG)					27.84		40.32	46.56	17.28	42	46.8
SODIUM (NA)					26.5		45.5	50	34.1	43.6	54.1
POTASSIUM (K)								2.5	1.8		
ACIDITY AS CACO3					<0.01		6	16	57	17.5	8
ALKALINITY AS CACO3 (LAB)					232		230	230	160	270	220
BICARBONATE (HCO3) (LAB)					270.8		280.6	280.6	195.2	329.4	268.4
HARDNESS (CACO3) TOTAL					256		276	354	251	315	370
HYDROXIDE AS OH					<0.01		<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3					<0.01		<0.01	<0.01	<0.01	<0.01	<0.01
SULFATE (SO4)					62		<3.00	194	133	40	190
CHLORIDE (CL)					14		24	20	14.9	22	25
NUTRIENTS											
NITRATE (NO3-N)					<0.02		<0.01	<0.01	0.08	0.22	2.85
TOTAL PHOSPHATE (PO4)					0.94		0.04	0.04	0.68	0.18	0.2
TRACE ELEMENTS											
BARIUM (BA) TOTAL					0.22		0.23	0.116	0.21	0.12	0.09
BORON (B) TOTAL					0.1		0.19	0.195	0.1	0.183	0.2
IRON (FE) TOTAL					4		8.1	0.51	0.08	1.58	0.56
IRON (FE) DISS					0.05		0.03	0.036	0.02	0.06	0.2
MANGANESE (MN) TOTAL					0.135		0.004	0.03	<0.01	0.04	0.04
MANGANESE (MN) DISS					0.005		0.003	0.01	<0.01		0.04

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 042

STATION LOCATION - NORTH FORK OF QUITCHUPAH CREEK ABOVE CONFLUENCE WITH SOUTH FORK

SAMPLE DATE	06/12/85	08/13/85	10/08/85	06/04/86	08/12/86	10/08/86	06/16/87	08/05/87	10/14/87	06/07/88	08/08/88
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	28	29	7	28	21	18	26	21	8	15.5	28
FLOW (CFS)	9.06	2.16	2.56	6.82	1.54	2.3	3.72	1.56	1.96	4.75	1.42
WATER TEMPERATURE (C)	20	22	6	17	19	15.5	20	14	8.5	9	24
SPEC. COND. (UMHOS/CM) FIELD	1340	674	832	524	900	797	653	858	1000	714	835
PH (SU) FIELD	7.5	8.35	7.95	8.4	8.3	8.1	8	8	8.2	8.0	7.50
TURBIDITY (NTU) FIELD	0.65	32.9	34	1155	29.03	31.67	205	2.3	150	54.5	42.90
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	868	440	630	328	580	518	444	564	660	386	580
COMMON IONS											
CALCIUM (CA)	132	48	101.2	60.9	49.6	64	78.4	60.52	85.2	104	135.20
MAGNESIUM (MG)	75.4	36.96	22.8	22.1	35.5	37.9	22.5	41.77	42	6.7	5.76
SODIUM (NA)	86	59	38	25.35	38.48	46.2	36.04	46.03	74.4	27.15	50.35
POTASSIUM (K)	8.8	7.3									
ACIDITY AS CACO3	21.4	10.7	24	<0.01	2.5	1.2	2	0.2	<0.01	<0.01	4.00
ALKALINITY AS CACO3 (LAB)	346	188	239	200	184	208	193	199	228	208	169
BICARBONATE (HCO3) (LAB)	442	229.4	292	220	195.2	205	239	243	278	254	206
HARDNESS (CACO3) TOTAL	644	274	347	244	272	318	290	330	388	288	362
HYDROXIDE AS OH	<0.01	<0.01	<0.01		14.4	24	<0.01	<0.01	<0.01	<0.10	<0.10
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10
SULFATE (SO4)	269	155	199	97	317	199	136	194	285	109	252
CHLORIDE (CL)	96.5	22.2	26	11.8	35.2	20.3	12.4	15.4	22.4	10.3	30.0
NUTRIENTS											
NITRATE (NO3-N)	0.3	0.05	0.48	0.1	0.1	0.05	0.19	0.12	0.08	0.03	0.11
TOTAL PHOSPHATE (PO4)	0.08	<0.01	0.05	0.1	0.02	0.13	<0.04	0.19	1.05	<0.04	0.09
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.06	0.06	0.3	0.53	0.08	0.09	0.11	0.06	0.52	0.13	0.07
BORON (B) TOTAL		0.28	0.3	0.153	1.04	0.24	0.23	0.54	0.39	0.23	0.38
IRON (FE) TOTAL	0.09	0.07	0.7	10.8	0.85	0.24	2.76	0.03	48.3	0.49	0.39
IRON (FE) DISS	0.04	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.03	<0.03
MANGANESE (MN) TOTAL	<0.01	<0.02	0.03	0.64	0.04	<0.01	0.1	<0.01	0.61	0.04	0.03
MANGANESE (MN) DISS	0.03	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCD - 042

STATION LOCATION - NORTH FORK OF QUITCHUPAH CREEK ABOVE CONFLUENCE WITH SOUTH FORK

SAMPLE DATE	10/04/88
PHYSICAL PARAMETERS	
AIR TEMPERATURE (C)	22
FLOW (CFS)	1.15
WATER TEMPERATURE (C)	15
SPEC. COND. (UMHOS/CM) FIELD	969
PH (SU) FIELD	7.0
TURBIDITY (NTU) FIELD	4.8
TOTAL SUSP. SOLIDS	
TOTAL DISS. SOLIDS MEAS.	710
COMMON IONS	
CALCIUM (CA)	160.00
MAGNESIUM (MG)	18.00
SODIUM (NA)	48.86
POTASSIUM (K)	
ACIDITY AS CACO3	13.00
ALKALINITY AS CACO3 (LAB)	209
BICARBONATE (HCO3) (LAB)	255
HARDNESS (CACO3) TOTAL	475
HYDROXIDE AS OH	<0.10
CARBONATE AS CO3	<0.10
SULFATE (SO4)	345
CHLORIDE (CL)	18.0
NUTRIENTS	
NITRATE (NO3-N)	<0.02
TOTAL PHOSPHATE (PO4)	<0.04
TRACE ELEMENTS	
BARIUM (BA) TOTAL	0.05
BORON (B) TOTAL	0.360
IRON (FE) TOTAL	0.04
IRON (FE) DISS	<0.03
MANGANESE (MN) TOTAL	<0.01
MANGANESE (MN) DISS	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 046

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	3	28	18.4	6.54	18
FLOW (CFS)	0.02	0.8	0.24	0.20	18
WATER TEMPERATURE (C)	6	21	15.2	4.04	18
SPEC. COND. (UMHOS/CM) FIELD	480	1400	1133.1	200.95	18
PH (SU) FIELD	6.8	8.2	7.74	0.35	18
TURBIDITY (NTU) FIELD	0.11	70	20.48	15.73	18
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	306	916	744.4	135.92	17
COMMON IONS					
CALCIUM (CA)	50	224.8	107.4	44.89	18
MAGNESIUM (MG)	6.24	132	79.2	32.69	18
SODIUM (NA)	27	110	42.2	17.76	18
POTASSIUM (K)	3.3	5.6	4.2	0.88	4
ACIDITY AS CACO3	0.01	74	16.73	18.00	18
ALKALINITY AS CACO3 (LAB)	238	435	376.4	41.74	18
BICARBONATE (HCO3) (LAB)	290	560.7	455.6	55.74	18
HARDNESS (CACO3) TOTAL	294	715	599.3	103.46	18
HYDROXIDE AS OH	0.01	0.01	0.01	0.00	18
CARBONATE AS CO3	0.01	38.4	2.27	9.03	17
SULFATE (SO4)	65	290	196.2	58.16	18
CHLORIDE (CL)	10.6	110	67.4	27.87	18
NUTRIENTS					
NITRATE (NO3-N)	0.01	1.88	0.87	0.64	18
TOTAL PHOSPHATE (PO4)	0.01	0.8	0.12	0.19	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.05	0.24	0.07	0.04	18
BORON (B) TOTAL	0.135	0.82	0.233	0.16	17
IRON (FE) TOTAL	0.01	0.85	0.34	0.21	17
IRON (FE) DISS	0.01	0.25	0.04	0.07	18
MANGANESE (MN) TOTAL	0.015	0.14	0.100	0.04	17
MANGANESE (MN) DISS	0.01	0.13	0.07	0.04	17

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 046

STATION LOCATION - QUITCHUPAH CREEK ABOVE PUMPHOUSE

SAMPLE DATE	06/22/83	08/16/83	10/12/83	06/20/84	08/09/84	10/11/84	06/12/85	08/14/85	10/09/85	06/04/86	08/13/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	25	22	12	23	28	11	23	15	3	21	20
FLOW (CFS)	0.04	0.06	0.08	0.52	0.48	0.33	0.28	0.22	0.39	0.18	0.11
WATER TEMPERATURE (C)	21	19	11	17	18	9	18	13	6	16	14
SPEC. COND. (UMHOS/CM) FIELD	880	980	1200	1150	1100	1200	480	1400	1345	1326	1238
PH (SU) FIELD	7.9	7.8	7.6	7.55	7.6	7.65	7.75	8.1	7.6	8.1	8
TURBIDITY (NTU) FIELD	42	15	15	20	70	35	0.11	22.37	16	14.83	6.13
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	591	688	810		725	860	306	916	798	886	804
COMMON IONS											
CALCIUM (CA)	76	72	93.6	111.2	50	100	72.4	92.8	114.43	87.2	84.8
MAGNESIUM (MG)	63.36	73.44	103.68	77.76	132	111.6	27.1	111.4	102.34	107.5	107
SODIUM (NA)	32.5	37	38	49.9	47.8	52	27	110	34	42.11	38.06
POTASSIUM (K)			5.6	4.2			3.6	3.3			
ACIDITY AS CACO3	<0.01	12	32	74	20	15	10.7	30.3	44	2.4	2.5
ALKALINITY AS CACO3 (LAB)	332	352	394	388	435	390	238	418	409	384	392
BICARBONATE (HCO3) (LAB)	390.4	429.4	480.7	473.4	560.7	475.8	290	510	499	468	478.2
HARDNESS (CACO3) TOTAL	454	486	666	602	675	715	294	696	712	666	658
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
SULFATE (SO4)	159	136	209	158	99	220	65	259	229	290	230
CHLORIDE (CL)	32	50	100	109	108	110	10.6	96.7	78	64.2	70.3
NUTRIENTS											
NITRATE (NO3-N)	<0.02	<0.01	0.61	1.58	1.73	0.66	0.18	1.83	1.61	1.88	1.46
TOTAL PHOSPHATE (PO4)	0.28	0.02	0.05	0.22	0.11	0.8	0.02	<0.01	<0.01	<0.01	0.02
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.07	0.06	0.072	0.06	0.08	0.07	0.07	0.05	0.24	0.07	0.05
BORON (B) TOTAL	0.14	0.14	0.135	0.185	0.2	0.17		0.16	0.24	0.268	0.82
IRON (FE) TOTAL	0.64	0.33	0.16	0.1	0.85	0.45	0.04	<0.01	0.4	0.46	0.43
IRON (FE) DISS	0.02	0.01	0.058	0.02	0.02	0.2	0.02	<0.01	0.04	<0.01	<0.01
MANGANESE (MN) TOTAL	0.06	0.015	0.1	0.06	0.13	0.13	0.02	0.12	0.13	0.14	0.11
MANGANESE (MN) DISS	0.01	0.01	0.1	0.03		0.04	<0.01	0.13	0.13	0.1	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 046

STATION LOCATION - QUITCHUPAH CREEK ABOVE PUMPHOUSE

SAMPLE DATE	10/08/86	06/16/87	08/05/87	10/13/87	06/08/88	08/09/88	10/05/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)	13	28	24	13	20	19	12
FLOW (CFS)	0.12	0.08	0.02	0.41	0.16	0.10	0.80
WATER TEMPERATURE (C)	10	19	18	13	17.5	19.5	14
SPEC. COND. (UMHOS/CM) FIELD	1276	1140	1202	1050	1179	1081	1168
PH (SU) FIELD	8	8	8	8.2	7.6	7.1	6.8
TURBIDITY (NTU) FIELD	23.33	24	17.4	13.5	3.4	24.4	6.2
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.	824	722	772	687	680	765	820
COMMON IONS							
CALCIUM (CA)	92	116	85.86	92.68	156	224.80	212.00
MAGNESIUM (MG)	96	65.2	80.4	74.54	51.84	6.24	33.60
SODIUM (NA)	37.5	31.8	34.14	46.8	34.2	34.93	31.83
POTASSIUM (K)							
ACIDITY AS CACO3	6.3	8	6	<0.01	14	12.00	12.00
ALKALINITY AS CACO3 (LAB)	396	355	345	392	396	382	377
BICARBONATE (HCO3) (LAB)	405	433	421	478	483	466	460
HARDNESS (CACO3) TOTAL	630	562	566	541	606	588	670
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	38.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SULFATE (SO4)	264	210	187	170	191	180	275
CHLORIDE (CL)	69.6	46.1	51.6	60	43.1	70.2	43.0
NUTRIENTS							
NITRATE (NO3-N)	1.23	0.63	0.63	0.57	0.38	0.45	0.18
TOTAL PHOSPHATE (PO4)	0.04	<0.04	<0.04	0.31	<0.04	0.05	<0.04
TRACE ELEMENTS							
BARIUM (BA) TOTAL	0.07	0.05	0.05	0.06	0.05	0.07	0.06
BORON (B) TOTAL	0.17	0.22	0.29	0.17	0.33	0.18	0.140
IRON (FE) TOTAL	0.43	0.36	0.3	0.38		0.29	0.11
IRON (FE) DISS	<0.01	<0.01	<0.01	<0.01	0.25	<0.03	<0.03
MANGANESE (MN) TOTAL	0.12	0.1	0.12	0.13		0.12	0.09
MANGANESE (MN) DISS	0.08	0.11	0.11	0.08	0.08	0.08	0.06

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 047

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	3	27	18.6	7.33	18
FLOW (CFS)	0.04	0.13	0.07	0.03	14
WATER TEMPERATURE (C)	25	30	27.7	1.36	15
SPEC. COND. (UMHOS/CM) FIELD	350	865	750.8	112.12	18
PH (SU) FIELD	6.2	8	7.30	0.48	18
TURBIDITY (NTU) FIELD	0.17	9	2.03	2.42	18
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	224	612	477.9	79.66	18
COMMON IONS					
CALCIUM (CA)	53.6	163.2	99.6	27.25	18
MAGNESIUM (MG)	0.08	51.6	33.1	13.17	18
SODIUM (NA)	14	120	32.3	26.83	18
POTASSIUM (K)	2.5	4	3.3	0.55	4
ACIDITY AS CACO3	0.01	63	18.02	18.01	18
ALKALINITY AS CACO3 (LAB)	179	380	325.1	41.50	18
BICARBONATE (HCO3) (LAB)	218	463.6	392.3	50.61	18
HARDNESS (CACO3) TOTAL	208	540	389.6	58.28	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	24	1.44	5.64	17
SULFATE (SO4)	22	195	90.6	40.68	18
CHLORIDE (CL)	14	49.9	19.7	7.92	18
NUTRIENTS					
NITRATE (NO3-N)	0.01	1.52	0.19	0.34	18
TOTAL PHOSPHATE (PO4)	0.01	0.25	0.08	0.08	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.06	0.26	0.10	0.04	18
BORON (B) TOTAL	0.014	60.08	3.703	14.10	17
IRON (FE) TOTAL	0.01	0.46	0.10	0.10	18
IRON (FE) DISS	0.01	0.098	0.02	0.02	18
MANGANESE (MN) TOTAL	0.01	0.11	0.06	0.03	18
MANGANESE (MN) DISS	0.01	0.1	0.05	0.03	17

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 047

STATION LOCATION - PUMPHOUSE EFFLUENT

SAMPLE DATE	06/22/83	08/16/83	10/12/83	06/20/84	08/09/84	10/11/84	06/13/85	08/14/85	10/09/85	06/04/86	08/13/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	25	26	16	27	27	11	21	14	3	24	19
FLOW (CFS)	0.05	0.05	0.05	0.07	0.05	0.12		0.06	0.07	0.13	
WATER TEMPERATURE (C)	25	28	27	27	28	25	27	29	27	28	
SPEC. COND. (UMHOS/CM) FIELD	740	740	650	700	840	700	350	830	778	779	751
PH (SU) FIELD	7.4	7.6	7.3	7.25	7.3	7.2	7.4	7.2	6.65	7.4	7.5
TURBIDITY (NTU) FIELD	9	0.4	0.8	1	2.4	7	0.34	0.45	4	0.97	0.21
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	490	480	440	460	545	560	224	530	524	466	430
COMMON IONS											
CALCIUM (CA)	80	80.8	81.6	120.4	84	94	53.6	87.2	107.4	91.2	88.8
MAGNESIUM (MG)	46.56	38.4	40.8	22.32	51.6	45.6	17.8	37.9	27.98	38.4	39.4
SODIUM (NA)	22	21	14	22.2	76	68	25	120	16	21.57	21.19
POTASSIUM (K)			2.5	3.1			3.5	4			
ACIDITY AS CACO3	8	13	28	63	35.5	19	10.1	54.9	33	4.8	7.4
ALKALINITY AS CACO3 (LAB)	364	338	310	344	380	380	179	322	322	339	320
BICARBONATE (HCO3) (LAB)	422.1	412.4	378.2	419.7	463.6	463.6	218	392.8	394	414	390.4
HARDNESS (CACO3) TOTAL	394	362	374	394	425	425	208	376	385	388	386
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
SULFATE (SO4)	92	144	76	71	47	90	22	82	69	78	177
CHLORIDE (CL)	22	20	14	15.1	14.9	16	20.5	17.8	20	17.9	26.6
NUTRIENTS											
NITRATE (NO3-N)	<0.02	<0.01	<0.02	0.15	0.17	1.52	0.37	0.02	0.22	<0.01	0.02
TOTAL PHOSPHATE (PO4)	0.2	0.03	0.1	0.17	0.07	0.24	0.01	<0.01	<0.01	0.01	<0.01
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.09	0.09	0.105	0.08	0.09	0.07	0.06	0.08	0.26	0.11	0.09
BORON (B) TOTAL	0.08	0.08	60.08	0.095	0.156	0.17		0.11	0.26	0.084	1.03
IRON (FE) TOTAL	0.01	0.03	0.11	0.07	0.15	0.11	0.02	0.04	0.12	0.46	0.09
IRON (FE) DISS	0.01	0.03	0.098	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MANGANESE (MN) TOTAL	0.015	0.03	0.03	0.03	0.04	0.06	<0.01	0.06	0.07	0.11	0.11
MANGANESE (MN) DISS	0.015	0.02	0.04	0.01		0.06	<0.01	0.05	0.05	0.1	0.02

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 047

STATION LOCATION - PUMPHOUSE EFFLUENT

SAMPLE DATE	10/09/86	06/16/87	08/05/87	10/13/87	06/08/88	08/09/88	10/05/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)	18	27	24	9	24	12	8.5
FLOW (CFS)	0.06	0.04	0.06	0.06	0.07		
WATER TEMPERATURE (C)	28.5	28	29	30	29		
SPEC. COND. (UMHOS/CM) FIELD	760	792	853	750	865	817	819
PH (SU) FIELD	8	7.6	7.6	7.8	7.8	6.2	6.2
TURBIDITY (NTU) FIELD	0.17	0.61	0.61	1.2	2.8	0.80	3.7
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.	462	456	504	400	480	540	612
COMMON IONS							
CALCIUM (CA)	91.2	114.4	80.5	84.71	146.4	163.20	144.00
MAGNESIUM (MG)	36.5	23	38.53	37.69	10	0.08	43.20
SODIUM (NA)	18.4	19.74	20.42	32	21.23	22.46	20.45
POTASSIUM (K)							
ACIDITY AS CACO3	3.7	12	8	<0.01	<0.01	24.00	<0.01
ALKALINITY AS CACO3 (LAB)	324	317	298	325	337	317	336
BICARBONATE (HCO3) (LAB)	364.5	387	364	369	411	387	410
HARDNESS (CACO3) TOTAL	380	382	404	368	408	414	540
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
CARBONATE AS CO3	24	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
SULFATE (SO4)	86	79	74	87	78	83	195
CHLORIDE (CL)	17.1	15.4	15.4	18.8	15.3	49.9	18.0
NUTRIENTS							
NITRATE (NO3-N)	0.04	0.42	0.12	0.19	0.03	0.08	<0.02
TOTAL PHOSPHATE (PO4)	0.08	<0.04	<0.04	0.25	<0.04	<0.04	<0.04
TRACE ELEMENTS			6				
BARIUM (BA) TOTAL	0.1	0.09	0.08	0.11	0.09	0.10	0.09
BORON (B) TOTAL	0.13	0.014	0.22	0.11	0.13	0.12	0.090
IRON (FE) TOTAL	0.04	0.06	0.04	0.2	0.1	<0.03	<0.03
IRON (FE) DISS	<0.01	<0.01	<0.01	<0.01	<0.03	<0.03	<0.03
MANGANESE (MN) TOTAL	0.08	0.08	0.09	0.08	0.08	0.08	0.06
MANGANESE (MN) DISS	0.05	0.09	0.09	0.06	0.08	0.08	0.05

ALALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 047A

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	1	32	18.0	7.92	23
FLOW (CFS)	0.09	1	0.25	0.26	23
WATER TEMPERATURE (C)	6	16	13.2	2.20	22
SPEC. COND. (UMHOS/CM) FIELD	600	1870	1151.9	219.47	23
PH (SU) FIELD	6.1	8.65	7.58	0.57	23
TURBIDITY (NTU) FIELD	0.16	100	11.88	21.35	23
TOTAL SUSP. SOLIDS	7	248	74.5	80.74	6
TOTAL DISS. SOLIDS MEAS.	394	1200	748.0	139.67	23
COMMON IONS					
CALCIUM (CA)	44.8	192	122.3	38.28	18
MAGNESIUM (MG)	17.7	119.5	57.9	20.97	18
SODIUM (NA)	32.33	285	62.0	57.94	18
POTASSIUM (K)	2	4.1	3.0	0.78	5
ACIDITY AS CACO3	0.01	50	16.25	13.15	18
ALKALINITY AS CACO3 (LAB)	275	690	359.7	84.87	18
BICARBONATE (HCO3) (LAB)	336	841.8	436.1	104.28	18
HARDNESS (CACO3) TOTAL	279	660	542.9	87.30	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	24	1.44	5.64	17
SULFATE (SO4)	76	272	188.2	53.20	18
CHLORIDE (CL)	26.4	93	66.9	17.72	18
NUTRIENTS					
NITRATE (NO3-N)	0.02	4	0.58	0.91	18
TOTAL PHOSPHATE (PO4)	0.01	0.3	0.09	0.09	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.04	0.29	0.08	0.05	18
BORON (B) TOTAL	0.11	0.9	0.23	0.18	17
IRON (FE) TOTAL	0.04	6.54	0.51	1.47	18
IRON (FE) DISS	0.01	0.11	0.04	0.03	18
MANGANESE (MN) TOTAL	0.01	0.17	0.04	0.04	17
MANGANESE (MN) DISS	0.01	0.07	0.02	0.02	17

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 047A

STATION LOCATION - EAST SPRING CANYON ABOVE CONFLUENCE WITH QUITCHUPAH CREEK

SAMPLE DATE	04/19/83	05/05/83	05/17/83	06/07/83	06/20/83	07/14/83	08/16/83	10/12/83	06/20/84	08/09/84	10/11/84
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	14	16	11	22	26	32	26	11	27	27	11
FLOW (CFS)	0.12	0.15	0.84	0.79	0.53	1	0.12	0.11	0.09	0.14	0.16
WATER TEMPERATURE (C)	12	12	6	12	15	16	14	12	15	14	12
SPEC. COND. (UMHOS/CM) FIELD	1396	1230	1305	841	960	1120	1120	1030	1200	1090	1870
PH (SU) FIELD	6.7	7.4	7.7	8.3	7.7	8.2	7.8	7.6	7.4	7.4	7.2
TURBIDITY (NTU) FIELD	28	11	100	18	16	0.5	2.4	1	10	2.8	0.16
TOTAL SUSP. SOLIDS	7	61	248	24		74		33			
TOTAL DISS. SOLIDS MEAS.	796	738	846	522	660	636	804	670	770	720	1200
COMMON IONS											
CALCIUM (CA)					96.8		100	103.2	132.8	130	130
MAGNESIUM (MG)					47.04		60	58.08	53.52	73.2	79.2
SODIUM (NA)					56		57	55	54.1	47.8	285
POTASSIUM (K)								3.1	2.2		
ACIDITY AS CACO3					4		19	26	50	26	15
ALKALINITY AS CACO3 (LAB)					334		336	330	357	410	690
BICARBONATE (HCO3) (LAB)					407.5		409.9	402.6	435.5	500.2	841.8
HARDNESS (CACO3) TOTAL					438		480	500	555	630	655
HYDROXIDE AS OH					<0.01		<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3					<0.01		<0.01	<0.01	<0.01	<0.01	<0.01
SULFATE (SO4)					127		156	193	190	89	190
CHLORIDE (CL)					40		90	60	80.4	85.4	87
NUTRIENTS											
NITRATE (NO3-N)					<0.02		0.15	0.15	<0.84	0.04	1.09
TOTAL PHOSPHATE (PO4)					0.3		0.14	0.16	0.21	0.07	0.06
TRACE ELEMENTS											
BARIUM (BA) TOTAL					0.08		0.075	0.076	0.09	0.07	0.06
BORON (B) TOTAL					0.2		0.18	0.167	0.15	0.239	0.25
IRON (FE) TOTAL					0.29		0.09	0.13	0.1	0.3	0.23
IRON (FE) DISS					0.02		0.08	0.04	0.07	0.07	0.11
MANGANESE (MN) TOTAL					0.077		0.033	0.03	0.1		0.04
MANGANESE (MN) DISS					0.07		0.025	0.02	0.04		0.04

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 047A

STATION LOCATION - EAST SPRING CANYON ABOVE CONFLUENCE WITH QUITCHUPAH CREEK

SAMPLE DATE	06/12/85	08/14/85	10/09/85	06/04/86	08/13/86	10/09/86	06/16/87	08/05/87	10/13/87	06/08/88	08/09/88
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)	23	14	1	21	19	9	27	24	9	24	12
FLOW (CFS)	0.12	0.1	0.15	0.14	0.13	0.29	0.11	0.11	0.16	0.12	0.17
WATER TEMPERATURE (C)	14	13	10	14	14	12	16	16	14	14.5	
SPEC. COND. (UMHOS/CM) FIELD	600	1300	1200	1212	1105	1146	1101	1150	1100	1185	1078
PH (SU) FIELD	8.05	7.65	8.55	7.6	7.7	8	7.6	7.6	8	7.6	6.3
TURBIDITY (NTU) FIELD	42.4	0.79	6	1.32	1.29	2	15.62	2.5	2.6	2.3	2.7
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	394	850	826	796	740	752	712	740	720	756	745
COMMON IONS											
CALCIUM (CA)	53.2	44.8	152.8	123.2	119.2	114.4	132	102.8	108.1	192	181.60
MAGNESIUM (MG)	35	119.5	57.98	66.2	65.8	61.4	50.8	58.5	61.33	17.7	28.80
SODIUM (NA)	63	125	36	41.3	37.82	36	32.39	38.34	50.4	32.33	36.34
POTASSIUM (K)	4.1	3.4	2								
ACIDITY AS CACO3	8.8	36.9	31	4.8	5	5	14	14	<0.01	<0.01	16.00
ALKALINITY AS CACO3 (LAB)	275	332	324	360	350	354	321	294	340	365	341
BICARBONATE (HCO3) (LAB)	336	405	395	439	427	383.1	392	359	415	445	416
HARDNESS (CACO3) TOTAL	279	610	623	484	572	542	542	550	524	554	574
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10
CARBONATE AS CO3	<0.01	<0.01	<0.01		<0.01	24	<0.01	<0.01	<0.01	<0.10	<0.10
SULFATE (SO4)	76	271	272	220	198	219	181	171	210	174	181
CHLORIDE (CL)	26.4	89.5	68	66.3	65.1	66.5	53	55.1	66	54	93.0
NUTRIENTS											
NITRATE (NO3-N)	0.08	1.23	0.3	0.26	0.92	0.19	0.24	4	0.43	0.19	0.33
TOTAL PHOSPHATE (PO4)	0.06	<0.01	<0.01	<0.01	0.03	0.04	<0.04	<0.04	0.26	<0.04	0.05
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.11	0.05	0.29	0.06	0.06	0.06	0.04	0.05	0.1	0.06	0.06
BORON (B) TOTAL		0.16	0.29	0.158	0.9	0.11	0.17	0.28	0.13	0.21	0.14
IRON (FE) TOTAL	0.24	0.08	0.11	0.06	0.22	0.18	0.32	0.04	6.54	0.07	0.09
IRON (FE) DISS	0.03	0.04	0.05	0.04	<0.01	0.08	<0.01	<0.01	<0.01	<0.03	<0.03
MANGANESE (MN) TOTAL	0.06	0.03	0.03	0.02	0.04	0.03	<0.01	0.02	0.17	<0.01	0.03
MANGANESE (MN) DISS	0.03	0.03	0.02	<0.01	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCD - 047A

STATION LOCATION - EAST SPRING CANYON ABOVE CONFLUENCE WITH QUITCHUPAH CREEK

SAMPLE DATE	10/05/88
PHYSICAL PARAMETERS	
AIR TEMPERATURE (C)	9
FLOW (CFS)	0.13
WATER TEMPERATURE (C)	13.5
SPEC. COND. (UMHOS/CM) FIELD	1154
PH (SU) FIELD	6.1
TURBIDITY (NTU) FIELD	3.9
TOTAL SUSP. SOLIDS	
TOTAL DISS. SOLIDS MEAS.	812
COMMON IONS	
CALCIUM (CA)	184.00
MAGNESIUM (MG)	48.00
SODIUM (NA)	32.50
POTASSIUM (K)	
ACIDITY AS CACO3	17.00
ALKALINITY AS CACO3 (LAB)	361
BICARBONATE (HCO3) (LAB)	440
HARDNESS (CACO3) TOTAL	660
HYDROXIDE AS OH	<0.10
CARBONATE AS CO3	<0.10
SULFATE (SO4)	270
CHLORIDE (CL)	58.0
NUTRIENTS	
NITRATE (NO3-N)	0.05
TOTAL PHOSPHATE (PO4)	<0.04
TRACE ELEMENTS	
BARIUM (BA) TOTAL	0.05
BORON (B) TOTAL	0.110
IRON (FE) TOTAL	0.08
IRON (FE) DISS	0.05
MANGANESE (MN) TOTAL	0.02
MANGANESE (MN) DISS	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 057A

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	13	21	18.0	3.56	3
FLOW (CFS)	0	0.002	0.0007	0.00	3
WATER TEMPERATURE (C)	5	21	13.7	6.60	3
SPEC. COND. (UMHOS/CM) FIELD	580	667	620.0	35.86	3
PH (SU) FIELD	7	7.95	7.52	0.39	3
TURBIDITY (NTU) FIELD	1.6	20.3	8.2	8.59	3
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	328	408	370.7	32.88	3
COMMON IONS					
CALCIUM (CA)	97.03	107.2	103.20	4.43	3
MAGNESIUM (MG)	4.8	16.86	12.71	5.59	3
SODIUM (NA)	9.15	9.79	9.44	0.26	3
POTASSIUM (K)	ERR	ERR	ERR	ERR	0
ACIDITY AS CACO3	0.01	1	0.34	0.47	3
ALKALINITY AS CACO3 (LAB)	270	285	277.3	6.13	3
BICARBONATE (HCO3) (LAB)	329	348	338.3	7.76	3
HARDNESS (CACO3) TOTAL	288	333	310.3	18.37	3
HYDROXIDE AS OH	0.01	0.1	0.04	0.04	3
CARBONATE AS CO3	0.01	0.1	0.04	0.04	3
SULFATE (SO4)	7	49	22.3	18.93	3
CHLORIDE (CL)	15.2	20.7	18.3	2.30	3
NUTRIENTS					
NITRATE (NO3-N)	0.02	0.25	0.11	0.10	3
TOTAL PHOSPHATE (PO4)	0.04	0.11	0.06	0.03	3
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.14	0.17	0.15	0.01	3
BORON (B) TOTAL	0.05	0.16	0.11	0.04	3
IRON (FE) TOTAL	0.16	0.32	0.24	0.07	3
IRON (FE) DISS	0.01	0.03	0.02	0.01	3
MANGANESE (MN) TOTAL	0.05	0.12	0.09	0.03	3
MANGANESE (MN) DISS	0.03	10.11	3.39	4.75	3

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 057A

STATION LOCATION - SPRING AT THE HEAD OF DUNCAN DRAW

SAMPLE DATE	08/12/87	10/28/87	06/07/88	08/09/88	10/05/88
					STATION NOT ACCESSIBLE
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	20	13	21		
FLOW (CFS)		0.00014	0.002	0	
WATER TEMPERATURE (C)	21	5	15		
SPEC. COND. (UMHOS/CM) FIELD	667	580	613		
PH (SU) FIELD	7.6	7.95	7		
TURBIDITY (NTU) FIELD	20.3	2.6	1.6		
TOTAL SUSP. SOLIDS					
TOTAL DISS. SOLIDS MEAS.	408	376	328		
COMMON IONS					
CALCIUM (CA)	97.03	105.37	107.2		
MAGNESIUM (MG)	16.46	16.86	4.8		
SODIUM (NA)	9.15	9.38	9.79		
POTASSIUM (K)					
ACIDITY AS CACO3	1	<0.01	<0.01		
ALKALINITY AS CACO3 (LAB)	285	277	270		
BICARBONATE (HCO3) (LAB)	348	338	329		
HARDNESS (CACO3) TOTAL	310	333	288		
HYDROXIDE AS OH	<0.01	<0.01	<0.10		
CARBONATE AS CO3	<0.01	<0.01	<0.10		
SULFATE (SO4)	11	49	7		
CHLORIDE (CL)	19	20.7	15.2		
NUTRIENTS					
NITRATE (NO3-N)	0.06	0.25	<0.02		
TOTAL PHOSPHATE (PO4)	0.11	<0.04	<0.04		
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.14	0.17	0.14		
BORON (B) TOTAL	0.11	0.05	0.16		
IRON (FE) TOTAL	0.32	0.23	0.16		
IRON (FE) DISS	<0.01	0.02	<0.03		
MANGANESE (MN) TOTAL	0.12	0.09	0.05		
MANGANESE (MN) DISS	10.11	0.04	0.03		

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE SUFCO - 062

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	10	11	10.5	0.50	2
FLOW (CFS)	0.0008	0.0013	0.0011	0.00	2
WATER TEMPERATURE (C)	9	13	10.4	1.10	8
SPEC. COND. (UMHOS/CM) FIELD	350	940	570.1	123.49	18
PH (SU) FIELD	6.4	8.2	7.5	0.38	18
TURBIDITY (NTU) FIELD	0.01	3.2	0.94	0.96	17
TOTAL SUSP. SOLIDS	ERR	ERR	ERR	ERR	0
TOTAL DISS. SOLIDS MEAS.	222	610	364.1	73.33	18
COMMON IONS					
CALCIUM (CA)	51.6	120	83.2	18.87	18
MAGNESIUM (MG)	0.1	38.4	25.0	10.51	18
SODIUM (NA)	3.5	69	13.2	15.95	18
POTASSIUM (K)	2	4.1	2.8	0.71	5
ACIDITY AS CACO3	0.01	54	13.07	13.10	18
ALKALINITY AS CACO3 (LAB)	192	340	252.5	29.09	18
BICARBONATE (HCO3) (LAB)	234	414.8	308.0	35.51	18
HARDNESS (CACO3) TOTAL	192	400	311.0	42.35	18
HYDROXIDE AS OH	0.01	0.1	0.03	0.03	18
CARBONATE AS CO3	0.01	0.1	0.03	0.03	17
SULFATE (SO4)	22	140	63.5	24.46	18
CHLORIDE (CL)	6	31	11.1	5.63	18
NUTRIENTS					
NITRATE (NO3-N)	0.02	1.45	0.16	0.33	18
TOTAL PHOSPHATE (PO4)	0.01	1.65	0.16	0.37	18
TRACE ELEMENTS					
BARIUM (BA) TOTAL	0.036	0.39	0.083	0.08	18
BORON (B) TOTAL	0.02	0.82	0.11	0.18	17
IRON (FE) TOTAL	0.01	1.54	0.19	0.42	18
IRON (FE) DISS	0.009	0.03	0.015	0.01	18
MANGANESE (MN) TOTAL	0.01	0.57	0.06	0.13	18
MANGANESE (MN) DISS	0.01	0.05	0.02	0.02	17

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 062

STATION LOCATION - UNDERGROUND NORTH MAIN AT #6 ENTRY

SAMPLE DATE	06/22/83	08/31/83	10/12/83	06/20/84	08/08/84	10/10/84	06/13/85	08/14/85	10/22/85	06/05/86	08/12/86
PHYSICAL PARAMETERS											
AIR TEMPERATURE (C)			11							10	
FLOW (CFS)										0.0008	
WATER TEMPERATURE (C)	10	10	9							10	
SPEC. COND. (UMHOS/CM) FIELD	525	520	480	500	940	495	350	582	637	626	606
PH (SU) FIELD	7.3	7.3	7.5	7.3	7.4	7.3	8.2	7.85	7.75	7.75	7.8
TURBIDITY (NTU) FIELD	2.8	1	0.5	1	2.6	0.17		0.25	0.16	0.32	<0.01
TOTAL SUSP. SOLIDS											
TOTAL DISS. SOLIDS MEAS.	309	336	312	330	610	350	222	379	374	388	378
COMMON IONS											
CALCIUM (CA)	68.8	68.8	71.2	77.2	116	74	51.6	77.6	88.4	80	84
MAGNESIUM (MG)	25.92	27.36	26.88	27.36	12	38.4	15.1	28.8	32.2	33.1	32.2
SODIUM (NA)	7	12	3.5	7.2	69	7.5	24	40	6.3	7.37	8.3
POTASSIUM (K)		4.1	2	2.4			2.8	2.9			
ACIDITY AS CACO3	5	18	31	54	22	15	6.9	18	23.8	4.8	5
ALKALINITY AS CACO3 (LAB)	272	250	230	261	340	250	192	248	268	267	266
BICARBONATE (HCO3) (LAB)	331.8	305	280.6	318.4	414.8	305	234	302.6	327	326	324.5
HARDNESS (CACO3) TOTAL	280	286	290	307	340	345	192	314	355	338	334
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
SULFATE (SO4)	56	54	55	46	52	52	22	78	80	79	68
CHLORIDE (CL)	14	10	6	8	8.3	9	6.9	9.8	8.8	13.5	7.1
NUTRIENTS											
NITRATE (NO3-N)	<0.02	<0.02	<0.02	0.03	0.05	1.45	0.26	0.02	0.02	0.04	0.03
TOTAL PHOSPHATE (PO4)	0.2	0.19	0.02	0.05	0.07	0.34	1.65	<0.01	<0.01	0.02	0.03
TRACE ELEMENTS											
BARIUM (BA) TOTAL	0.07	0.036	0.088	0.09	0.08	0.06	0.39	0.06	0.05	0.07	0.07
BORON (B) TOTAL	0.03	0.032	0.11	0.1	0.081	0.1		0.04	0.046	0.04	0.82
IRON (FE) TOTAL	0.026	0.01	0.01	0.04	1.54	0.12	1.14	0.09	0.09	<0.01	0.02
IRON (FE) DISS	0.011	0.01	0.009	<0.01	0.01	<0.01	0.03	<0.01	0.02	<0.01	<0.01
MANGANESE (MN) TOTAL	0.015	0.05	0.04	0.06	0.12	0.03	0.57	<0.01	0.02	<0.01	<0.01
MANGANESE (MN) DISS	0.01	0.05	0.05	0.05		<0.01	<0.01	0.02	<0.01	<0.01	<0.01

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - 062

STATION LOCATION - UNDERGROUND NORTH MAIN AT #6 ENTRY

SAMPLE DATE	10/10/86	06/18/87	08/05/87	10/28/87	06/08/88	08/24/88	10/05/88
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)							
FLOW (CFS)						0.0013	
WATER TEMPERATURE (C)	10.5			11	10	13	
SPEC. COND. (UMHOS/CM) FIELD	581	588	691	550	378	575	638
PH (SU) FIELD	7.6	7.6	7.6	7.8	7.0	7.6	6.4
TURBIDITY (NTU) FIELD	0.02	1.18	0.71	0.5	1.1	0.5	3.2
TOTAL SUSP. SOLIDS							
TOTAL DISS. SOLIDS MEAS.	338	358	382	349	346	355	438
COMMON IONS							
CALCIUM (CA)	68	96	74.68	65.65	120	119.20	96.00
MAGNESIUM (MG)	31.7	16.8	26.18	32.32	<0.10	5.58	38.40
SODIUM (NA)	5.7	6.44	6.66	5.26	8.29	6.23	6.72
POTASSIUM (K)							
ACIDITY AS CACO3	3.8	6	8	<0.01	<0.01	3.00	11.00
ALKALINITY AS CACO3 (LAB)	234	239	242	254	259	260	213
BICARBONATE (HCO3) (LAB)	285.5	292	295	308	316	317	260
HARDNESS (CACO3) TOTAL	302	310	324	261	300	320	400
HYDROXIDE AS OH	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
CARBONATE AS CO3	<0.01	<0.01	<0.01	<0.01	<0.10	<0.10	<0.10
SULFATE (SO4)	66	59	51	93	46	46	140
CHLORIDE (CL)	16.3	8.6	9.1	8.6	9.2	16.0	31.0
NUTRIENTS							
NITRATE (NO3-N)	0.09	0.08	0.29	0.3	0.06	0.07	<0.02
TOTAL PHOSPHATE (PO4)	0.11	<0.04	<0.04	<0.04	<0.04	0.05	<0.04
TRACE ELEMENTS							
BARIUM (BA) TOTAL	0.07	0.06	0.06	0.06	0.06	0.06	0.06
BORON (B) TOTAL	0.05	0.087	0.11	0.04	0.08	0.020	0.030
IRON (FE) TOTAL	<0.01	0.1	<0.01	0.02	0.04	<0.03	<0.03
IRON (FE) DISS	<0.01	<0.01	<0.01	<0.01	<0.03	<0.03	<0.03
MANGANESE (MN) TOTAL	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MANGANESE (MN) DISS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

ALALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE - WRDS # 3

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	-3.5	18	6.9	7.12	8
WATER LEVEL (FT)	7863	7864.2	7863.6	0.42	12
WATER TEMPERATURE (C)	6	12	7.8	1.73	9
SPEC. COND. (UMHOS/CM) FIELD	7110	8500	7430.0	411.37	9
PH (SU) FIELD	6.1	7.65	6.8	0.46	9
TURBIDITY (NTU) FIELD	0.5	458	93.2	182.40	5
COMMON IONS					
ALKALINITY AS CACO3 (LAB)	301	301	301.0	0.00	1
BICARBONATE (HCO3) (LAB)	366	426	395.1	24.01	9
CALCIUM (CA)	557.6	1516	882.7	314.07	9
CARBONATE AS CO3	0.1	0.1	0.1	ERR	8
CHLORIDE (CL)	1330	1800	1521.1	117.89	9
FLUORIDE (FL)	0.16	0.25	0.2	0.04	8
HARDNESS (CACO3) TOTAL	3350	3790	3464.9	161.67	9
MAGNESIUM (MG)	0.1	455.7	298.9	148.59	9
POTASSIUM (K)	4.38	21.3	7.1	5.37	8
SODIUM (NA)	508.6	595.2	551.3	28.08	9
SULFATE (SO4)	1820	2200	2054.1	115.52	9
SULFIDE (S)	0.01	1.2	0.3	0.43	8
TOTAL DISS. SOLIDS MEAS.	5085	6090	5585.7	346.62	9
NUTRIENTS					
AMMONIA (NH3-N)	0.03	0.09	0.1	0.02	8
NITRATE (NO3-N)	0.29	5.15	3.6	1.36	9
NITRITE (NO2-N)	0.01	0.03	0.0	0.01	8
TOTAL PHOSPHATE (PO4)	0.04	2	0.5	0.76	9
TRACE ELEMENTS					
ALUMINUM (AL) DISS	0.001	0.001	0.0	ERR	8
ARSENIC (AR) DISS	0.001	0.002	0.0	0.00	8
BARIUM (BA) TOTAL	0.06	0.06	0.1	0.00	1
BARIUM (BA) DISS	0.01	0.05	0.0	0.01	8
BORON (B) TOTAL	0.45	0.45	0.5	0.00	1
BORON (B) DISS	0.11	0.19	0.1	0.02	8
CADMIUM (CD) DISS	0.001	0.001	0.0	ERR	8
CHROMIUM (CR) DISS	0.001	0.003	0.0	0.00	8
COPPER (CU) DISS	0.01	0.02	0.0	0.00	8
IRON (FE) TOTAL	10.45	10.45	10.5	0.00	1
IRON (FE) DISS	0.01	1.65	0.2	0.51	9
LEAD (PB) DISS	0.001	0.001	0.0	ERR	8
MANGANESE (MN) TOTAL	0.46	0.46	0.5	ERR	1
MANGANESE (MN) DISS	0.01	4	0.5	1.25	9
MERCURY (HG) DISS	0.0002	0.0004	0.0	0.00	8
MOLYDENUM (MO) DISS	0.001	0.01	0.0	0.00	8
NICKEL (NI) DISS	0.01	0.03	0.0	0.01	8
SELENIUM (SE) TOTAL	0.009	0.009	0.0	0.00	1
SELENIUM (SE) DISS	0.01	0.042	0.0	0.01	8
ZINC (ZN) DISS	0.012	0.028	0.0	0.00	8

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 3

STATION LOCATION - WASTE ROCK DISPOSAL SITE

SAMPLE DATE	08/12/87	10/27/87	12/09/87	02/16/88	02/25/88	03/07/88	04/12/88	05/11/88
PHYSICAL PARAMETERS								
AIR TEMPERATURE (C)			0			-1	18	10
WATER LEVEL (FT)	7864.2	7863.9	7863.7	7863.1	7863.6	7863	7863.1	7863.1
WATER TEMPERATURE (C)			7	6.5		7	7	9
SPEC. COND. (UMHOS/CM) FIELD			7440	7200		7300	7300	7200
PH (SU) FIELD			6.8	7.65		7.05	7.05	6.8
TURBIDITY (NTU) FIELD			3			458		
COMMON IONS								
ALKALINITY AS CACO3 (LAB)			301					
BICARBONATE (HCO3) (LAB)			367	373		416	366	416
CALCIUM (CA)			663.4	613.8		557.6	720	835.2
CARBONATE AS CO3				<0.1		<0.1	<0.1	<0.1
CHLORIDE (CL)			1475	1475		1330	1530	1565
FLUORIDE (FL)				0.17		0.16	0.24	0.25
HARDNESS (CACO3) TOTAL			3410	3350		3350	3360	3366
MAGNESIUM (MG)			410.2	455.7		432.4	374.4	306.5
POTASSIUM (K)				21.3		5.4	5.42	4.88
SODIUM (NA)			595.2	574.5		508.6	558.5	518.4
SULFATE (SO4)			2115	2190		2010	1940	1820
SULFIDE (S)				<0.1		<0.01	<0.01	<0.01
TOTAL DISS. SOLIDS MEAS.			6052	5535		5085	5350	5260
NUTRIENTS								
AMMONIA (NH3-N)				0.05		<0.03	0.07	0.08
NITRATE (NO3-N)			3.55	3.25		4.2	3.6	2.85
NITRITE (NO2-N)				<0.02		0.03	<0.01	<0.02
TOTAL PHOSPHATE (PO4)			2	1.85		0.08	<0.04	<0.04
TRACE ELEMENTS								
ALUMINUM (AL) DISS				<0.001		<0.001	<0.001	<0.001
ARSENIC (AR) DISS				<0.001		<0.002	<0.001	<0.001
BARIUM (BA) TOTAL			0.06					
BARIUM (BA) DISS				0.05		0.01	0.02	0.01
BORON (B) TOTAL			0.45					
BORON (B) DISS				0.14		0.19	0.13	0.14
CADMIUM (CD) DISS				<0.001		<0.001	<0.001	<0.001
CHROMIUM (CR) DISS				<0.002		0.002	<0.001	<0.001
COPPER (CU) DISS				<0.01		0.02	<0.01	0.02
IRON (FE) TOTAL			10.45					
IRON (FE) DISS			1.65	<0.01		<0.01	<0.01	<0.01
LEAD (PB) DISS				<0.001		<0.001	<0.001	<0.001
MANGANESE (MN) TOTAL			0.46					
MANGANESE (MN) DISS			0.03	0.03		<0.02	<0.03	0.02
MERCURY (HG) DISS				<0.0002		<0.0002	<0.0002	<0.0002
MOLYDENUM (MO) DISS				<0.01		<0.001	<0.001	<0.001
NICKEL (NI) DISS				0.03		0.02	<0.01	<0.01
SELENIUM (SE) TOTAL			0.009					
SELENIUM (SE) DISS				0.018		0.01	0.023	0.028
ZINC (ZN) DISS				0.018		0.015	0.012	0.018

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 3

STATION LOCATION - WASTE ROCK DISPOSAL SITE

SAMPLE DATE	06/08/88	08/10/88	10/06/88	12/07/88
PHYSICAL PARAMETERS				
AIR TEMPERATURE (C)	13	11	7.5	-3.5
WATER LEVEL (FT)	7863.8	7864.2	7863.8	7863.3
WATER TEMPERATURE (C)	12	8.5	7	6
SPEC. COND. (UMHOS/CM) FIELD	7670	7150	7110	8500
PH (SU) FIELD	6.7	6.1	6.1	7.05
TURBIDITY (NTU) FIELD		0.5	3	1.5
COMMON IONS				
ALKALINITY AS CACO3 (LAB)				
BICARBONATE (HCO3) (LAB)	420	371	426	401
CALCIUM (CA)	828	1516	1360.00	850.00
CARBONATE AS CO3	<0.1	<0.1	<0.1	<0.1
CHLORIDE (CL)	1480	1800	1555	1480
FLUORIDE (FL)	0.22	0.17	0.17	0.24
HARDNESS (CACO3) TOTAL	3370	3790	3730	3458
MAGNESIUM (MG)	312	<0.1	79.20	320.00
POTASSIUM (K)	4.38	5.00	5.58	4.97
SODIUM (NA)	579.2	562.00	525.80	539.80
SULFATE (SO4)	2072	2015	2200	2125
SULFIDE (S)	<0.01	1.20	0.80	<0.10
TOTAL DISS. SOLIDS MEAS.	5399	6090	5980	5520
NUTRIENTS				
AMMONIA (NH3-N)	0.04	0.04	<0.03	0.09
NITRATE (NO3-N)	5	5.15	0.29	4.15
NITRITE (NO2-N)	<0.02	<0.02	<0.02	<0.02
TOTAL PHOSPHATE (PO4)	0.15	0.23	0.05	0.13
TRACE ELEMENTS				
ALUMINUM (AL) DISS	<0.001	<0.001	<0.001	<0.001
ARSENIC (AR) DISS	<0.001	<0.002	<0.001	<0.001
BARIUM (BA) TOTAL				
BARIUM (BA) DISS	0.02	0.01	0.02	0.02
BORON (B) TOTAL				
BORON (B) DISS	0.12	0.110	0.120	0.160
CADMIUM (CD) DISS	0.001	<0.001	<0.001	<0.001
CHROMIUM (CR) DISS	<0.001	<0.002	<0.002	0.003
COPPER (CU) DISS	0.02	0.02	<0.01	<0.01
IRON (FE) TOTAL				
IRON (FE) DISS	<0.03	<0.03	<0.03	<0.03
LEAD (PB) DISS	<0.001	<0.001	<0.001	<0.001
MANGANESE (MN) TOTAL				
MANGANESE (MN) DISS	<0.01	4.00	<0.01	<0.01
MERCURY (HG) DISS	<0.0002	0.0004	<0.0002	<0.0002
MOLYDENUM (MO) DISS	<0.001	<0.010	<0.010	<0.001
NICKEL (NI) DISS	<0.01	<0.02	<0.03	<0.03
SELENIUM (SE) TOTAL				
SELENIUM (SE) DISS	0.017	0.042	0.021	0.015
ZINC (ZN) DISS	0.014	0.028	0.024	0.018

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE - WRDS # 5

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)					
DEPTH (FT)	7940.3	7941.6	7940.9	0.43	9
WATER TEMPERATURE (C)					
SPEC. COND. (UMHOS/CM) FIELD					
PH (SU) FIELD					
TURBIDITY (NTU) FIELD					
COMMON IONS					
ALKALINITY AS CACO3 (LAB)					
BICARBONATE (HCO3) (LAB)					
CALCIUM (CA)					
CARBONATE AS CO3					
CHLORIDE (CL)					
FLUORIDE (FL)					
HARDNESS (CACO3) TOTAL					
MAGNESIUM (MG)					
SODIUM (NA)					
SULFIDE (S)					
SULFATE (SO4)					
TOTAL DISS. SOLIDS MEAS.					
NUTRIENTS					
AMMONIA (NH3-N)					
NITRATE (NO3-N)					
NITRITE (NO2-N)					
TOTAL PHOSPHATE (PO4)					
TRACE ELEMENTS					
ALUMINUM (AL) DISS					
ARSENIC (AR) DISS					
BARIUM (BA) TOTAL					
BARIUM (BA) DISS					
BORON (B) TOTAL					
BORON (B) DISS					
CADMIUM (CD) DISS					
CHROMIUM (CR) DISS					
COPPER (CU) DISS					
IRON (FE) TOTAL					
IRON (FE) DISS					
LEAD (PB) DISS					
MANGANESE (MN) TOTAL					
MANGANESE (MN) DISS					
MERCURY (HG) DISS					
MOLYDENUM (MO) DISS					
NICKEL (NI) DISS					
SELENIUM (SE) TOTAL					
SELENIUM (SE) DISS					
ZINC (ZN) DISS					

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 5

STATION LOCATION - WASTE ROCK DISPOSAL SITE

SAMPLE DATE	08/12/87	10/27/87	12/09/87	02/25/87	03/07/88	04/13/88	05/11/88	06/08/88
PHYSICAL PARAMETERS				STATION NOT ACCESSIBLE	STATION NOT ACCESSIBLE			
AIR TEMPERATURE (C)								
DEPTH (FT)	7941.6	7941.1	7940.7			7940.3	7940.4	7941.4
WATER TEMPERATURE (C)								
SPEC. COND. (UMHOS/CM) FIELD								
PH (SU) FIELD								
TURBIDITY (NTU) FIELD								
COMMON IONS								
ALKALINITY AS CACO3 (LAB)								
BICARBONATE (HCO3) (LAB)								
CALCIUM (CA)								
CARBONATE AS CO3								
CHLORIDE (CL)								
FLUORIDE (FL)								
HARDNESS (CACO3) TOTAL								
MAGNESIUM (MG)								
SODIUM (NA)								
SULFIDE (S)								
SULFATE (SO4)								
TOTAL DISS. SOLIDS MEAS.								
NUTRIENTS								
AMMONIA (NH3-N)								
NITRATE (NO3-N)								
NITRITE (NO2-N)								
TOTAL PHOSPHATE (PO4)								
TRACE ELEMENTS								
ALUMINUM (AL) DISS								
ARSENIC (AR) DISS								
BARIUM (BA) TOTAL								
BARIUM (BA) DISS								
BORON (B) TOTAL								
BORON (B) DISS								
CADMIUM (CD) DISS								
CHROMIUM (CR) DISS								
COPPER (CU) DISS								
IRON (FE) TOTAL								
IRON (FE) DISS								
LEAD (PB) DISS								
MANGANESE (MN) TOTAL								
MANGANESE (MN) DISS								
MERCURY (HG) DISS								
MOLYDENUM (MO) DISS								
NICKEL (NI) DISS								
SELENIUM (SE) TOTAL								
SELENIUM (SE) DISS								
ZINC (ZN) DISS								

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 5

STATION LOCATION - WASTE ROCK DISPOSAL SITE

SAMPLE DATE	08/09/88	10/06/88	12/07/88
PHYSICAL PARAMETERS			
AIR TEMPERATURE (C)			
DEPTH (FT)	7941.1	7940.5	7940.9
WATER TEMPERATURE (C)			
SPEC. COND. (UMHOS/CM) FIELD			
PH (SU) FIELD			
TURBIDITY (NTU) FIELD			
COMMON IONS			
ALKALINITY AS CACO3 (LAB)			
BICARBONATE (HCO3) (LAB)			
CALCIUM (CA)			
CARBONATE AS CO3			
CHLORIDE (CL)			
FLUORIDE (FL)			
HARDNESS (CACO3) TOTAL			
MAGNESIUM (MG)			
SODIUM (NA)			
SULFIDE (S)			
SULFATE (SO4)			
TOTAL DISS. SOLIDS MEAS.			
NUTRIENTS			
AMMONIA (NH3-N)			
NITRATE (NO3-N)			
NITRITE (NO2-N)			
TOTAL PHOSPHATE (PO4)			
TRACE ELEMENTS			
ALUMINUM (AL) DISS			
ARSENIC (AR) DISS			
BARIUM (BA) TOTAL			
BARIUM (BA) DISS			
BORON (B) TOTAL			
BORON (B) DISS			
CADMIUM (CD) DISS			
CHROMIUM (CR) DISS			
COPPER (CU) DISS			
IRON (FE) TOTAL			
IRON (FE) DISS			
LEAD (PB) DISS			
MANGANESE (MN) TOTAL			
MANGANESE (MN) DISS			
MERCURY (HG) DISS			
MOLYDENUM (MO) DISS			
NICKEL (NI) DISS			
SELENIUM (SE) TOTAL			
SELENIUM (SE) DISS			
ZINC (ZN) DISS			

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE - WRDS # 6

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	-4	17	7.1	7.25	8
WATER LEVEL (FT)	7884.6	7891.4	7888.6	2.43	12
WATER TEMPERATURE (C)	6	9	7.9	1.21	9
SPEC. COND. (UMHOS/CM) FIELD	5530	8900	7237.8	809.56	9
PH (SU) FIELD	6	7.6	6.8	0.45	9
TURBIDITY (NTU) FIELD	0.5	3	1.6	1.14	4
COMMON IONS					
ALKALINITY AS CACO3 (LAB)	322	322	322.0	0.00	1
BICARBONATE (HCO3) (LAB)	383	434	407.6	20.26	9
CALCIUM (CA)	525.8	1428	860.5	338.85	9
CARBONATE AS CO3	0.1	0.1	0.1	ERR	8
CHLORIDE (CL)	1130	1450	1233.6	92.48	9
FLUORIDE (FL)	0.13	0.18	0.2	0.01	8
HARDNESS (CACO3) TOTAL	3360	4170	3835.8	240.17	9
MAGNESIUM (MG)	60.48	580.1	403.9	183.29	9
POTASSIUM (K)	11.46	17.5	13.2	1.74	8
SODIUM (NA)	465.2	561.5	520.7	27.64	9
SULFATE (SO4)	2650	3035	2736.7	112.10	9
SULFIDE (S)	0.01	0.8	0.2	0.26	8
TOTAL DISS. SOLIDS MEAS.	5535	6918	6130.1	427.39	9
NUTRIENTS					
AMMONIA (NH3-N)	0.03	0.09	0.1	0.02	8
NITRATE (NO3-N)	0.1	3.1	2.0	1.03	9
NITRITE (NO2-N)	0.01	0.03	0.0	0.01	8
TOTAL PHOSPHATE (PO4)	0.04	0.45	0.2	0.13	9
TRACE ELEMENTS					
ALUMINUM (AL) DISS	0.001	0.001	0.0	ERR	8
ARSENIC (AR) DISS	0.001	0.002	0.0	0.00	8
BARIUM (BA) TOTAL	0.07	0.07	0.1	ERR	1
BARIUM (BA) DISS	0.01	0.06	0.0	0.02	8
BORON (B) TOTAL	0.42	0.42	0.4	ERR	1
BORON (B) DISS	0.08	0.16	0.1	0.03	8
CADMIUM (CD) DISS	0.001	0.002	0.0	0.00	8
CHROMIUM (CR) DISS	0.001	0.005	0.0	0.00	8
COPPER (CU) DISS	0.01	0.03	0.0	0.01	8
IRON (FE) TOTAL	20	20	20.0	0.00	1
IRON (FE) DISS	0.01	1.4	0.2	0.43	9
LEAD (PB) DISS	0.001	0.001	0.0	ERR	8
MANGANESE (MN) TOTAL	0.26	0.26	0.3	0.00	1
MANGANESE (MN) DISS	0.01	0.03	0.0	0.01	9
MERCURY (HG) DISS	0.0002	0.0002	0.0	ERR	8
MOLYDENUM (MO) DISS	0.001	0.01	0.0	0.00	8
NICKEL (NI) DISS	0.01	0.03	0.0	0.01	8
SELENIUM (SE) TOTAL	0.009	0.009	0.0	0.00	1
SELENIUM (SE) DISS	0.001	0.014	0.0	0.00	8
ZINC (ZN) DISS	0.005	0.041	0.0	0.01	8

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 6

STATION LOCATION - WASTE ROCK DISPOSAL SITE

SAMPLE DATE	08/12/87	10/27/87	12/09/87	02/16/88	02/25/88	03/07/88	04/13/88	05/11/88
PHYSICAL PARAMETERS								
AIR TEMPERATURE (C)			1			-1	17	12
WATER LEVEL (FT)	7886.0	7886.2	7886.1	7884.6	7890.1	7889.7	7886.1	7890.3
WATER TEMPERATURE (C)			9	6.5		7	9	9
SPEC. COND. (UMHOS/CM) FIELD			7400	7100		7300	7200	7100
PH (SU) FIELD			6.7	7.6		7.05	6.7	6.9
TURBIDITY (NTU) FIELD			3					
COMMON IONS								
ALKALINITY AS CACO3 (LAB)			322					
BICARBONATE (HCO3) (LAB)			393	386		434	392	427
CALCIUM (CA)			624.6	583.7		525.8	636	1388
CARBONATE AS CO3				0.10		<0.10	<0.10	<0.10
CHLORIDE (CL)			1240	1300		1130	1185	1170
FLUORIDE (FL)				0.16		0.14	0.15	0.15
HARDNESS (CACO3) TOTAL			3850	3750		3730	3750	4100
MAGNESIUM (MG)			544	580.1		569.6	518.4	60.48
POTASSIUM (K)				17.5		13.21	13.54	12.16
SODIUM (NA)			536.3	503.1		465.2	519	506.4
SULFATE (SO4)			2700	2680		2655	2675	2730
SULFIDE (S)				<0.10		<0.01	<0.01	<0.01
TOTAL DISS. SOLIDS MEAS.			6918	6216		5535	5751	6100
NUTRIENTS								
AMMONIA (NH3-N)				0.08		<0.03	0.09	0.08
NITRATE (NO3-N)			2.5	2.7		2.55	2.7	1.8
NITRITE (NO2-N)				<0.02		0.03	<0.01	<0.02
TOTAL PHOSPHATE (PO4)			0.26	0.45		0.16	0.21	0.1
TRACE ELEMENTS								
ALUMINUM (AL) DISS				<0.001		<0.001	<0.001	<0.001
ARSENIC (AR) DISS				<0.001		<0.002	<0.001	<0.001
BARIUM (BA) TOTAL			0.07					
BARIUM (BA) DISS				0.06		0.01	0.02	0.01
BORON (B) TOTAL			0.42					
BORON (B) DISS				0.1		0.14	0.100	0.1
CADMIUM (CD) DISS				<0.001		<0.001	<0.001	<0.001
CHROMIUM (CR) DISS				0.003		0.004	<0.001	<0.001
COPPER (CU) DISS				0.02		0.02	0.03	0.03
IRON (FE) TOTAL			20					
IRON (FE) DISS			1.4	<0.01		<0.01	<0.01	<0.01
LEAD (PB) DISS				<0.001		<0.001	<0.001	<0.001
MANGANESE (MN) TOTAL			0.26					
MANGANESE (MN) DISS			0.02	0.02		0.02	0.03	0.02
MERCURY (HG) DISS				<0.0002		<0.0002	<0.0002	<0.0002
MOLYDENUM (MO) DISS				<0.010		<0.001	<0.001	<0.001
NICKEL (NI) DISS				0.02		<0.01	<0.01	<0.01
SELENIUM (SE) TOTAL			0.009					
SELENIUM (SE) DISS				0.013		0.009	0.010	<0.001
ZINC (ZN) DISS				0.010		0.019	<0.005	0.015

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 6

STATION LOCATION - WASTE ROCK DISPOSAL SITE

SAMPLE DATE	06/08/88	08/10/88	10/06/88	12/07/88
PHYSICAL PARAMETERS				
AIR TEMPERATURE (C)	14	12	6	-4
WATER LEVEL (FT)	7891.3	7891.4	7890.9	7890.4
WATER TEMPERATURE (C)	9	9	7	6
SPEC. COND. (UMHOS/CM) FIELD	7570	7040	5530	8900
PH (SU) FIELD	6.7	6.2	6.0	7.05
TURBIDITY (NTU) FIELD		0.5	0.5	2.5
COMMON IONS				
ALKALINITY AS CACO3 (LAB)				
BICARBONATE (HCO3) (LAB)	432	383	426	395
CALCIUM (CA)	692	1428	1156.00	710.00
CARBONATE AS CO3	<0.10	<0.10	<0.10	<0.10
CHLORIDE (CL)	1142	1450	1245	1240
FLUORIDE (FL)	0.18	0.13	0.14	0.16
HARDNESS (CACO3) TOTAL	3360	4100	4170	3712
MAGNESIUM (MG)	463.2	127.20	307.20	465.00
POTASSIUM (K)	12.11	12.60	12.92	11.46
SODIUM (NA)	554.5	561.50	530.80	509.40
SULFATE (SO4)	2730	2775	3035	2650
SULFIDE (S)	0.8	<0.10	0.40	<0.10
TOTAL DISS. SOLIDS MEAS.	5821	6550	6490	5790
NUTRIENTS				
AMMONIA (NH3-N)	0.08	0.08	0.04	0.05
NITRATE (NO3-N)	3.1	0.30	0.10	2.60
NITRITE (NO2-N)	<0.02	<0.02	<0.02	<0.02
TOTAL PHOSPHATE (PO4)	<0.04	0.32	<0.04	0.07
TRACE ELEMENTS				
ALUMINUM (AL) DISS	<0.001	<0.001	<0.001	<0.001
ARSENIC (AR) DISS	<0.001	<0.002	<0.002	<0.001
BARIUM (BA) TOTAL				
BARIUM (BA) DISS	0.02	0.01	0.02	0.02
BORON (B) TOTAL				
BORON (B) DISS	0.1	0.080	0.090	0.160
CADMIUM (CD) DISS	0.002	<0.001	<0.001	<0.001
CHROMIUM (CR) DISS	0.003	<0.002	<0.002	0.005
COPPER (CU) DISS	0.03	0.03	<0.01	<0.01
IRON (FE) TOTAL				
IRON (FE) DISS	<0.03	<0.03	<0.03	<0.03
LEAD (PB) DISS	<0.001	<0.001	<0.001	<0.001
MANGANESE (MN) TOTAL				
MANGANESE (MN) DISS	0.03	0.03	<0.01	0.02
MERCURY (HG) DISS	<0.0002	<0.0002	<0.0002	<0.0002
MOLYDENUM (MO) DISS	<0.001	<0.001	<0.010	<0.010
NICKEL (NI) DISS	<0.01	<0.02	<0.03	<0.03
SELENIUM (SE) TOTAL				
SELENIUM (SE) DISS	0.009	0.014	0.014	0.009
ZINC (ZN) DISS	0.01	0.041	0.032	0.027

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE - WRDS # 7

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)					
DEPTH (FT)	7898.9	7903.1	7900.35	1.73	6
WATER TEMPERATURE (C)					
SPEC. COND. (UMHOS/CM) FIELD					
PH (SU) FIELD					
TURBIDITY (NTU) FIELD					
COMMON IONS					
ALKALINITY AS CACO3 (LAB)					
BICARBONATE (HCO3) (LAB)					
CALCIUM (CA)					
CARBONATE AS CO3					
CHLORIDE (CL)					
FLUORIDE (FL)					
HARDNESS (CACO3) TOTAL					
MAGNESIUM (MG)					
SODIUM (NA)					
SULFIDE (S)					
SULFATE (SO4)					
TOTAL DISS. SOLIDS MEAS.					
NUTRIENTS					
AMMONIA (NH3-N)					
NITRATE (NO3-N)					
NITRITE (NO2-N)					
TOTAL PHOSPHATE (PO4)					
TRACE ELEMENTS					
ALUMINUM (AL) DISS					
ARSENIC (AR) DISS					
BARIUM (BA) TOTAL					
BARIUM (BA) DISS					
BORON (B) TOTAL					
BORON (B) DISS					
CADMIUM (CD) DISS					
CHROMIUM (CR) DISS					
COPPER (CU) DISS					
IRON (FE) TOTAL					
IRON (FE) DISS					
LEAD (PB) DISS					
MANGANESE (MN) TOTAL					
MANGANESE (MN) DISS					
MERCURY (HG) DISS					
MOLYDENUM (MO) DISS					
NICKEL (NI) DISS					
SELENIUM (SE) TOTAL					
SELENIUM (SE) DISS					
ZINC (ZN) DISS					

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 7

SAMPLE DATE	10/27/87	12/09/87	02/25/88	03/07/88	04/13/88	05/11/88	06/08/88 WELL BLOCKED
PHYSICAL PARAMETERS							
AIR TEMPERATURE (C)							
DEPTH (FT)	7898.9	7898.9	7898.8	7900.1	7902.3	7903.1	
WATER TEMPERATURE (C)							
SPEC. COND. (UMHOS/CM) FIELD							
PH (SU) FIELD							
TURBIDITY (NTU) FIELD							
COMMON IONS							
ALKALINITY AS CACO3 (LAB)							
BICARBONATE (HCO3) (LAB)							
CALCIUM (CA)							
CARBONATE AS CO3							
CHLORIDE (CL)							
FLUORIDE (FL)							
HARDNESS (CACO3) TOTAL							
MAGNESIUM (MG)							
SODIUM (NA)							
SULFIDE (S)							
SULFATE (SO4)							
TOTAL DISS. SOLIDS MEAS.							
NUTRIENTS							
AMMONIA (NH3-N)							
NITRATE (NO3-N)							
NITRITE (NO2-N)							
TOTAL PHOSPHATE (PO4)							
TRACE ELEMENTS							
ALUMINUM (AL) DISS							
ARSENIC (AR) DISS							
BARIUM (BA) TOTAL							
BARIUM (BA) DISS							
BORON (B) TOTAL							
BORON (B) DISS							
CADMIUM (CD) DISS							
CHROMIUM (CR) DISS							
COPPER (CU) DISS							
IRON (FE) TOTAL							
IRON (FE) DISS							
LEAD (PB) DISS							
MANGANESE (MN) TOTAL							
MANGANESE (MN) DISS							
MERCURY (HG) DISS							
MOLYDENUM (MO) DISS							
NICKEL (NI) DISS							
SELENIUM (SE) TOTAL							
SELENIUM (SE) DISS							
ZINC (ZN) DISS							

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE - WRDS # 8

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)	-5	18	7.6	7.69	7
WATER LEVEL (FT)	7910.7	7913.5	7911.9	1.08	8
WATER TEMPERATURE (C)	6	14	9.1	2.25	7
SPEC. COND. (UMHOS/CM) FIELD	3180	7300	4461.4	1769.23	7
PH (SU) FIELD	6.5	7.25	6.85	0.26	7
TURBIDITY (NTU) FIELD	0.3	2	0.93	0.76	3
COMMON IONS					
ALKALINITY AS CACO3 (LAB)	ERR	ERR	ERR	ERR	0
BICARBONATE (HCO3) (LAB)	326	355	345.0	11.59	7
CALCIUM (CA)	299	708	472.3	148.44	7
CARBONATE AS CO3	0.1	0.1	0.1	ERR	7
CHLORIDE (CL)	466	610	533.7	39.81	7
FLUORIDE (FL)	0.08	0.29	0.23	0.07	7
HARDNESS (CACO3) TOTAL	1304	1590	1420.6	89.92	7
MAGNESIUM (MG)	0.01	134.4	61.3	58.49	7
POTASSIUM (K)	4.74	5.86	5.41	0.37	7
SODIUM (NA)	212.2	249.5	230.4	13.26	7
SULFATE (SO4)	695	1135	852.9	137.47	7
SULFIDE (S)	0.01	2.8	0.53	0.96	7
TOTAL DISS. SOLIDS MEAS.	2065	2792	2332.7	229.07	7
NUTRIENTS					
AMMONIA (NH3-N)	0.03	0.14	0.06	0.04	7
NITRATE (NO3-N)	0.02	0.35	0.12	0.10	7
NITRITE (NO2-N)	0.01	0.03	0.02	0.01	7
TOTAL PHOSPHATE (PO4)	0.08	0.93	0.39	0.28	7
TRACE ELEMENTS					
ALUMINUM (AL) DISS	0.001	0.001	0.001	ERR	7
ARSENIC (AR) DISS	0.001	0.002	0.001	0.00	7
BARIUM (BA) TOTAL	ERR	ERR	ERR	ERR	0
BARIUM (BA) DISS	0.01	0.02	0.01	0.00	7
BORON (B) TOTAL	ERR	ERR	ERR	ERR	0
BORON (B) DISS	0.01	0.14	0.10	0.04	7
CADMIUM (CD) DISS	0.001	0.001	0.001	ERR	7
CHROMIUM (CR) DISS	0.001	0.002	0.001	0.00	7
COPPER (CU) DISS	0.01	0.02	0.01	0.00	7
IRON (FE) TOTAL	ERR	ERR	ERR	ERR	0
IRON (FE) DISS	0.01	0.03	0.02	0.01	7
LEAD (PB) DISS	0.001	0.001	0.001	ERR	7
MANGANESE (MN) TOTAL	ERR	ERR	ERR	ERR	0
MANGANESE (MN) DISS	0.01	0.01	0.01	ERR	7
MERCURY (HG) DISS	0.0002	0.0002	0.0002	0.00	7
MOLYDENUM (MO) DISS	0.001	0.01	0.002	0.00	7
NICKEL (NI) DISS	0.01	0.03	0.02	0.01	7
SELENIUM (SE) TOTAL	ERR	ERR	ERR	ERR	0
SELENIUM (SE) DISS	0.001	0.004	0.002	0.00	7
ZINC (ZN) DISS	0.005	0.048	0.017	0.01	7

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT. THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS #8

STATION LOCATION - WASTE ROCK DISPOSAL SITE

SAMPLE DATE	02/25/88	03/07/88	04/13/88	05/11/88	06/08/88	08/10/88	10/06/88	12/07/88
PHYSICAL PARAMETERS								
AIR TEMPERATURE (C)		-2	18	7	13	12	10	-5
WATER LEVEL (FT)	7911.0	7911.3	7910.8	7913.5	7913.5	7912.2	7910.7	7912.4
WATER TEMPERATURE (C)		8	9	9	14	9.5	8.5	6
SPEC. COND. (UMHOS/CM) FIELD		7200	7300	3200	3470	3180	3280	3600
PH (SU) FIELD		6.6	7.05	7.05	6.9	6.6	6.5	7.25
TURBIDITY (NTU) FIELD						0.3	2	0.5
COMMON IONS								
ALKALINITY AS CACO3 (LAB)								
BICARBONATE (HCO3) (LAB)		348	328	354	353	351	355	326
CALCIUM (CA)		299	344	299.2	528	598.00	708.00	530.00
CARBONATE AS CO3		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
CHLORIDE (CL)		510	534	538	544	610	534	466
FLUORIDE (FL)		0.28	0.29	0.08	0.27	0.24	0.26	0.18
HARDNESS (CACO3) TOTAL		1380	1340	1304	1400	1495	1590	1435
MAGNESIUM (MG)		134.4	115.2	133.44	19.2	<0.01	<0.10	26.40
POTASSIUM (K)		5.81	5.86	5.43	5.54	5.43	5.08	4.74
SODIUM (NA)		212.2	240	214.23	249.5	241.50	223.00	232.40
SULFATE (SO4)		760	780	695	830	810	1135	960
SULFIDE (S)		<0.01	<0.01	<0.01	<0.01	0.80	2.80	<0.10
TOTAL DISS. SOLIDS MEAS.		2110	2188	2065	2355	2440	2792	2379
NUTRIENTS								
AMMONIA (NH3-N)		<0.03	0.14	0.05	0.1	<0.03	<0.03	<0.03
NITRATE (NO3-N)		0.06	0.12	0.1	0.35	0.17	<0.02	0.04
NITRITE (NO2-N)		0.03	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
TOTAL PHOSPHATE (PO4)		0.93	0.36	0.3	0.08	0.21	0.65	0.17
TRACE ELEMENTS								
ALUMINUM (AL) DISS		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
ARSENIC (AR) DISS		<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001
BARIUM (BA) TOTAL								
BARIUM (BA) DISS		0.01	0.02	0.01	0.01	0.01	0.01	<0.01
BORON (B) TOTAL								
BORON (B) DISS		0.14	0.110	0.12	0.01	0.090	0.100	0.100
CADMIUM (CD) DISS		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CHROMIUM (CR) DISS		<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002
COPPER (CU) DISS		<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
IRON (FE) TOTAL								
IRON (FE) DISS		<0.01	<0.01	<0.01	<0.03	<0.03	<0.03	<0.03
LEAD (PB) DISS		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MANGANESE (MN) TOTAL								
MANGANESE (MN) DISS		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MERCURY (HG) DISS		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
MOLYDENUM (MO) DISS		<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
NICKEL (NI) DISS		<0.01	<0.01	<0.01	<0.01	<0.02	<0.03	<0.03
SELENIUM (SE) TOTAL								
SELENIUM (SE) DISS		0.003	<0.001	<0.001	<0.001	0.003	0.004	<0.001
ZINC (ZN) DISS		0.008	<0.005	0.016	0.006	0.048	0.012	0.021

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

STATISTICAL SUMMARY OF WATER QUALITY ANALYSES FOR SITE - WRDS # 9

	RANGE MIN	RANGE MAX	MEAN	STANDARD DEVIATION	NUMBER OF SAMPLES
PHYSICAL PARAMETERS					
AIR TEMPERATURE (C)					
DEPTH (FT)	7874.6	7879.7	7876.73	1.74	6
WATER TEMPERATURE (C)					
SPEC. COND. (UMHOS/CM) FIELD					
PH (SU) FIELD					
TURBIDITY (NTU) FIELD					
COMMON IONS					
ALKALINITY AS CACO3 (LAB)					
BICARBONATE (HCO3) (LAB)					
CALCIUM (CA)					
CARBONATE AS CO3					
CHLORIDE (CL)					
FLUORIDE (FL)					
HARDNESS (CACO3) TOTAL					
MAGNESIUM (MG)					
SODIUM (NA)					
SULFIDE (S)					
SULFATE (SO4)					
TOTAL DISS. SOLIDS MEAS.					
NUTRIENTS					
AMMONIA (NH3-N)					
NITRATE (NO3-N)					
NITRITE (NO2-N)					
TOTAL PHOSPHATE (PO4)					
TRACE ELEMENTS					
ALUMINUM (AL) DISS					
ARSENIC (AR) DISS					
BARIUM (BA) TOTAL					
BARIUM (BA) DISS					
BORON (B) TOTAL					
BORON (B) DISS					
CADMIUM (CD) DISS					
CHROMIUM (CR) DISS					
COPPER (CU) DISS					
IRON (FE) TOTAL					
IRON (FE) DISS					
LEAD (PB) DISS					
MANGANESE (MN) TOTAL					
MANGANESE (MN) DISS					
MERCURY (HG) DISS					
MOLYDENUM (MO) DISS					
NICKEL (NI) DISS					
SELENIUM (SE) TOTAL					
SELENIUM (SE) DISS					
ZINC (ZN) DISS					

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED. FOR VALUES BELOW THE DETECTION LIMIT, THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS.

SUMMARY OF WATER QUALITY
ANALYSES SUFCO - WRDS # 9

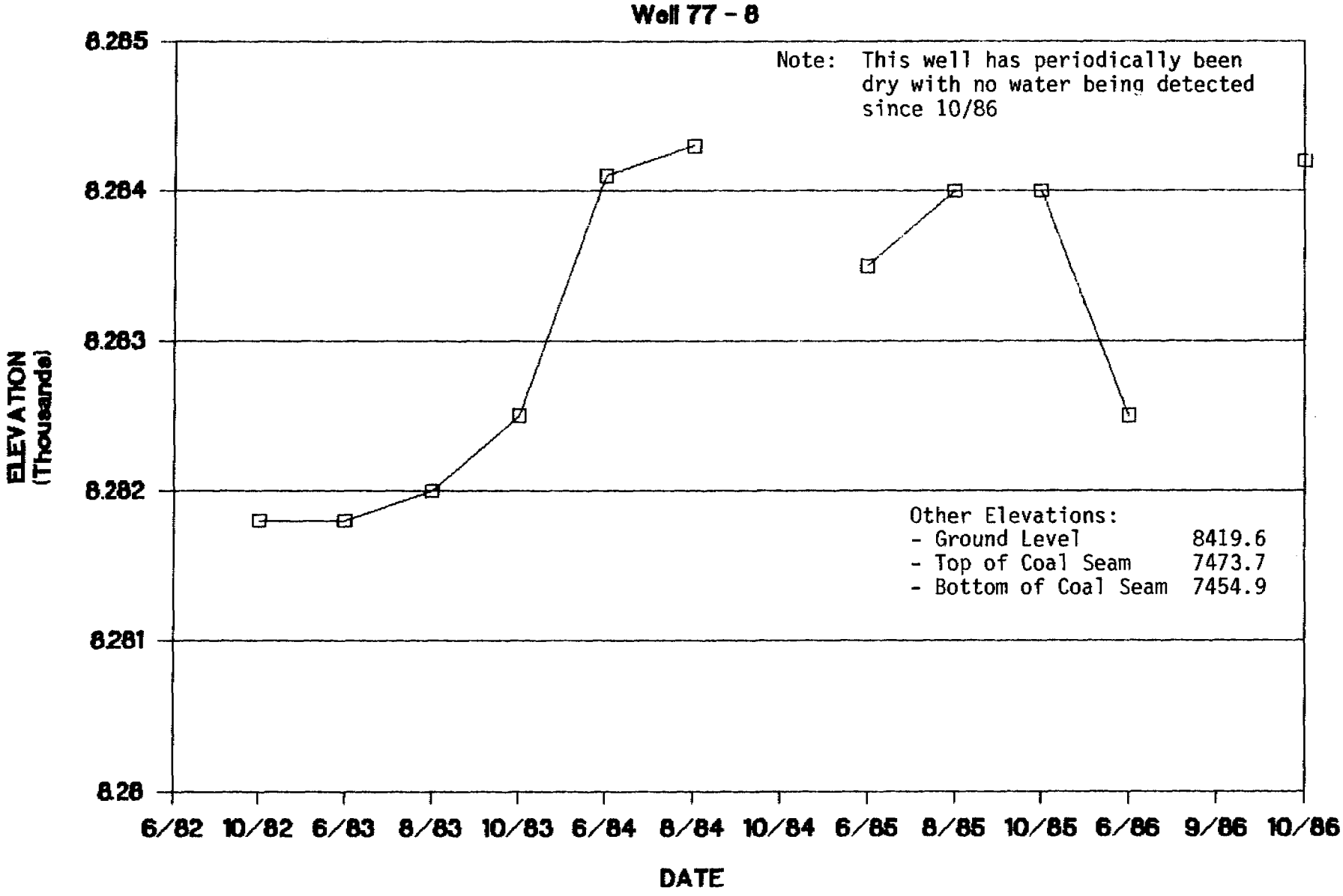
SAMPLE DATE	02/25/88	03/07/88	04/13/88	05/11/88	06/08/88	08/09/88	10/05/88 WELL DRY	12/07/88 WELL DRY
PHYSICAL PARAMETERS								
AIR TEMPERATURE (C)								
DEPTH (FT)	7879.7	7874.8	7877.7	7877.1	7876.5	7874.6		
WATER TEMPERATURE (C)								
SPEC. COND. (UMHOS/CM) FIELD								
PH (SU) FIELD								
TURBIDITY (NTU) FIELD								
COMMON IONS								
ALKALINITY AS CACO3 (LAB)								
BICARBONATE (HCO3) (LAB)								
CALCIUM (CA)								
CARBONATE AS CO3								
CHLORIDE (CL)								
FLUORIDE (FL)								
HARDNESS (CACO3) TOTAL								
MAGNESIUM (MG)								
SODIUM (NA)								
SULFIDE (S)								
SULFATE (SO4)								
TOTAL DISS. SOLIDS MEAS.								
NUTRIENTS								
AMMONIA (NH3-N)								
NITRATE (NO3-N)								
NITRITE (NO2-N)								
TOTAL PHOSPHATE (PO4)								
TRACE ELEMENTS								
ALUMINUM (AL) DISS								
ARSENIC (AR) DISS								
BARIUM (BA) TOTAL								
BARIUM (BA) DISS								
BORON (B) TOTAL								
BORON (B) DISS								
CADMIUM (CD) DISS								
CHROMIUM (CR) DISS								
COPPER (CU) DISS								
IRON (FE) TOTAL								
IRON (FE) DISS								
LEAD (PB) DISS								
MANGANESE (MN) TOTAL								
MANGANESE (MN) DISS								
MERCURY (HG) DISS								
MOLYDENUM (MO) DISS								
NICKEL (NI) DISS								
SELENIUM (SE) TOTAL								
SELENIUM (SE) DISS								
ZINC (ZN) DISS								

ALL QUANTITIES IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.

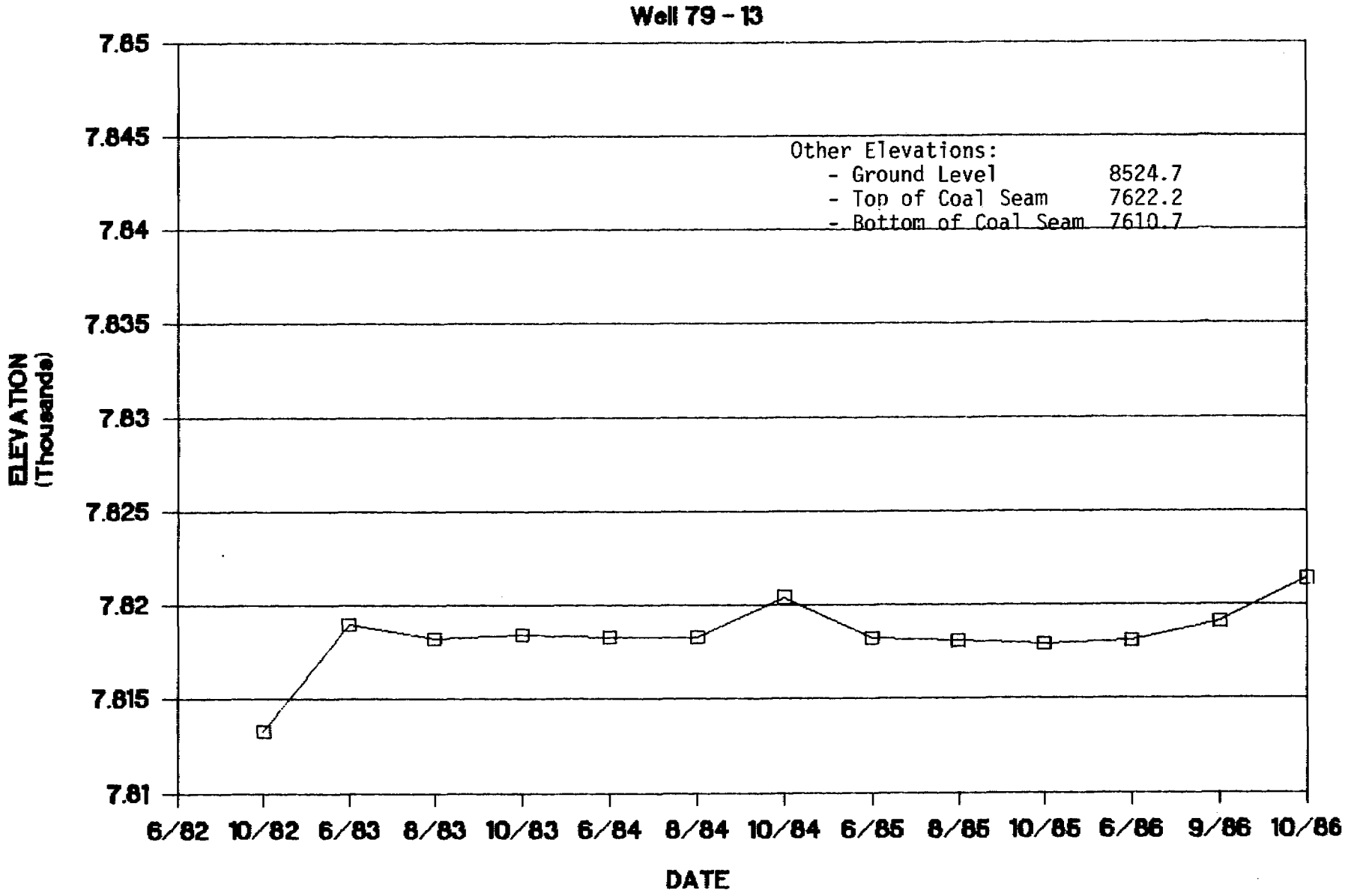
NOTE: The following wells have been dry during the period of record. No graphs are presented for these wells

77-7
77-9
79-9
79-10
79-12

WELL WATER LEVEL 1982 – 1986

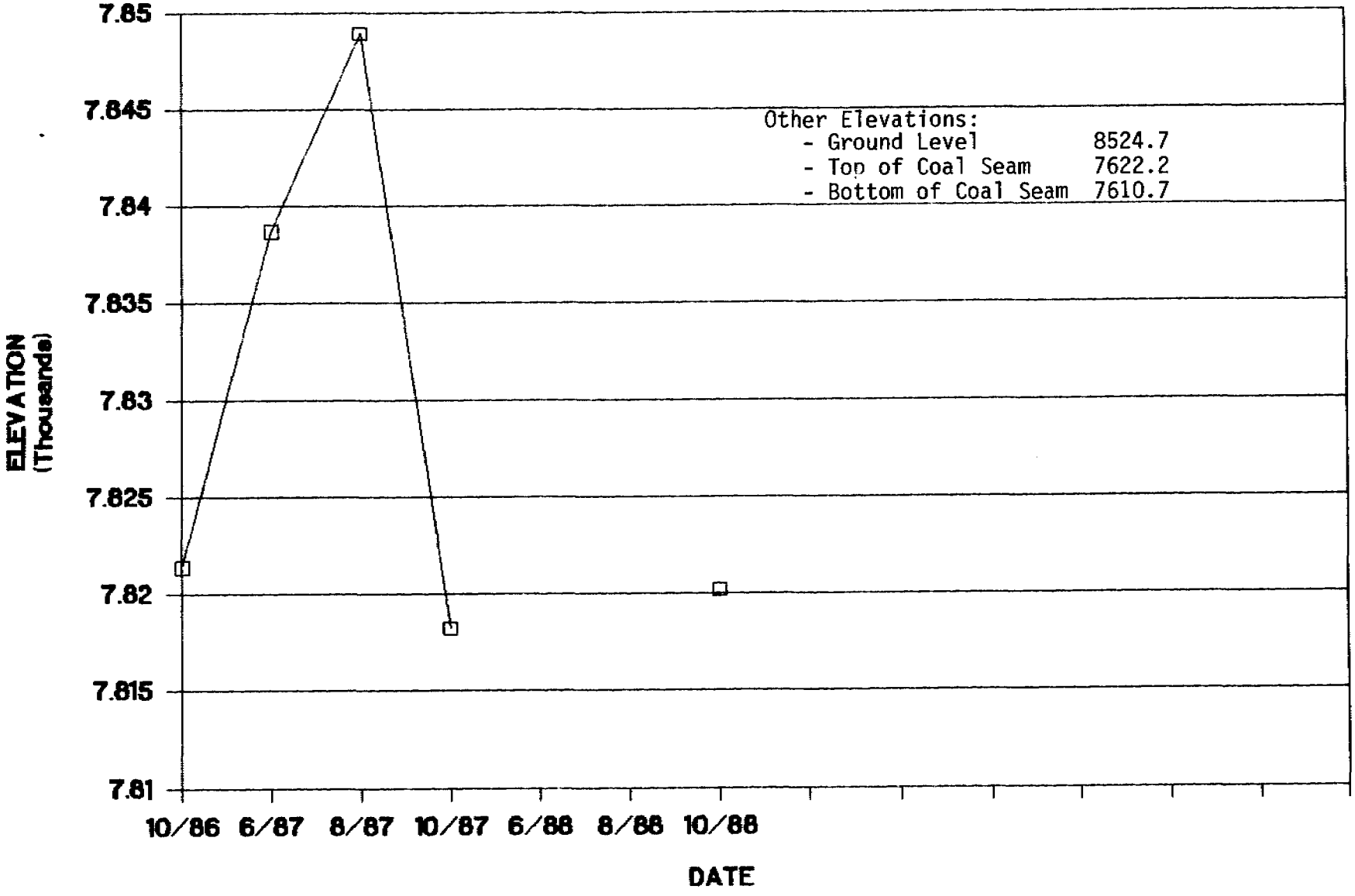


WELL WATER LEVEL 1982 – 1986

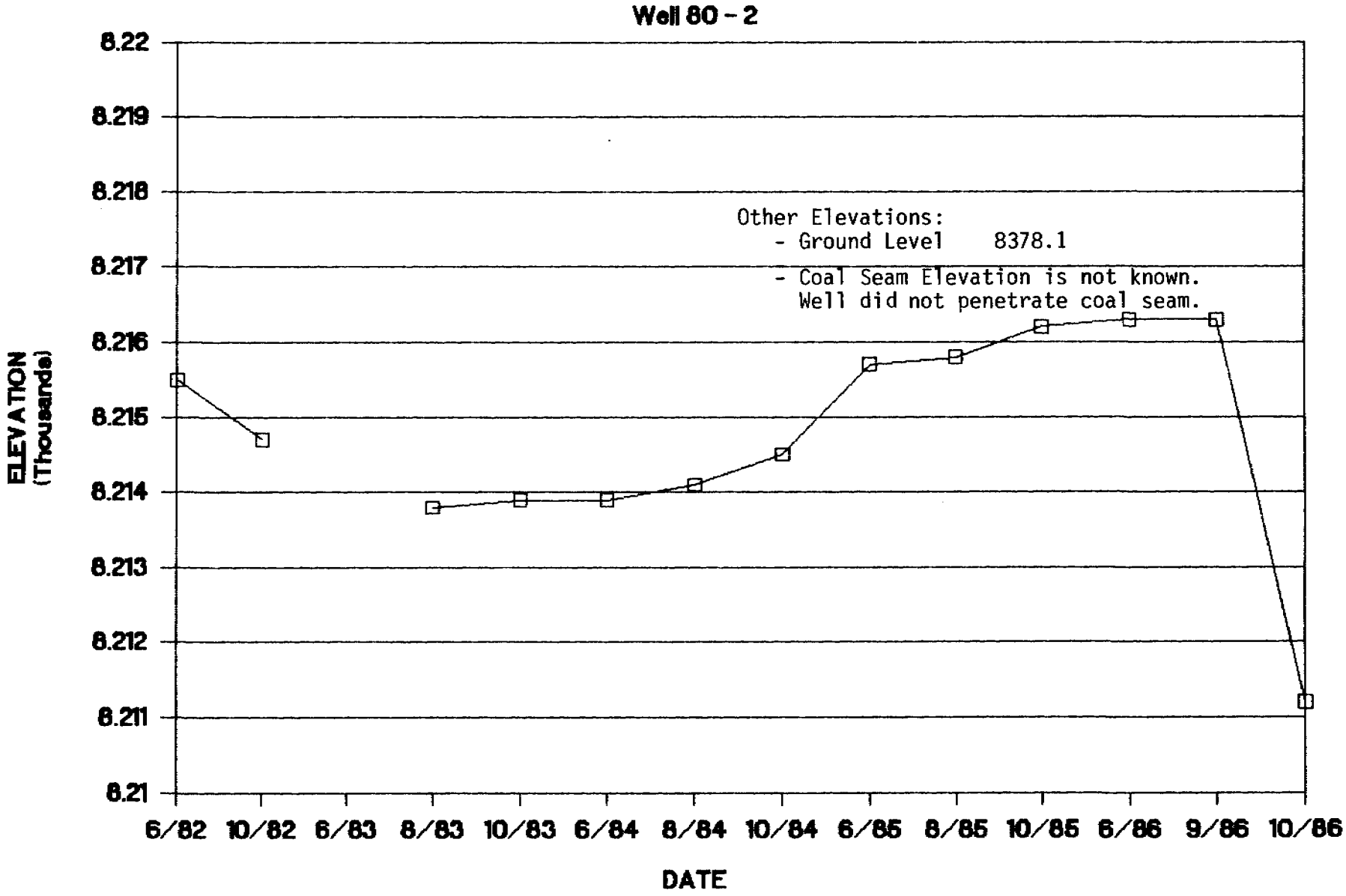


WELL WATER LEVEL 1987 -

Well 79 - 13

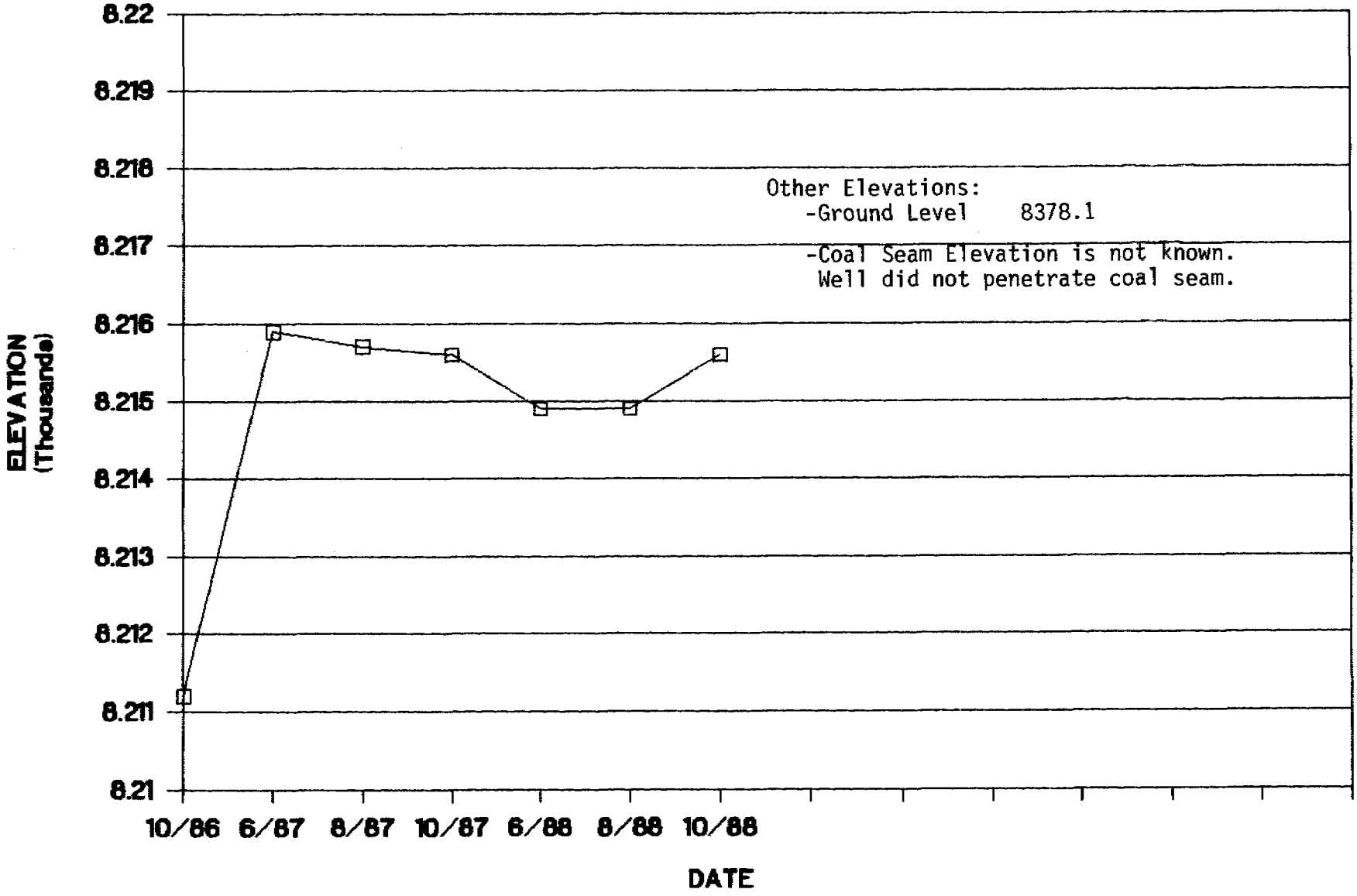


WELL WATER LEVEL 1982 – 1986

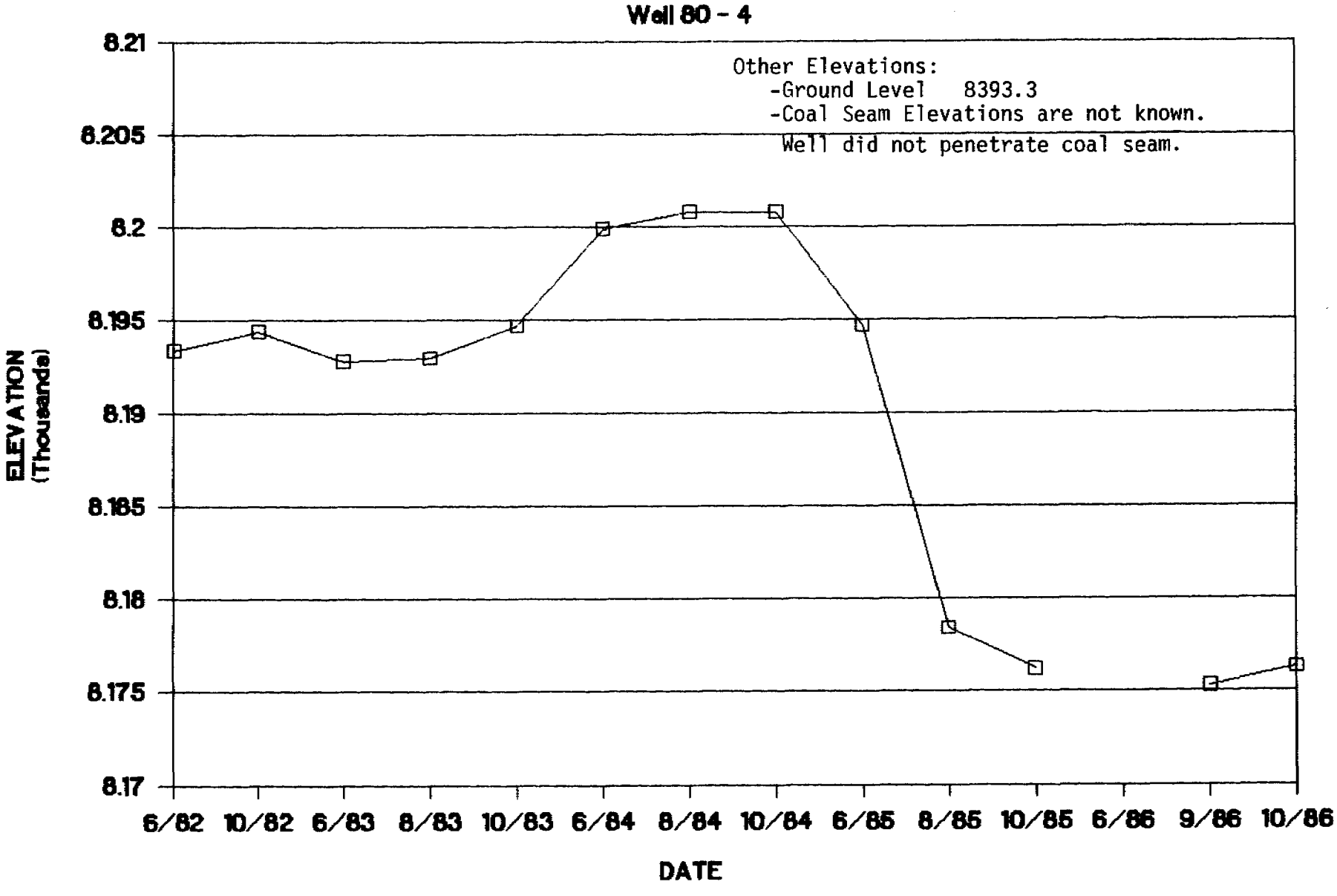


WELL WATER LEVEL 1987 –

Well 80 - 2

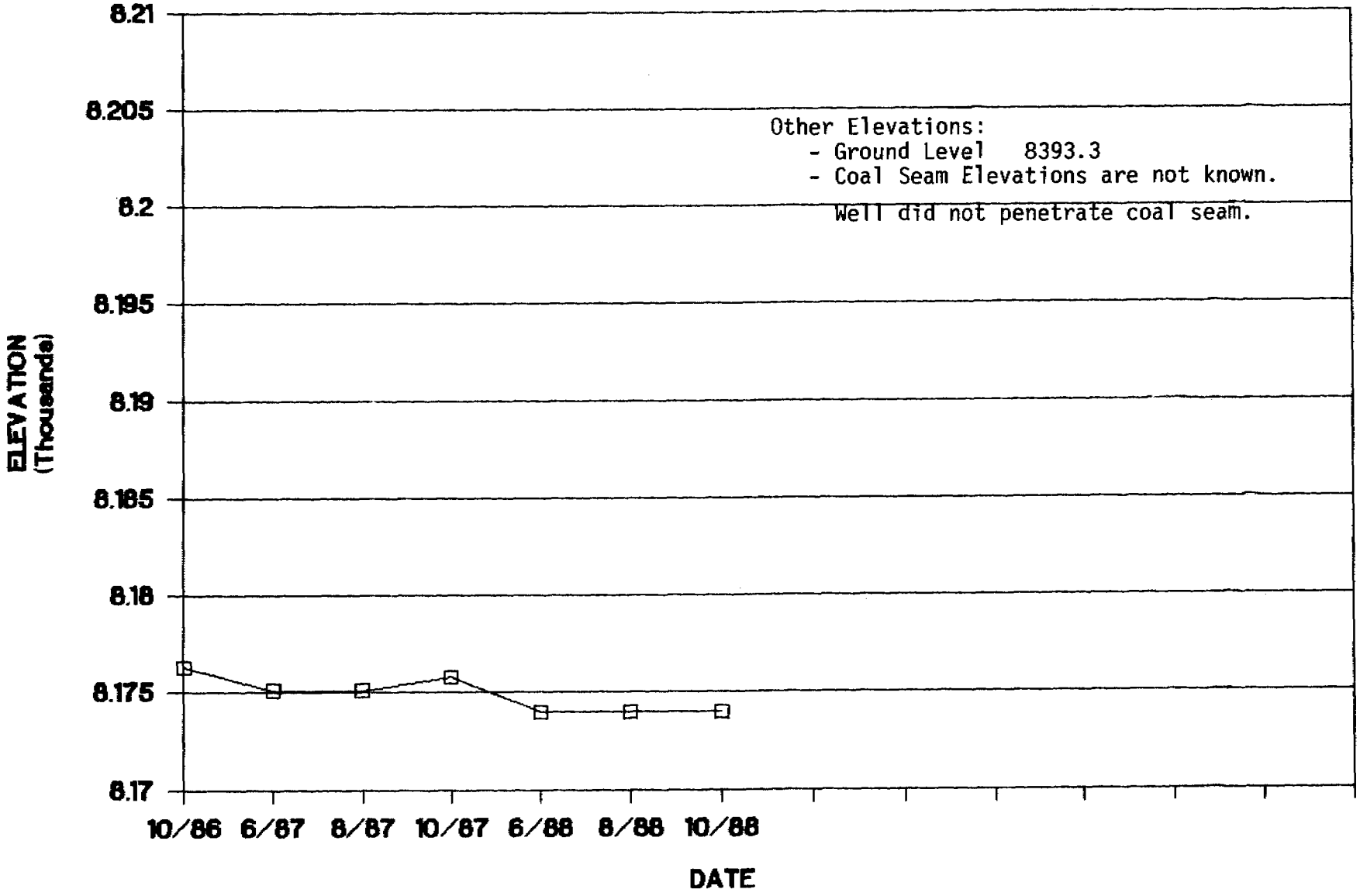


WELL WATER LEVEL 1982 – 1986

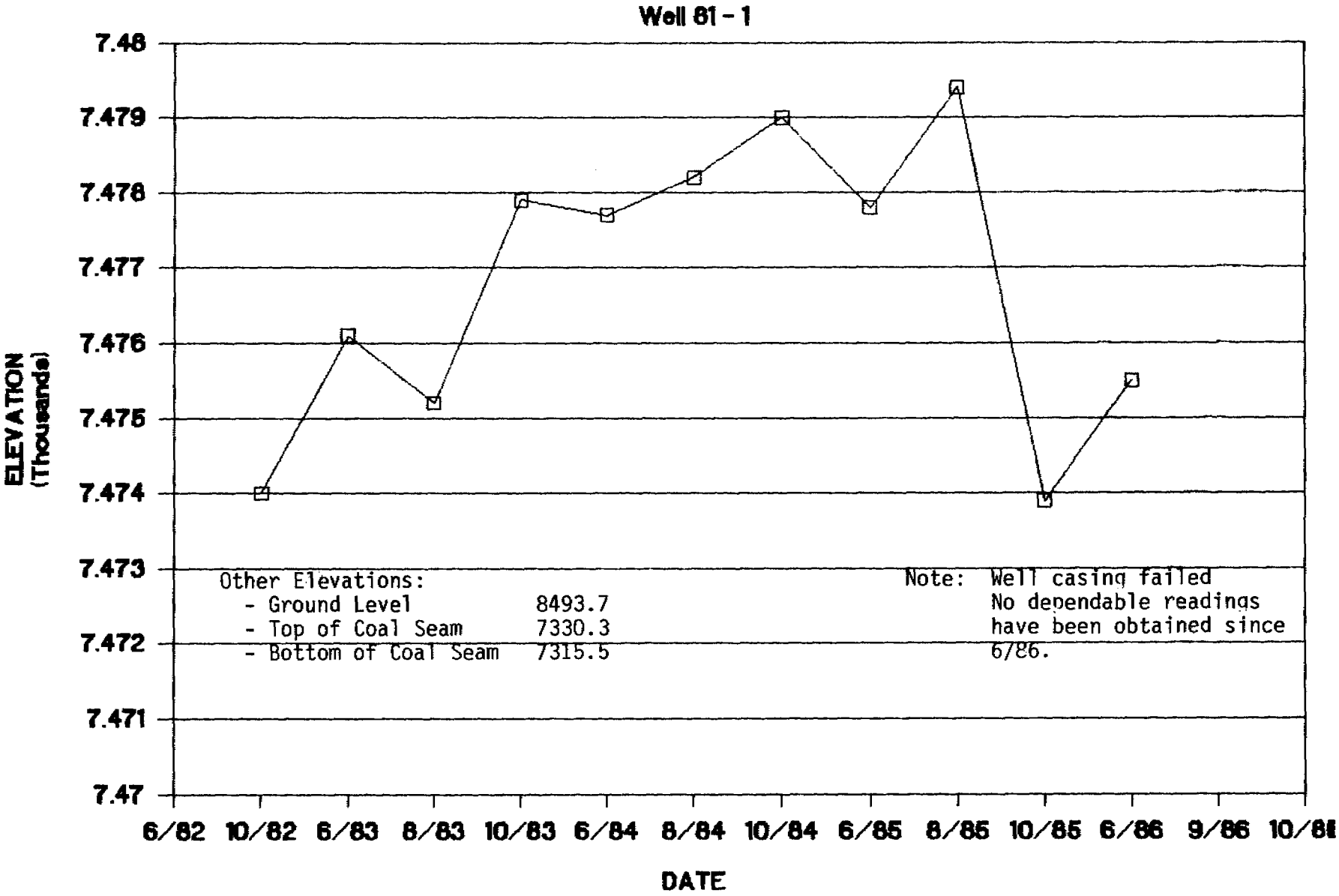


WELL WATER LEVEL 1987 -

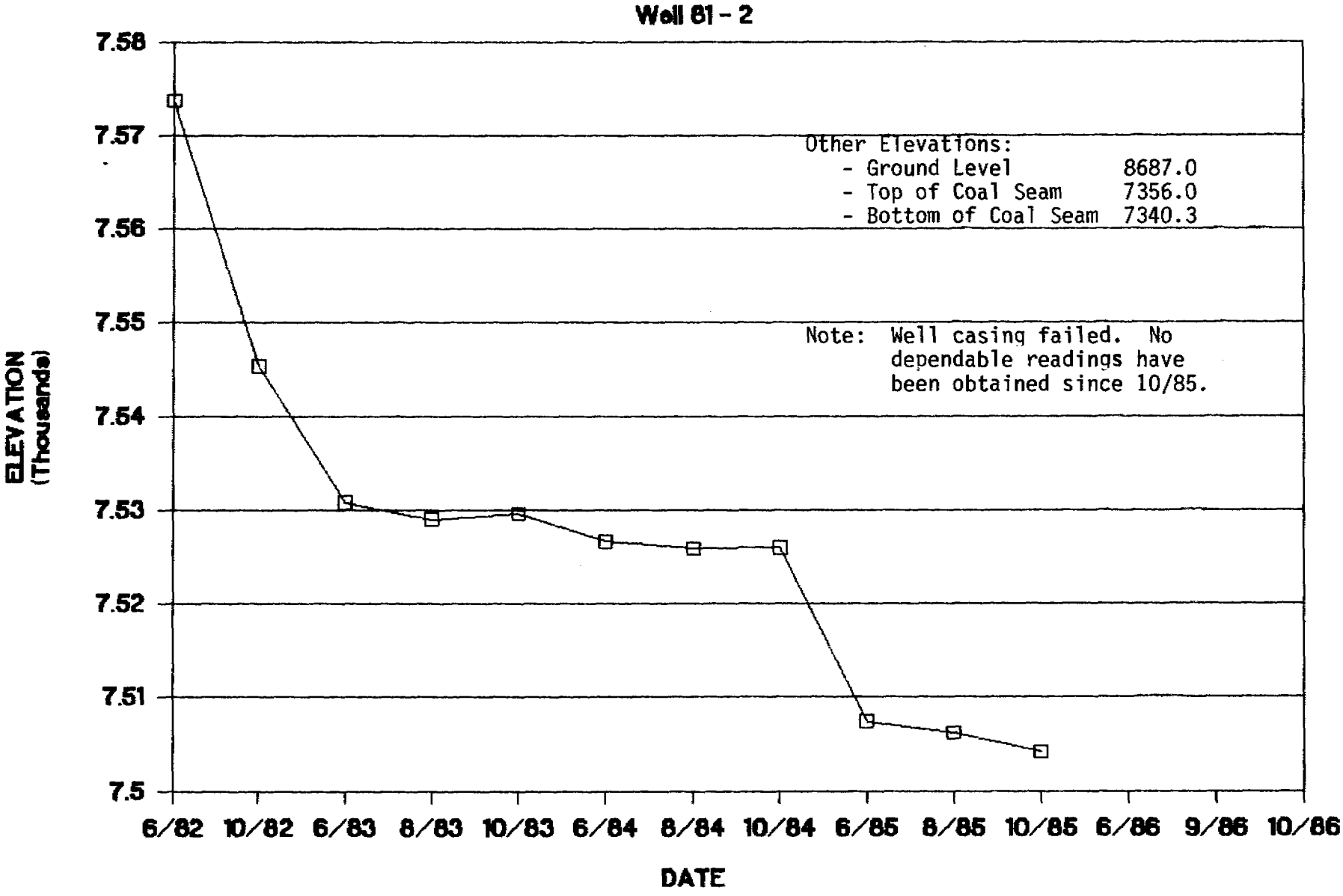
Well 80 - 4



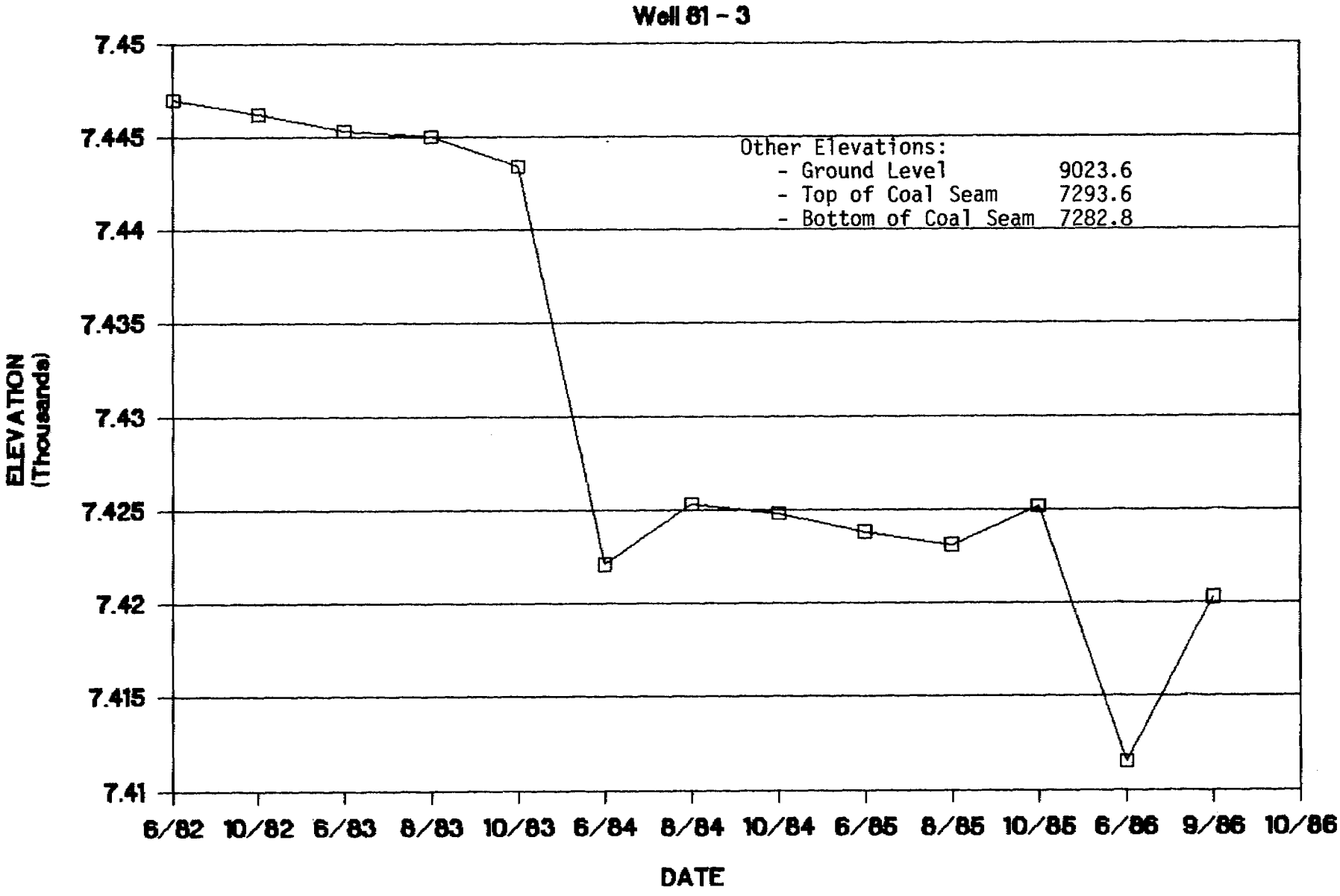
WELL WATER LEVEL 1982 – 1986



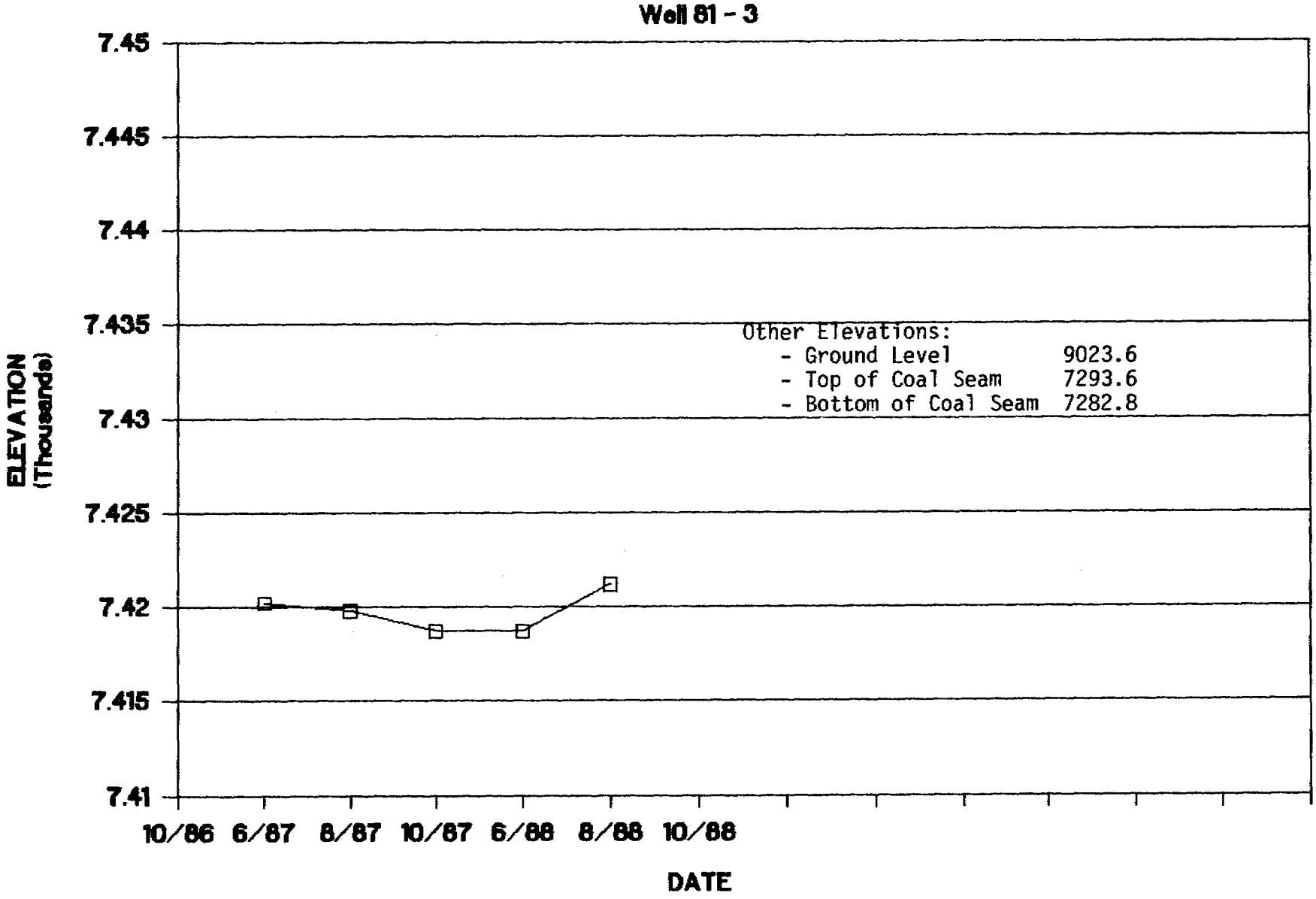
WELL WATER LEVEL 1982 – 1986



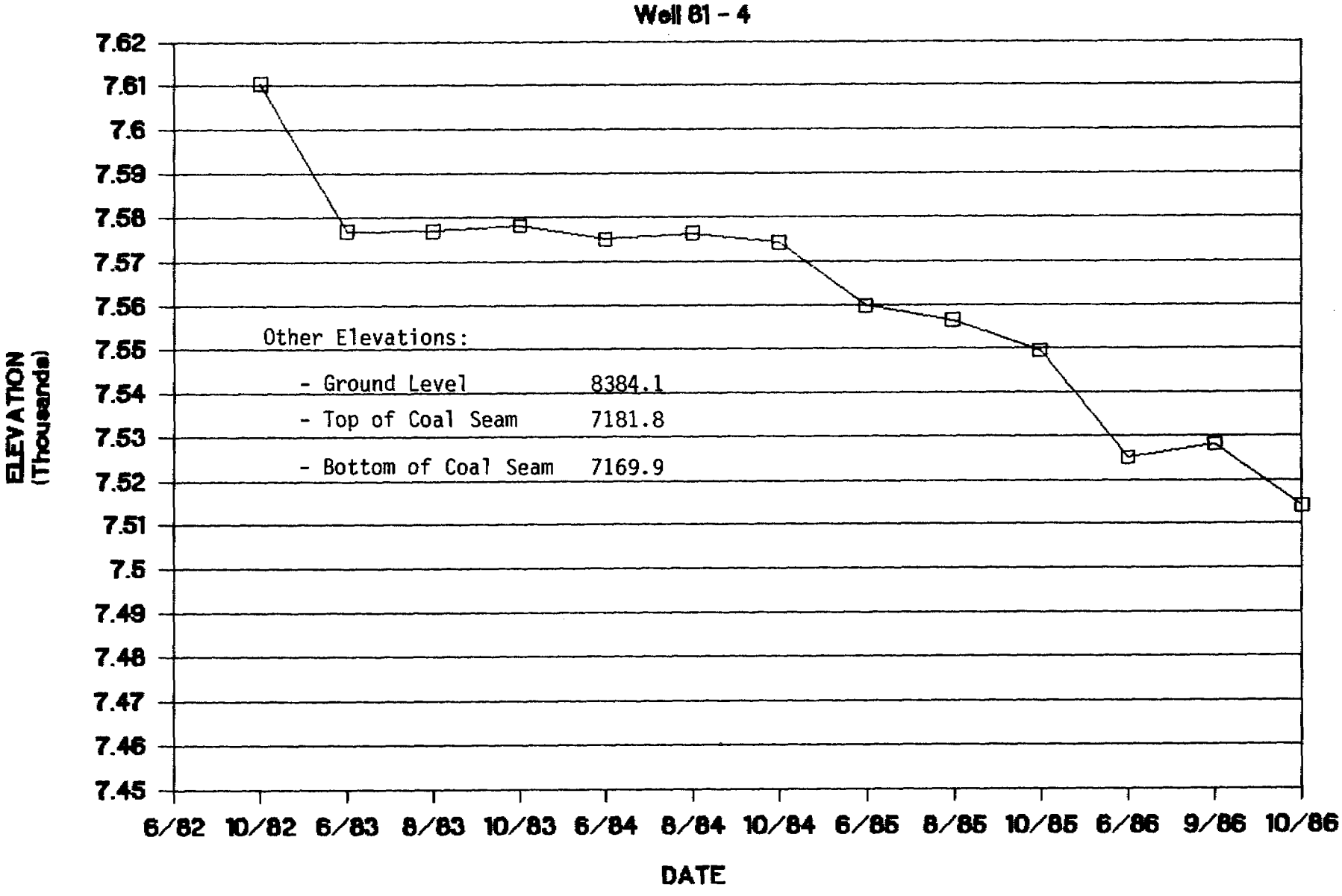
WELL WATER LEVEL 1982 – 1986



WELL WATER LEVEL 1987 -



WELL WATER LEVEL 1982 – 1986



WELL WATER LEVEL 1987 –

Well 81 – 4

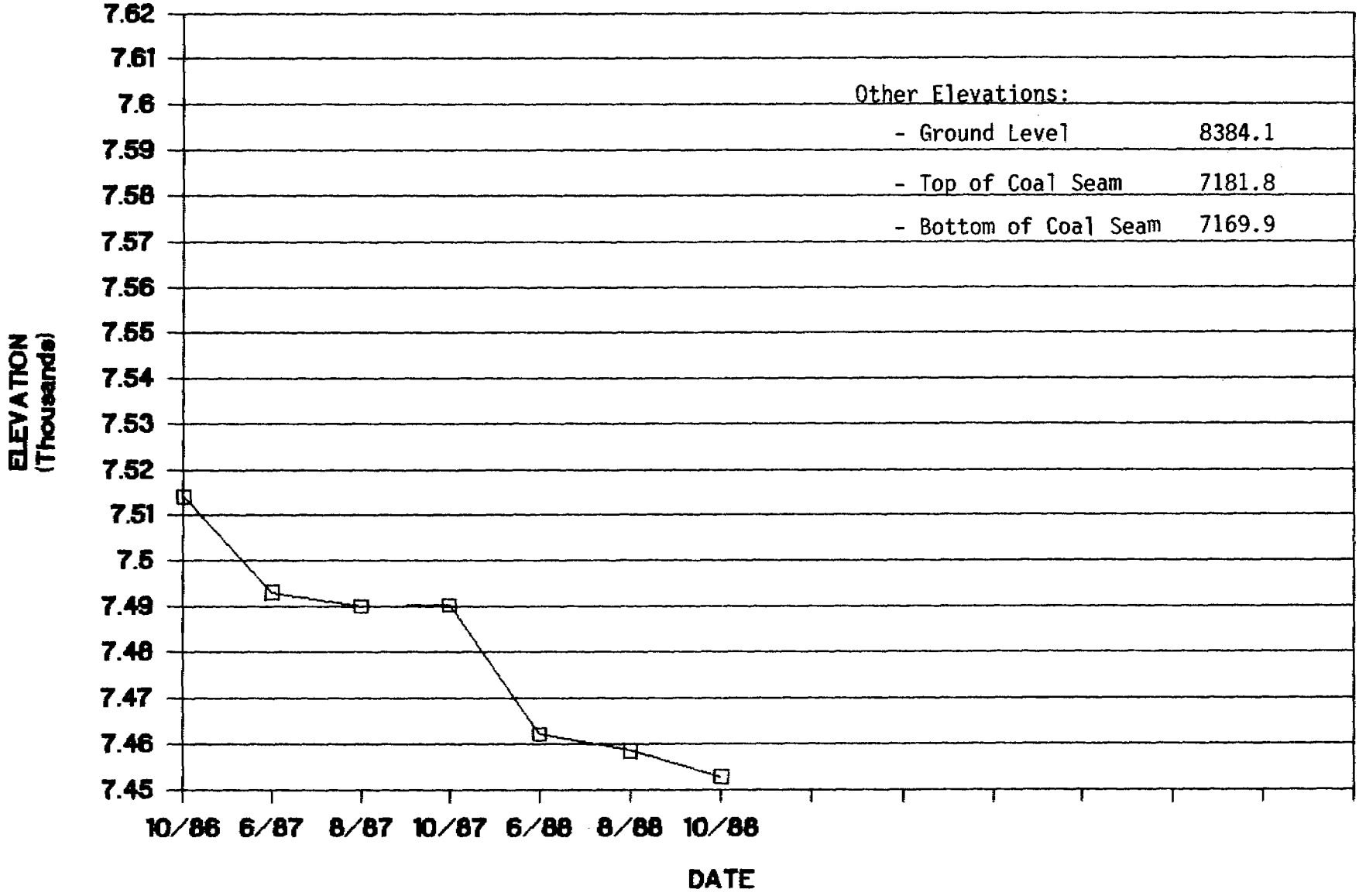
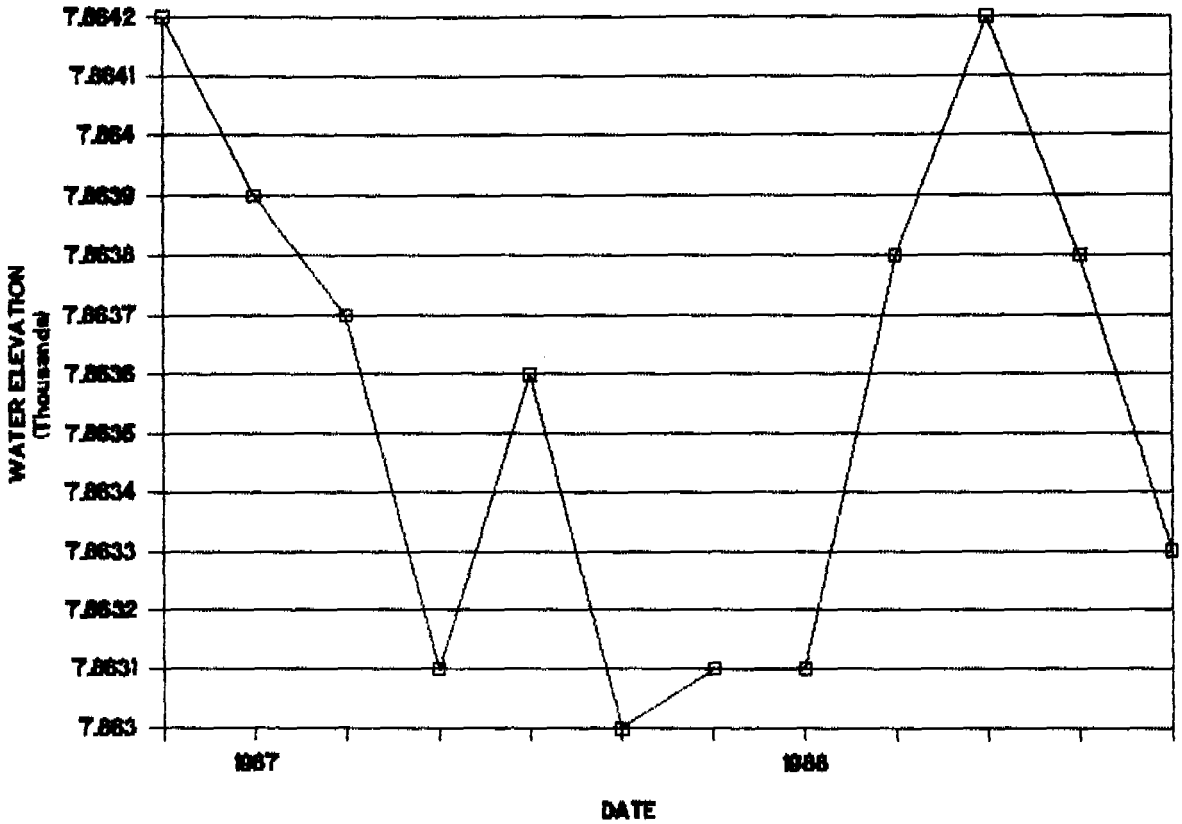


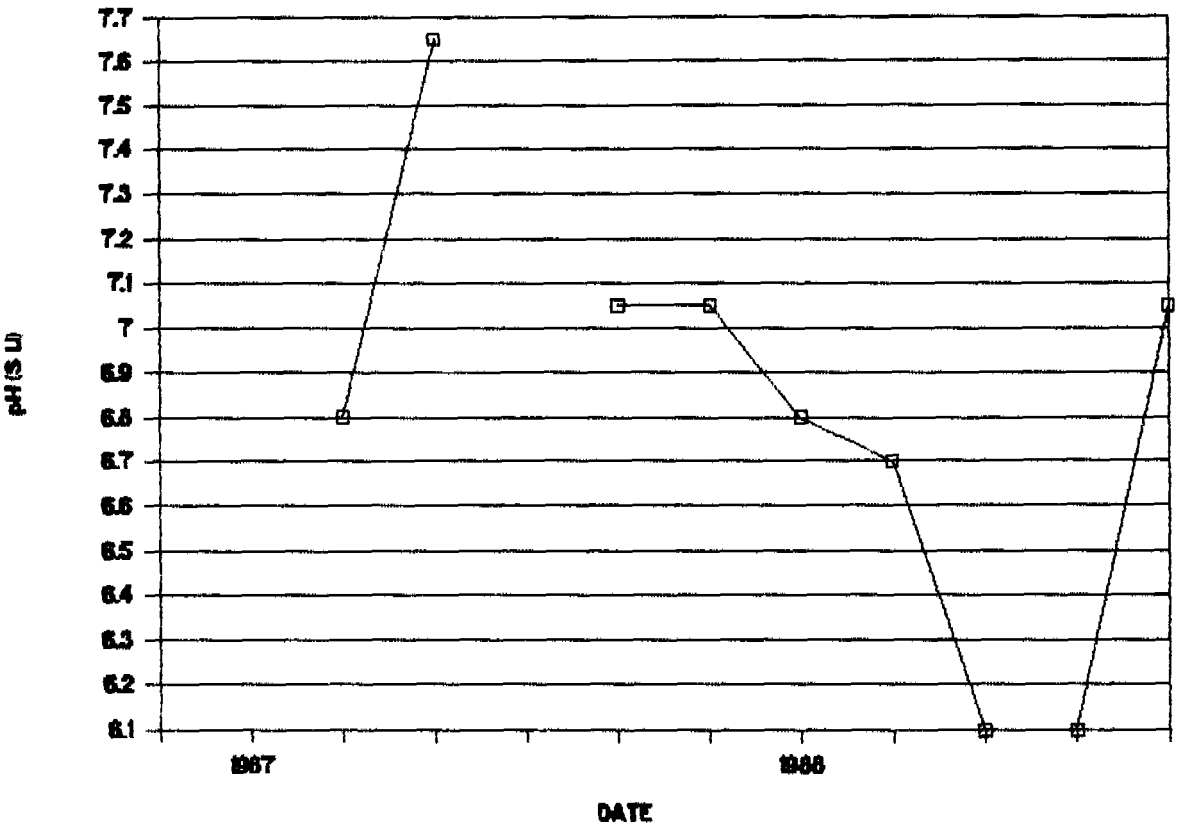
TABLE 7.
CHARACTERISTICS OF OBSERVATION WELLS ON SUFCO LEASEHOLD
(Revised March 19, 1988)

Height of Casing Above Ground (FT)	Elevation of Mineable Portion of Coal Seam Top	Bottom	Total Depth Measured (FT)	Total Depth Cased (FT)	Casing I.D. (IN)	Perforations (FT)	Formation Monitored
0.8	7439.0	7427.3	294	-	1½	-	-
2.4	7473.7	7454.9	NM	160	1½	110	Castlegate
0.9	7426.2	7413.1	NM	100	1½	75	Upper Blackhawk/ Lower Castlegate
1.4	7681.2	7669.3	860	860	2	20	U-Hia Coal
2.2	7692.3	7682.1	885	880	2	20	U-Hia Coal
1.8	7641.7	7628.3	860	860	2	20	U-Hia Coal
1.3	7622.2	7610.7	705	705	2	20	Sandstone in Blackhawk
1.85	Did Not Reach Coal		200.7	200	4	40	Castlegate
0.65	Did Not Reach Coal		243.6	240	4	40	Castlegate
2.3	7330.3	7315.5	1015	1300	2	20	U-Hia Coal
2.0	7356.0	7340.3	1157	1460	2	20	U-Hia Coal
3.4	7293.6	7282.8	1581	1940	6 (0-760 ft.) 2 (760-1940 ft.)	20	U-Hia Coal
3.9	7181.8	7169.9	803	1300	4½	20	U-Hia Coal

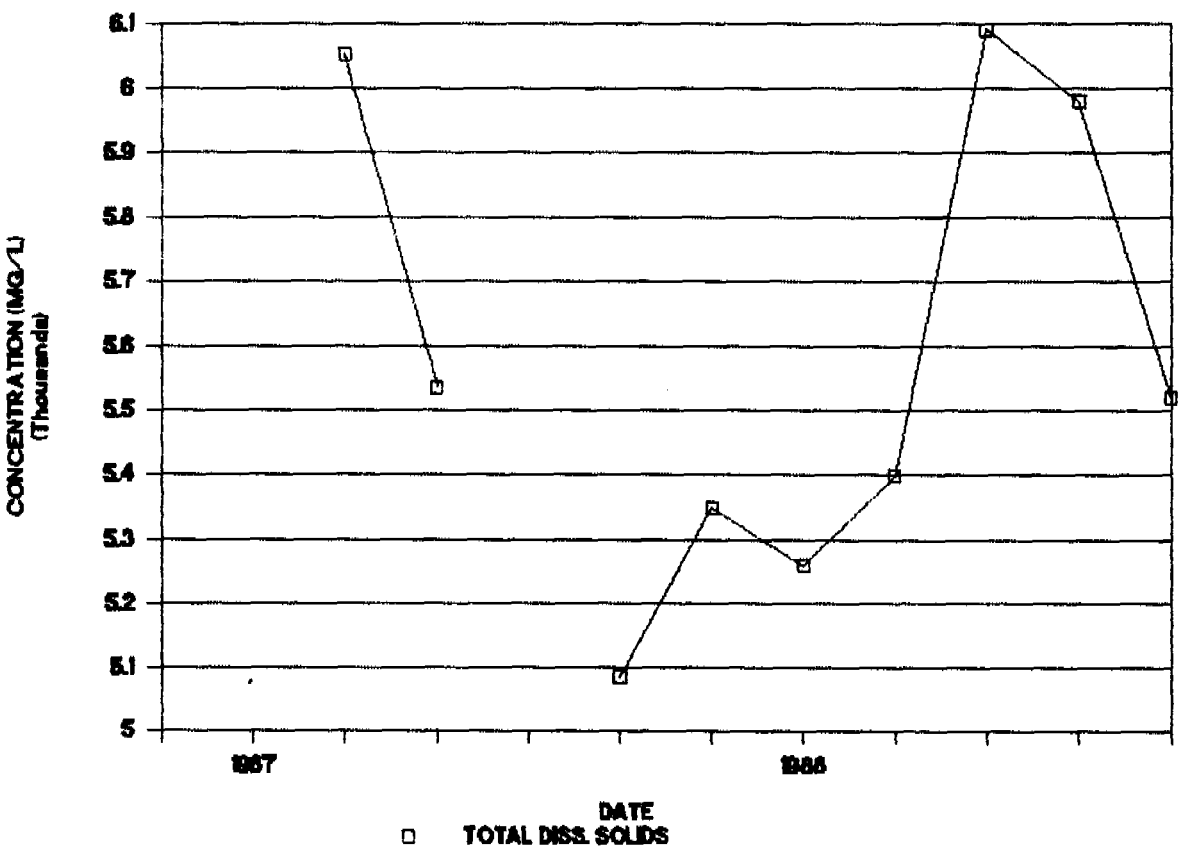
WATER LEVEL – WELL SITE WRDS #3



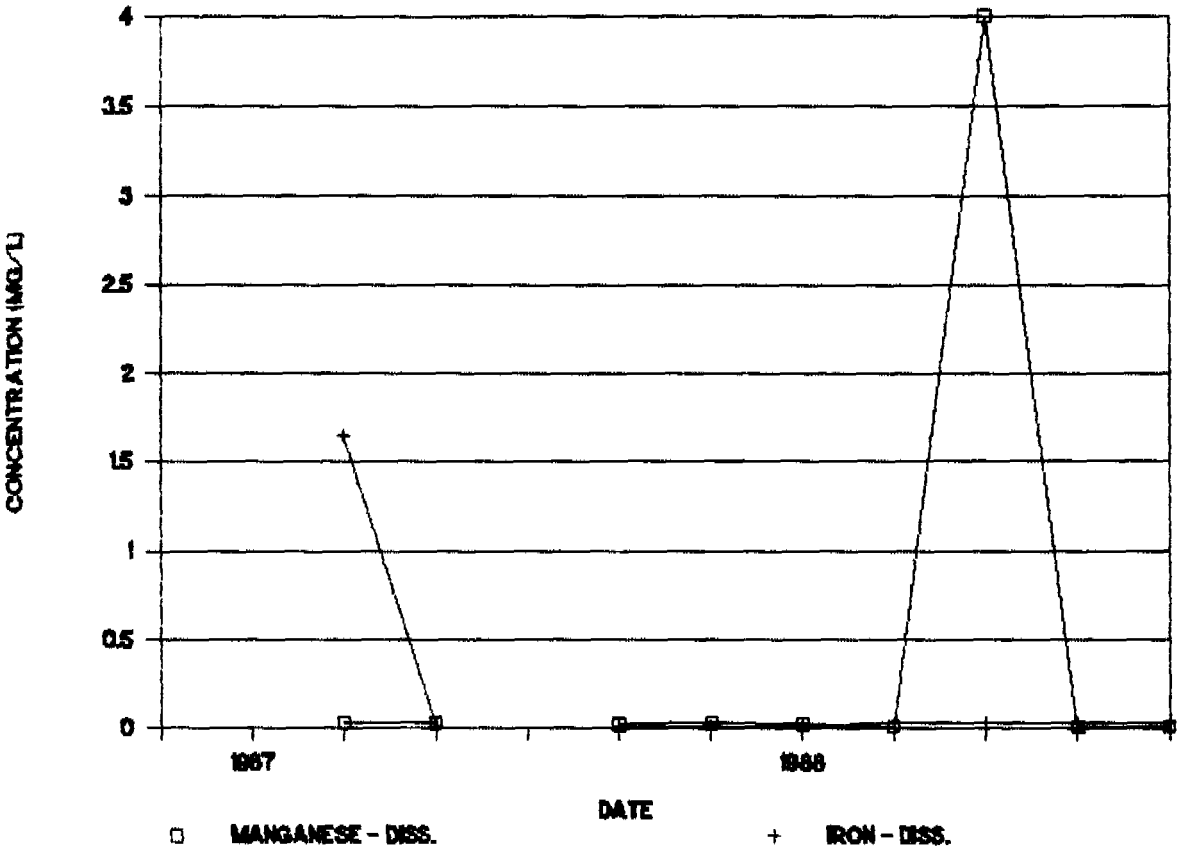
pH – WELL SITE WRDS #3



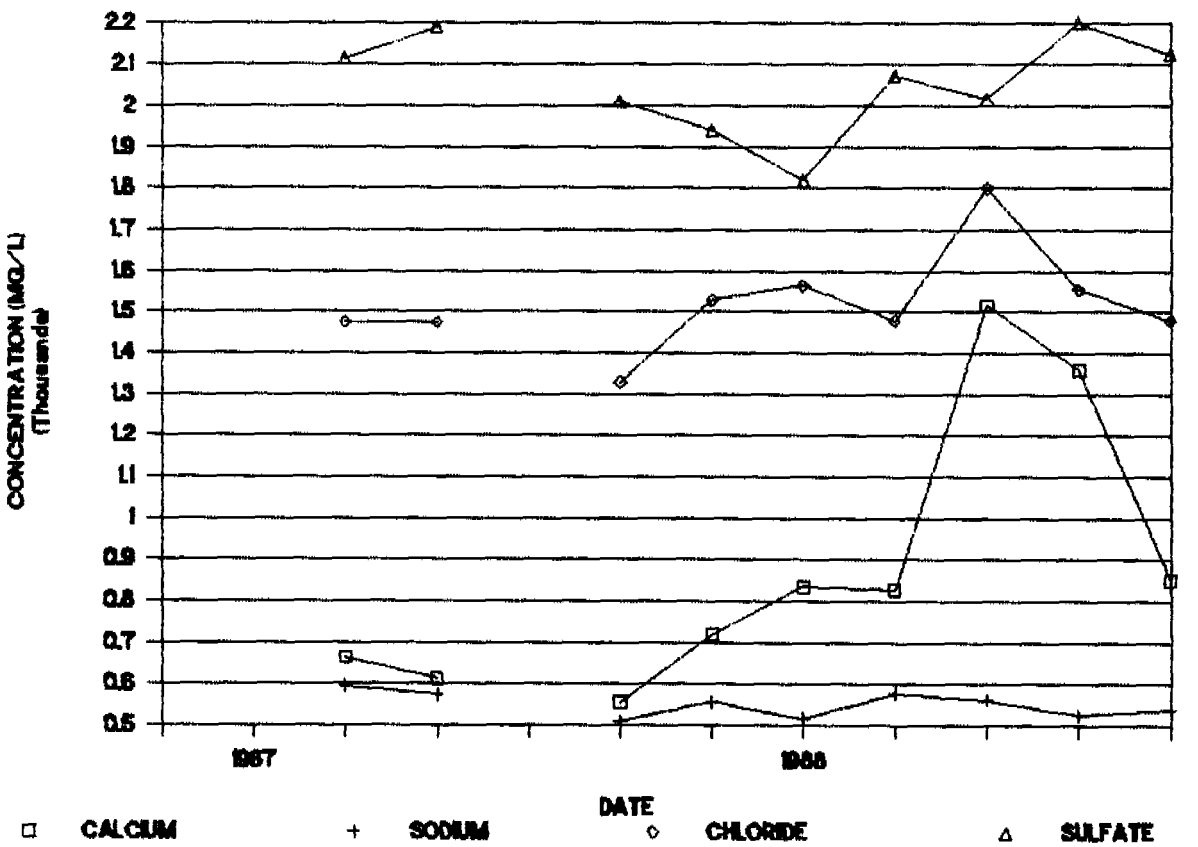
DISSOLVED SOLIDS – WELL SITE WRDS #3



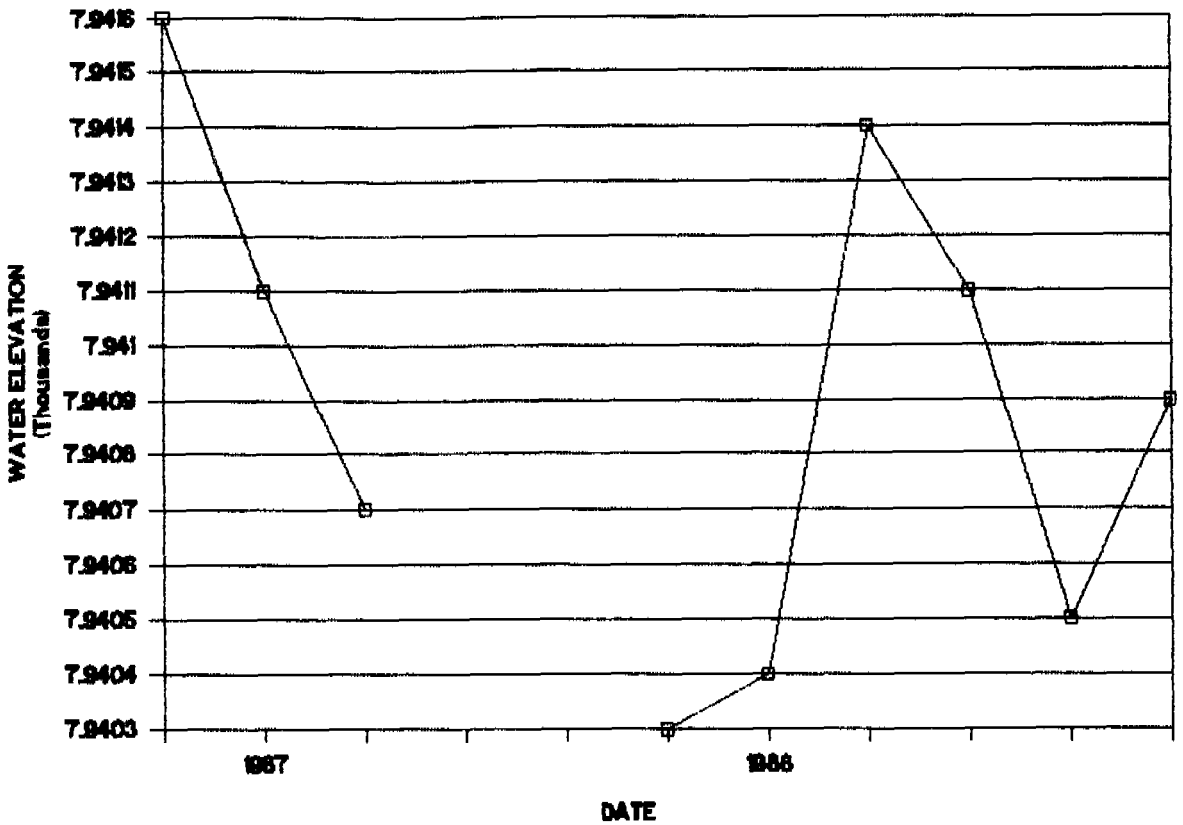
IRON/MANGANESE – WELL SITE WRDS #3



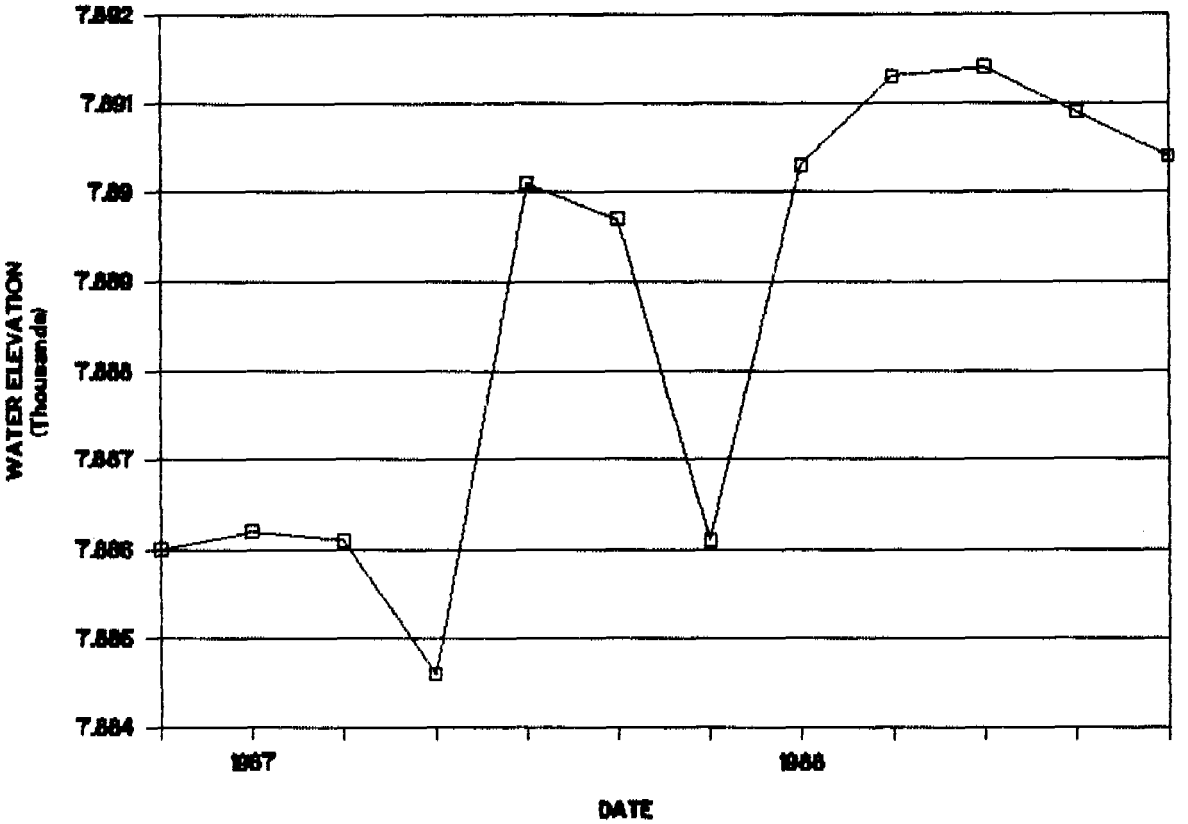
MAJOR IONS – WELL SITE WRDS #3



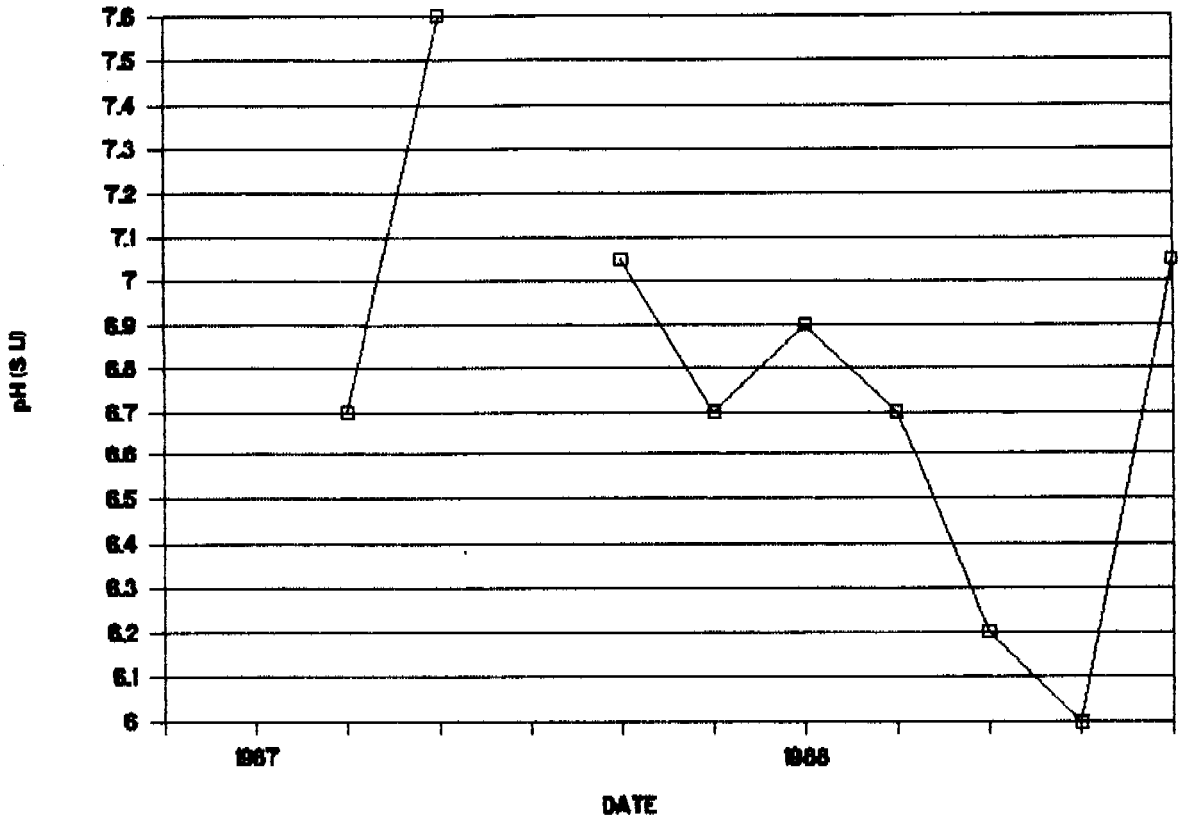
WATER LEVEL – WELL SITE WRDS #5



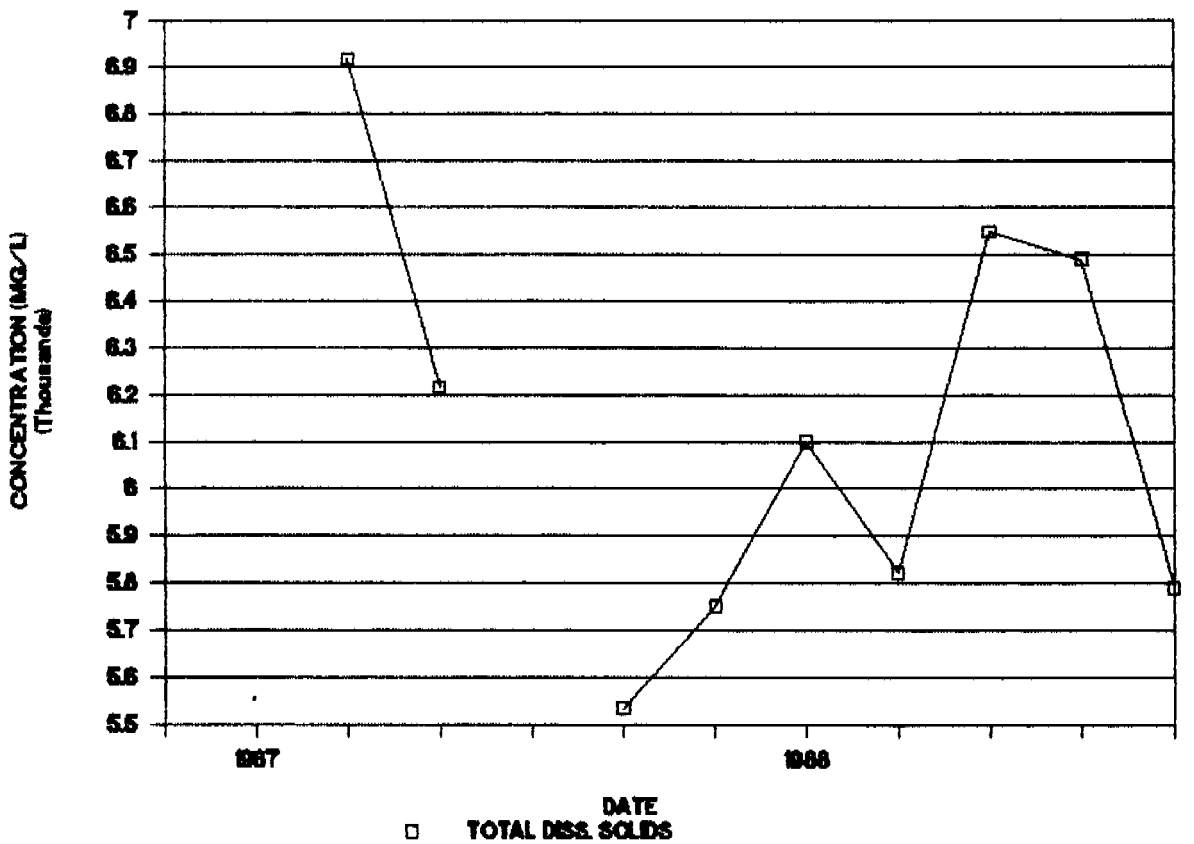
WATER LEVEL – WELL SITE #6



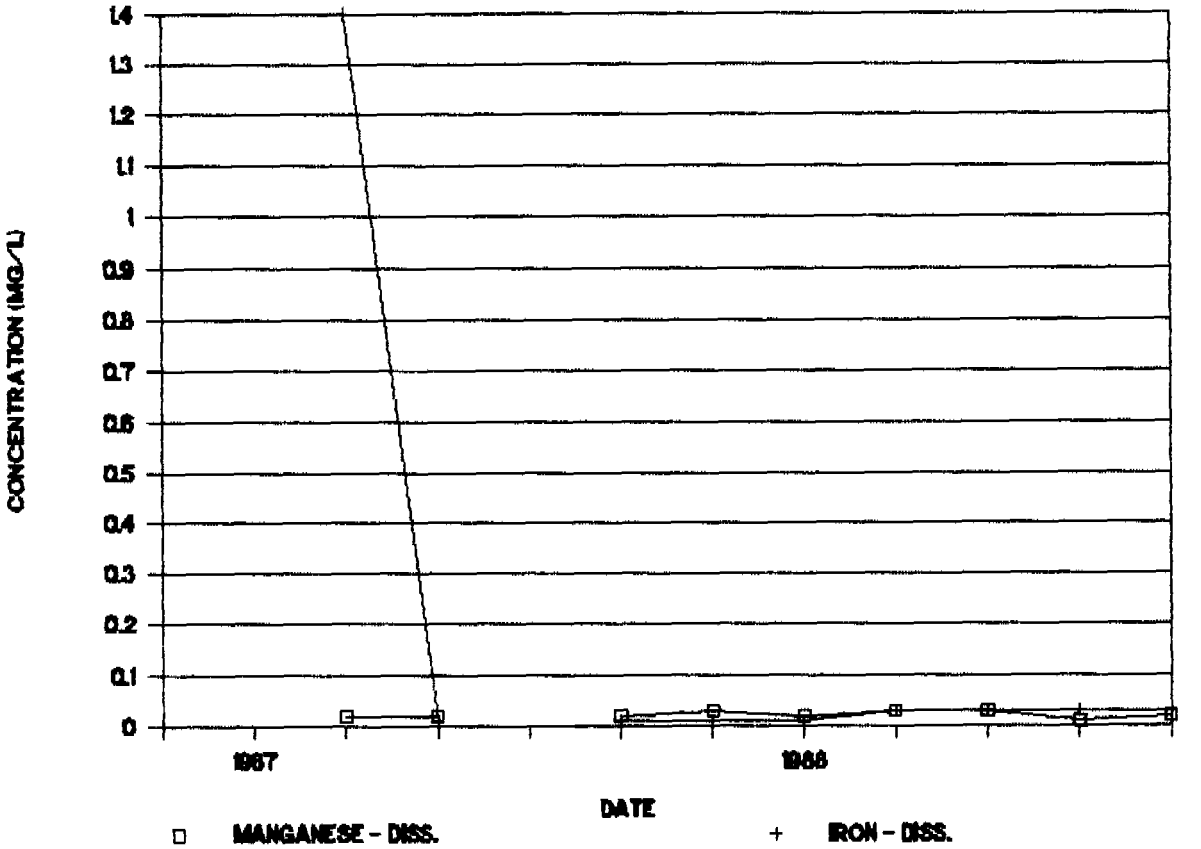
pH – WELL SITE #6



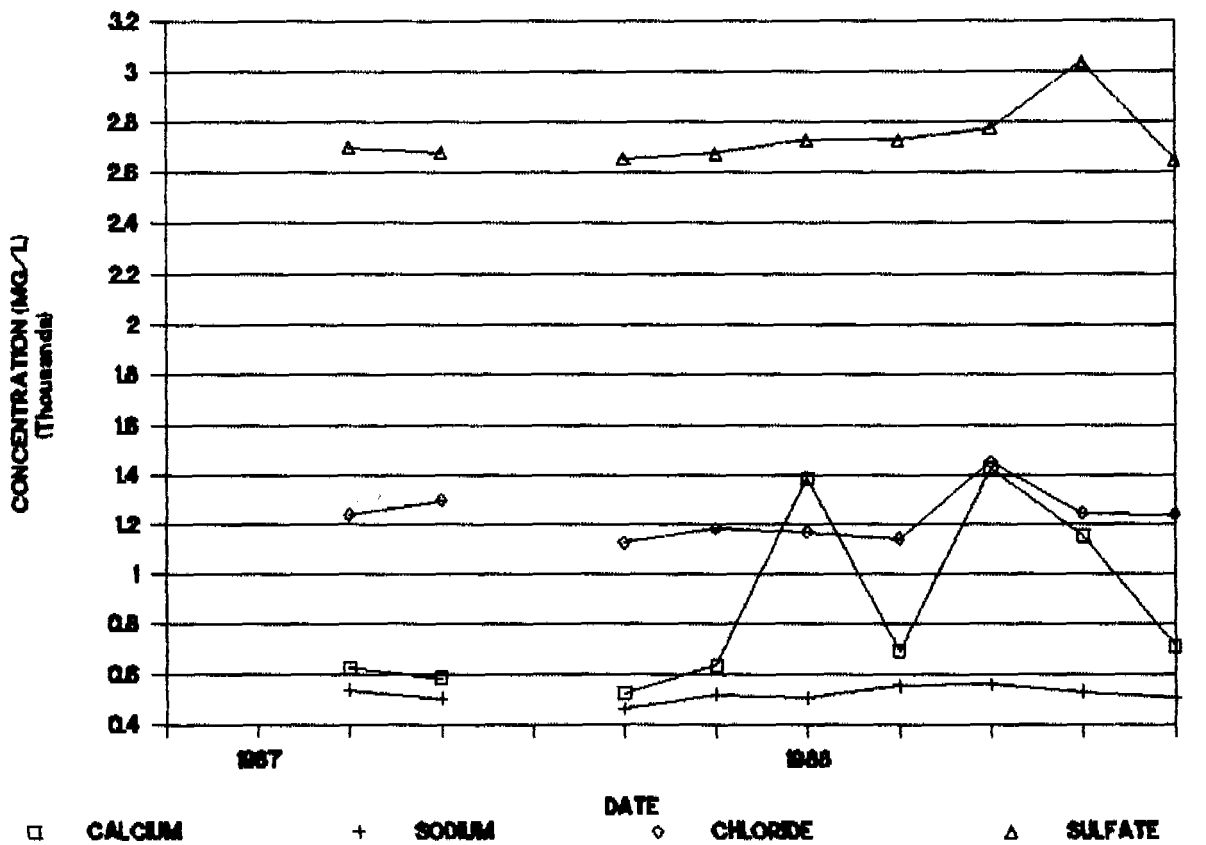
DISSOLVED SOLIDS – WELL SITE WRDS #6



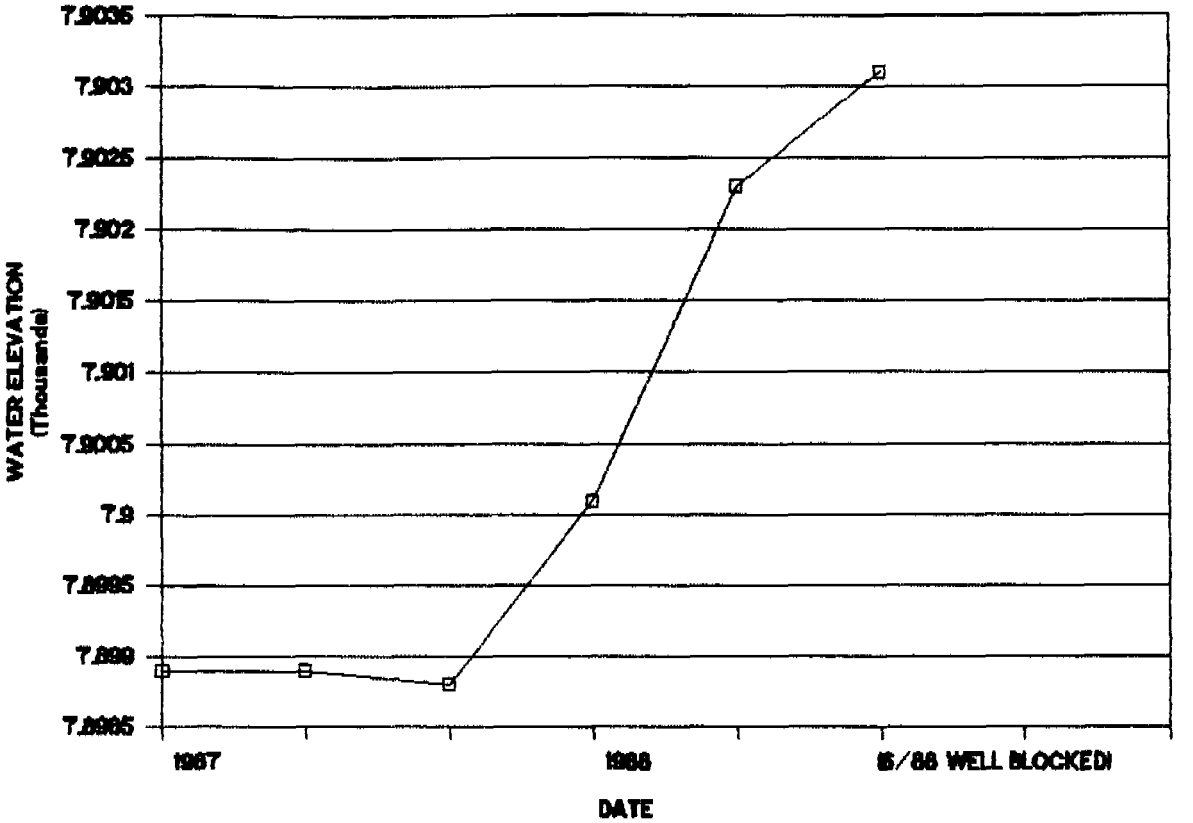
IRON/MANGANESE – WELL SITE WRDS #6



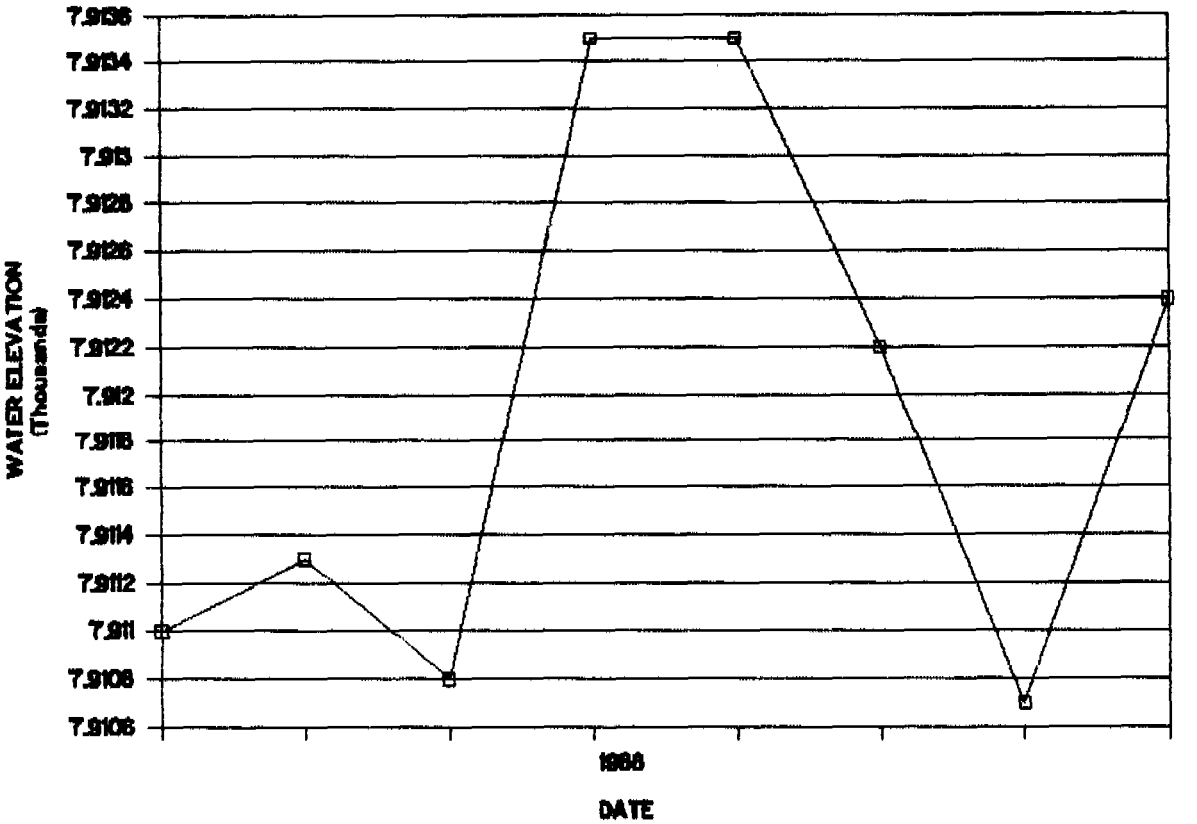
MAJOR IONS – WELL SITE WRDS #6



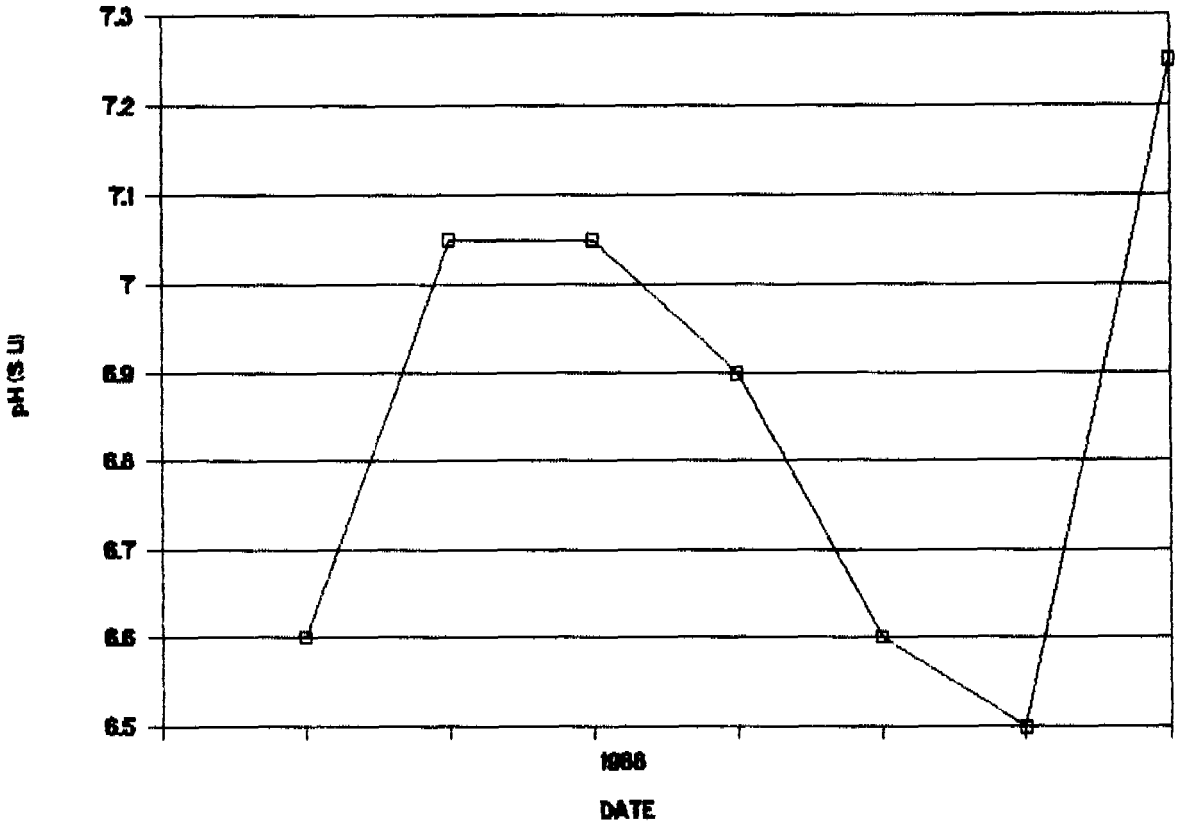
WATER LEVEL — WELL SITE #7



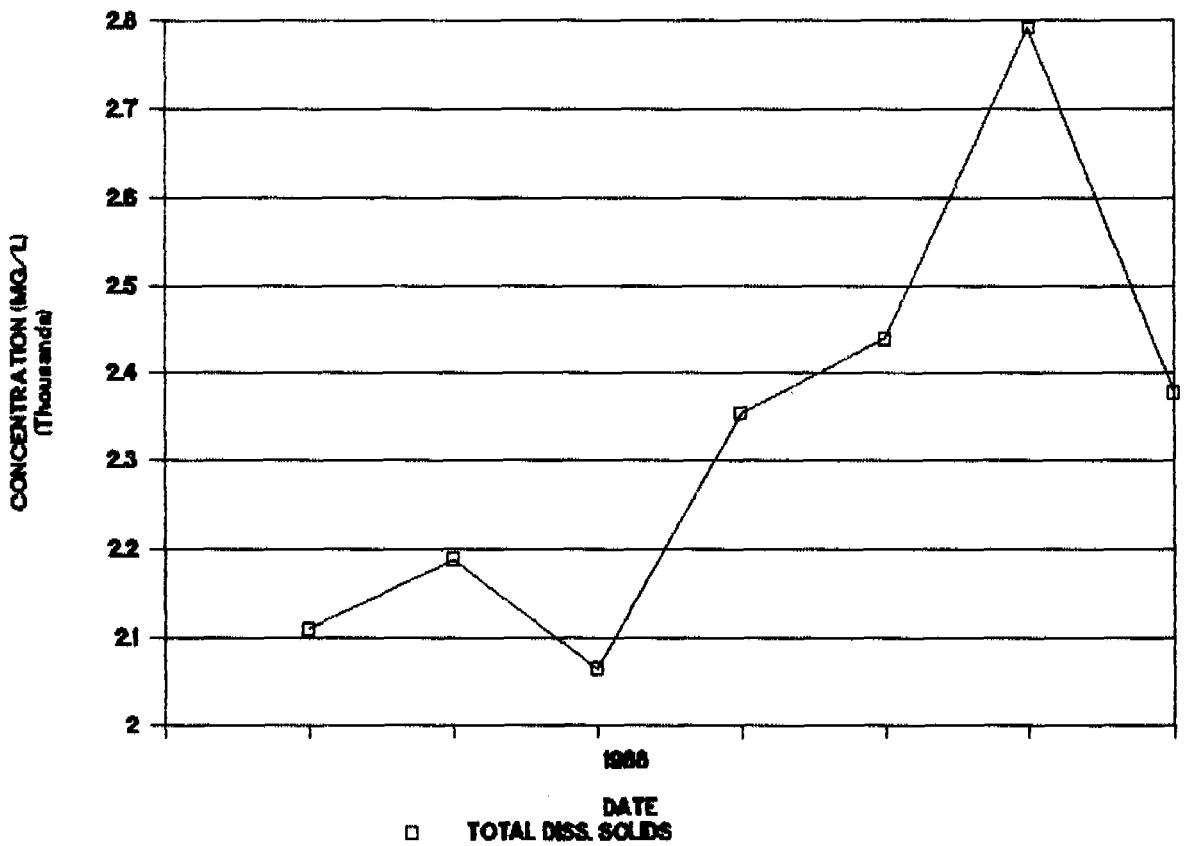
WATER LEVEL – WELL SITE WRDS #8



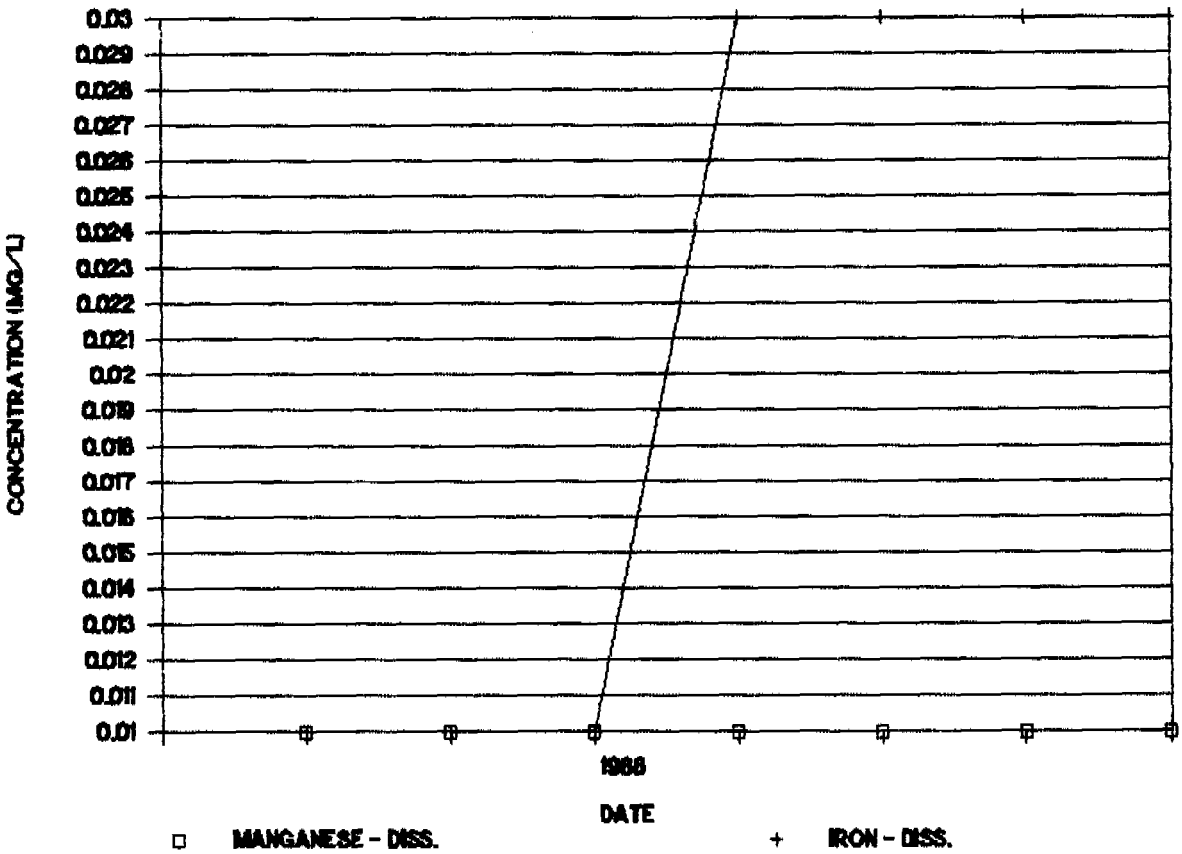
pH – WELL SITE WRDS #8



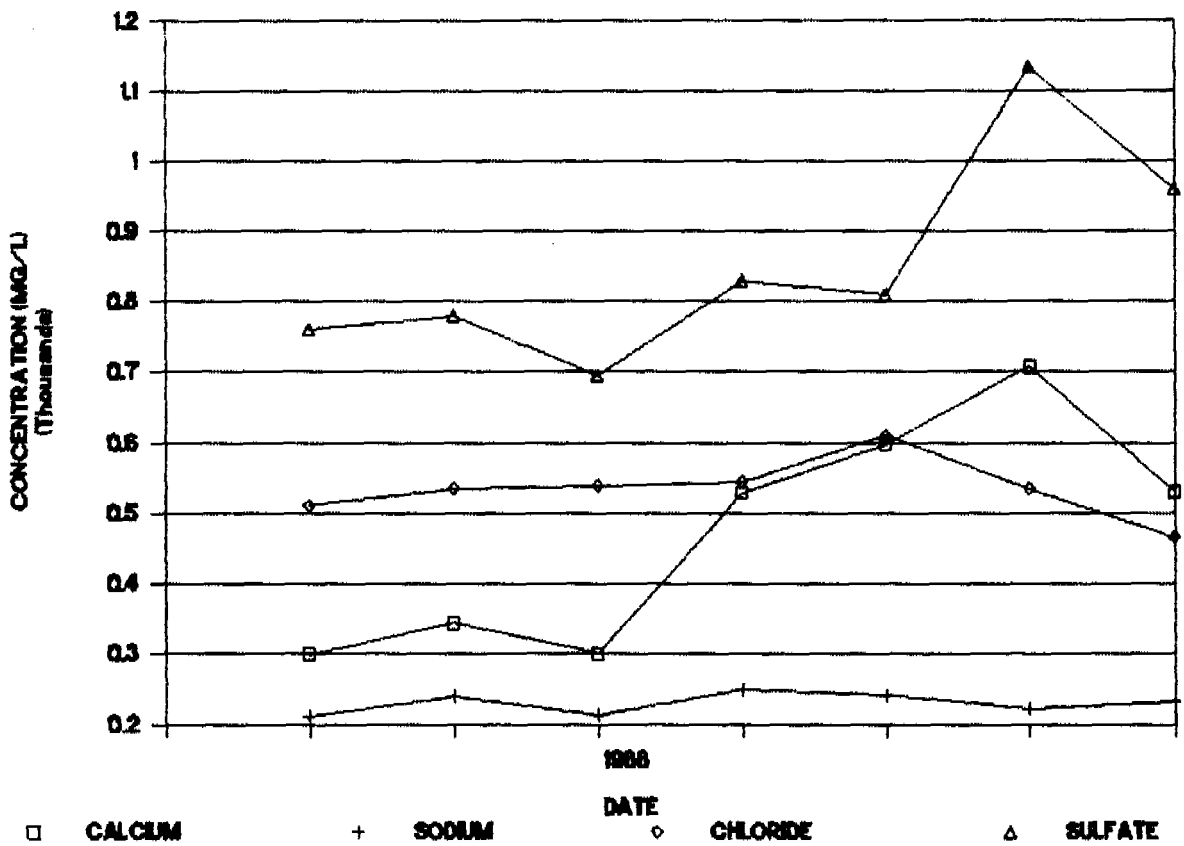
DISSOLVED SOLIDS – WELL SITE WRDS #8



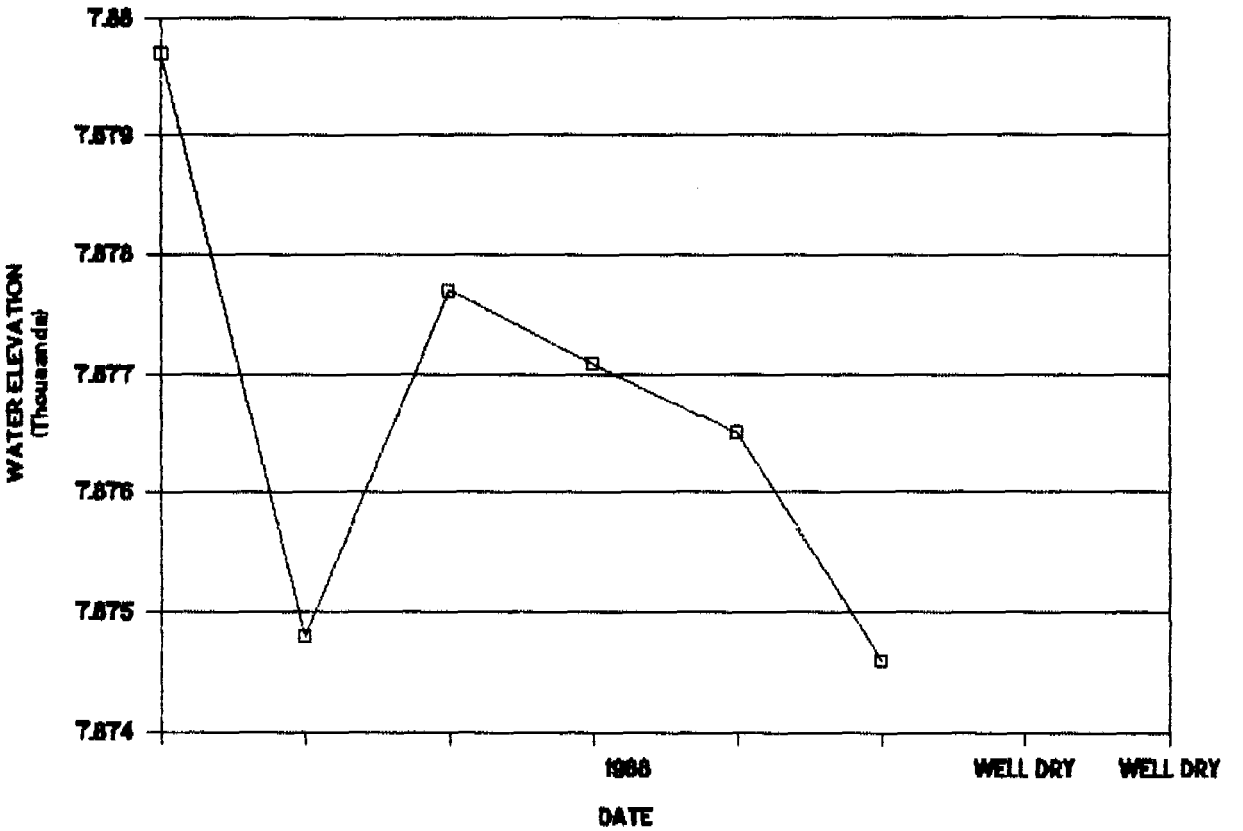
IRON/MANGANESE – WELL SITE WRDS #8

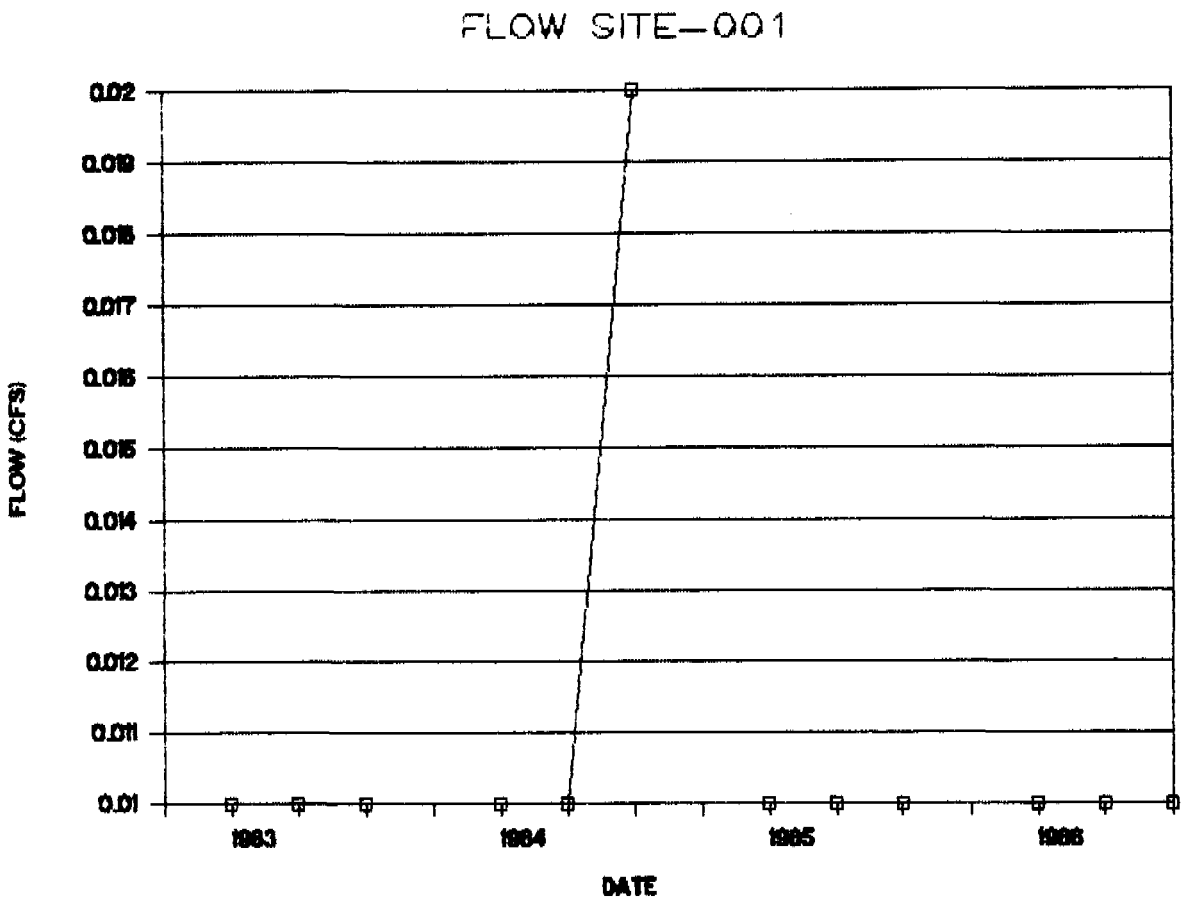


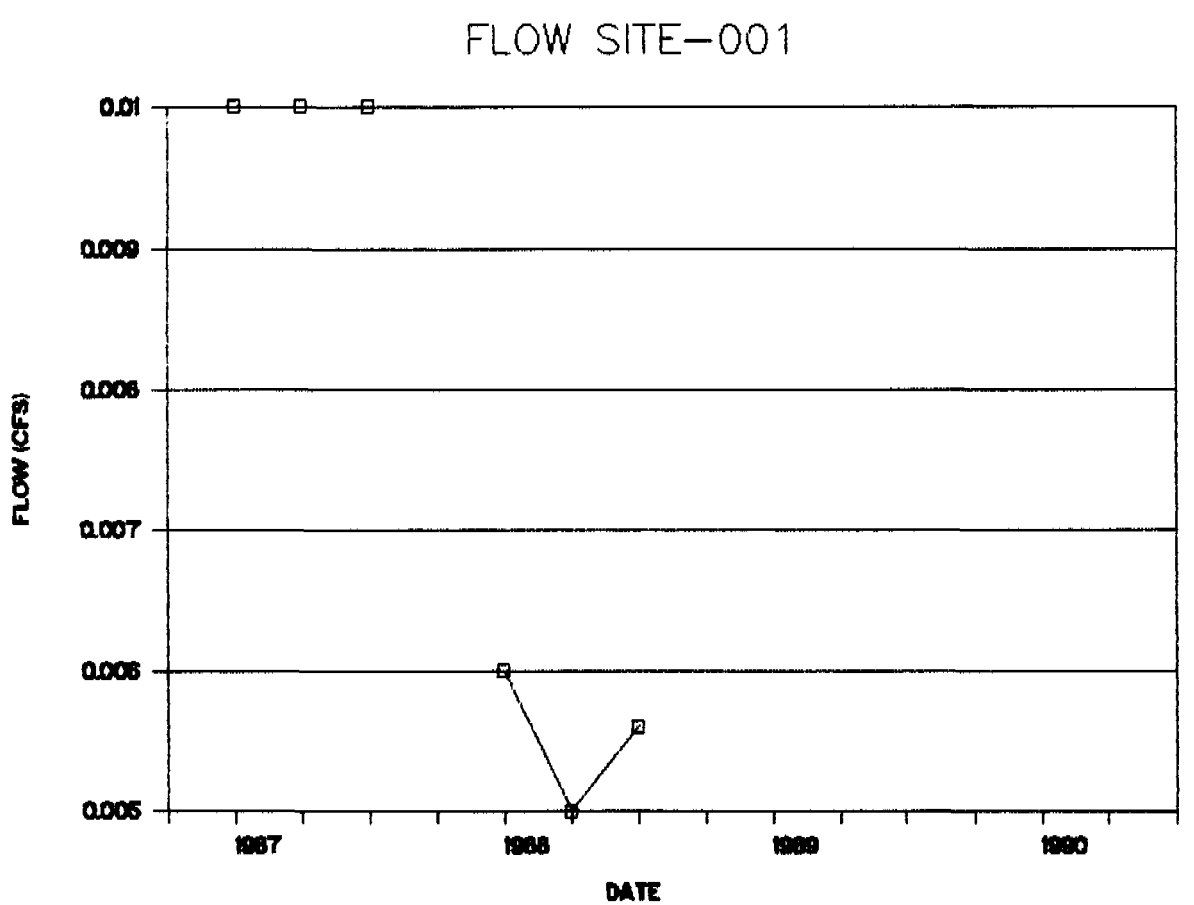
MAJOR IONS – WELL SITE WRDS #8

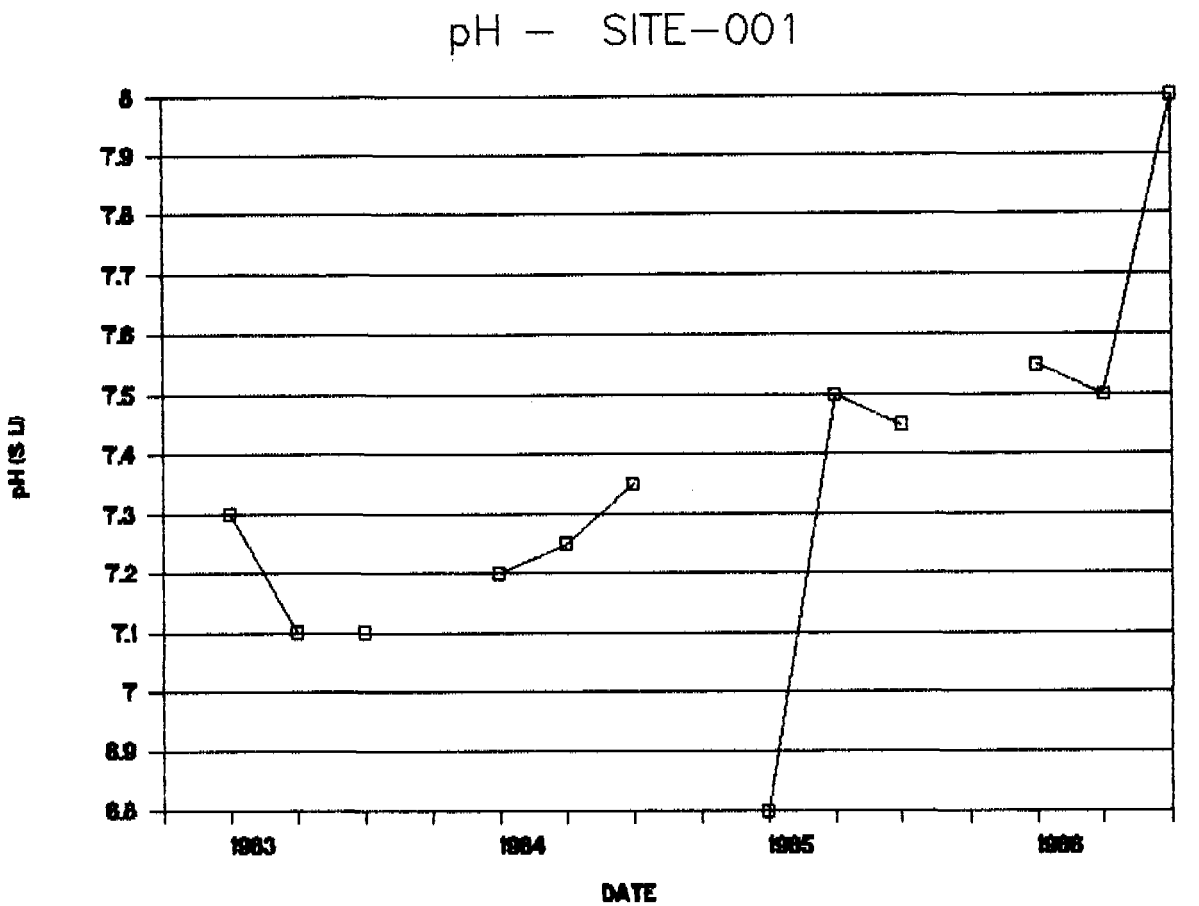


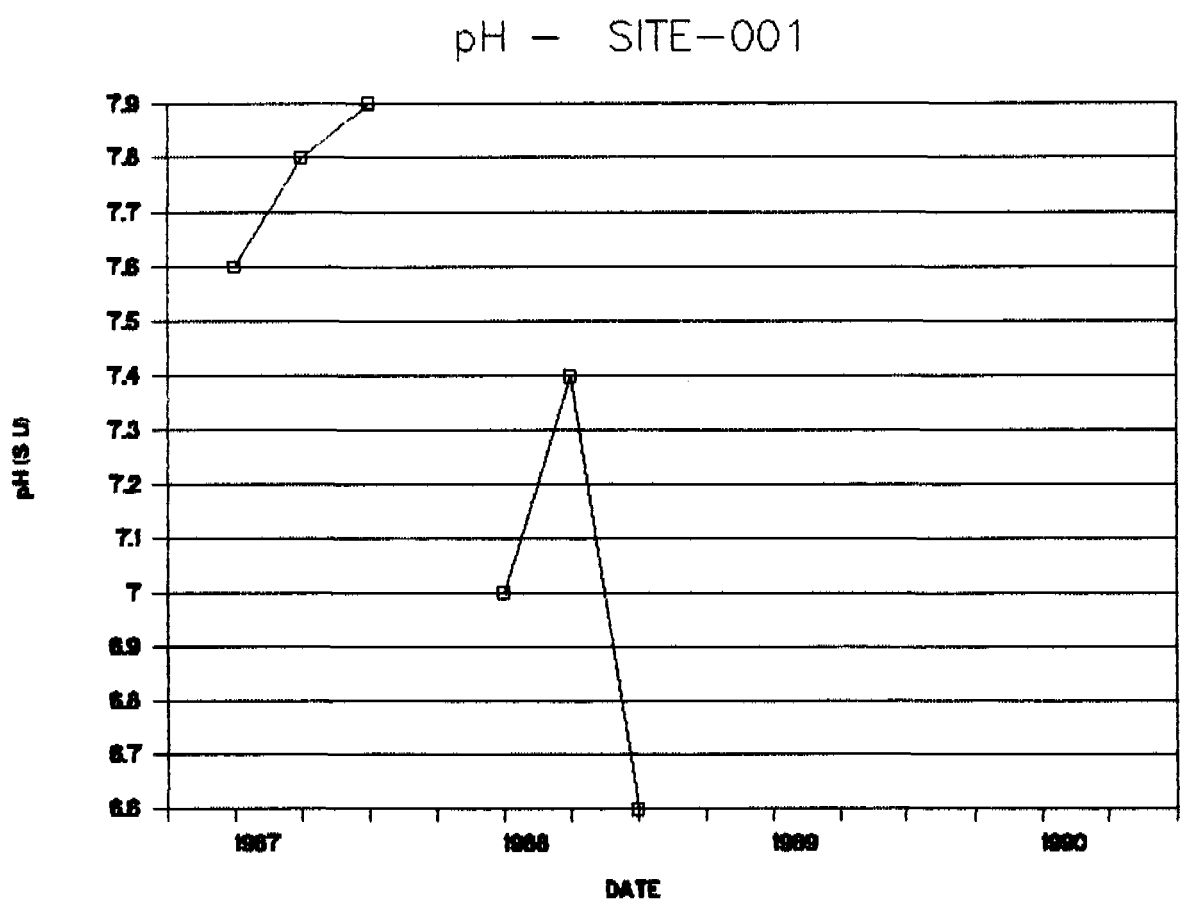
WATER LEVEL – WELL SITE #9

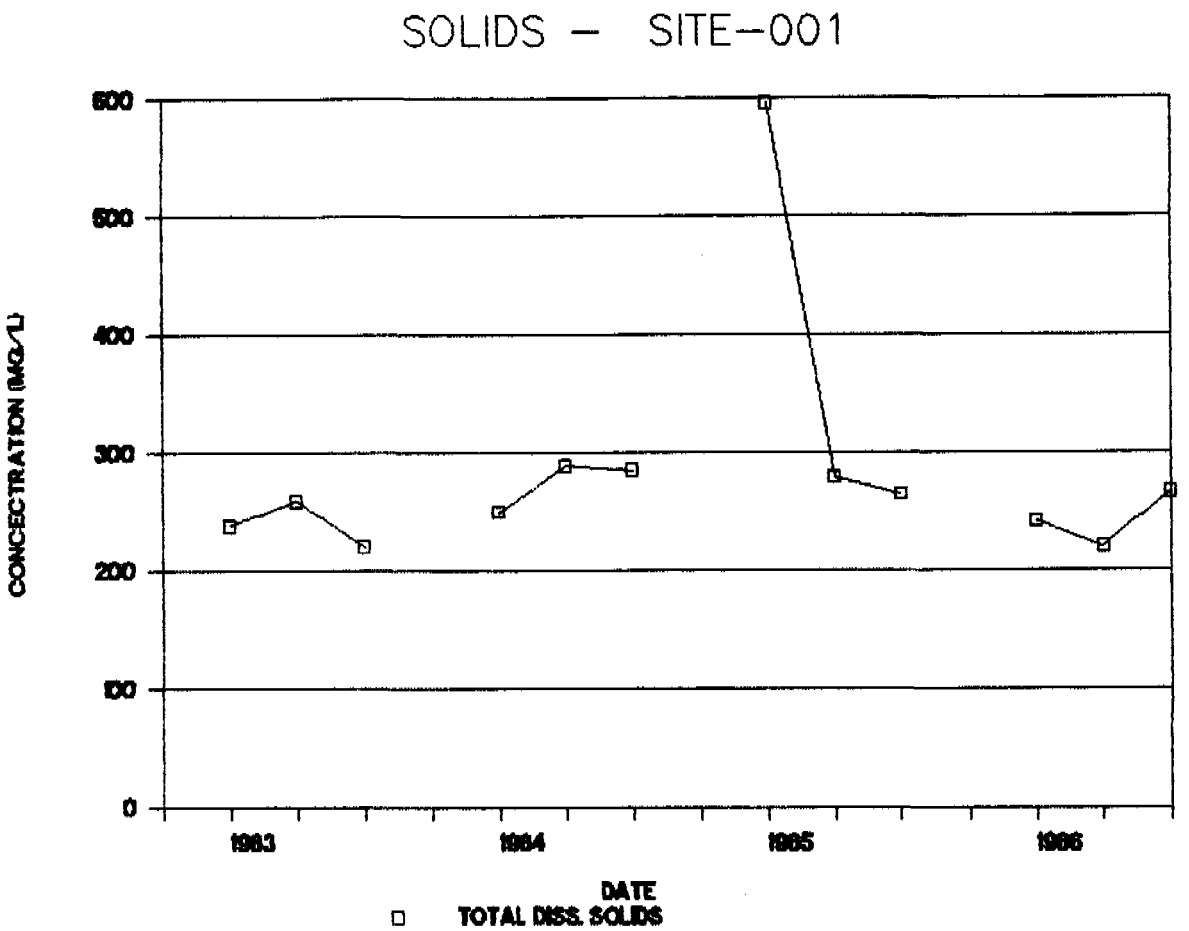


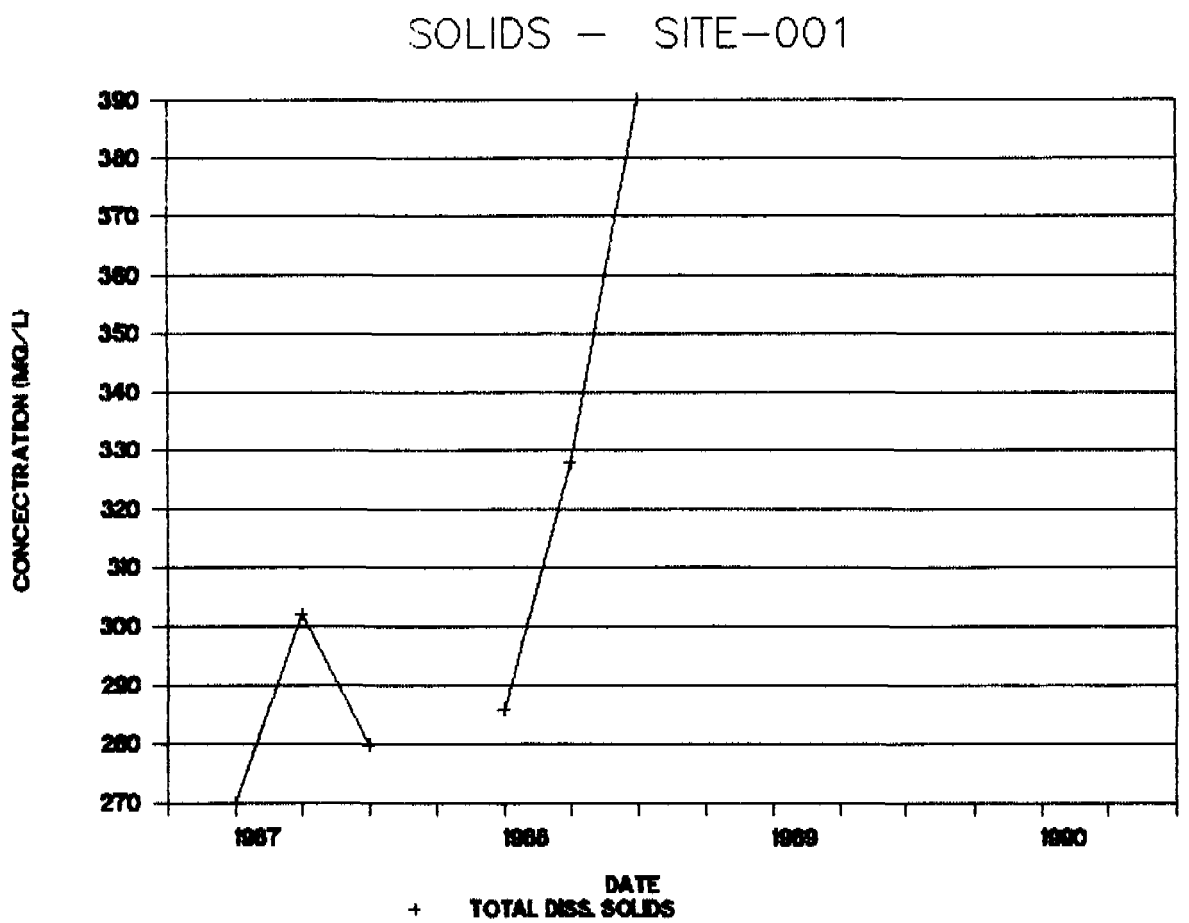

FLOW SITE-001
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
FLOW (CFS)
1983
1984
1985
1986
DATE


FLOW SITE-001
0.01
0.009
0.008
0.007
0.006
0.005
FLOW (CFS)
1987
1988
1989
1990
DATE

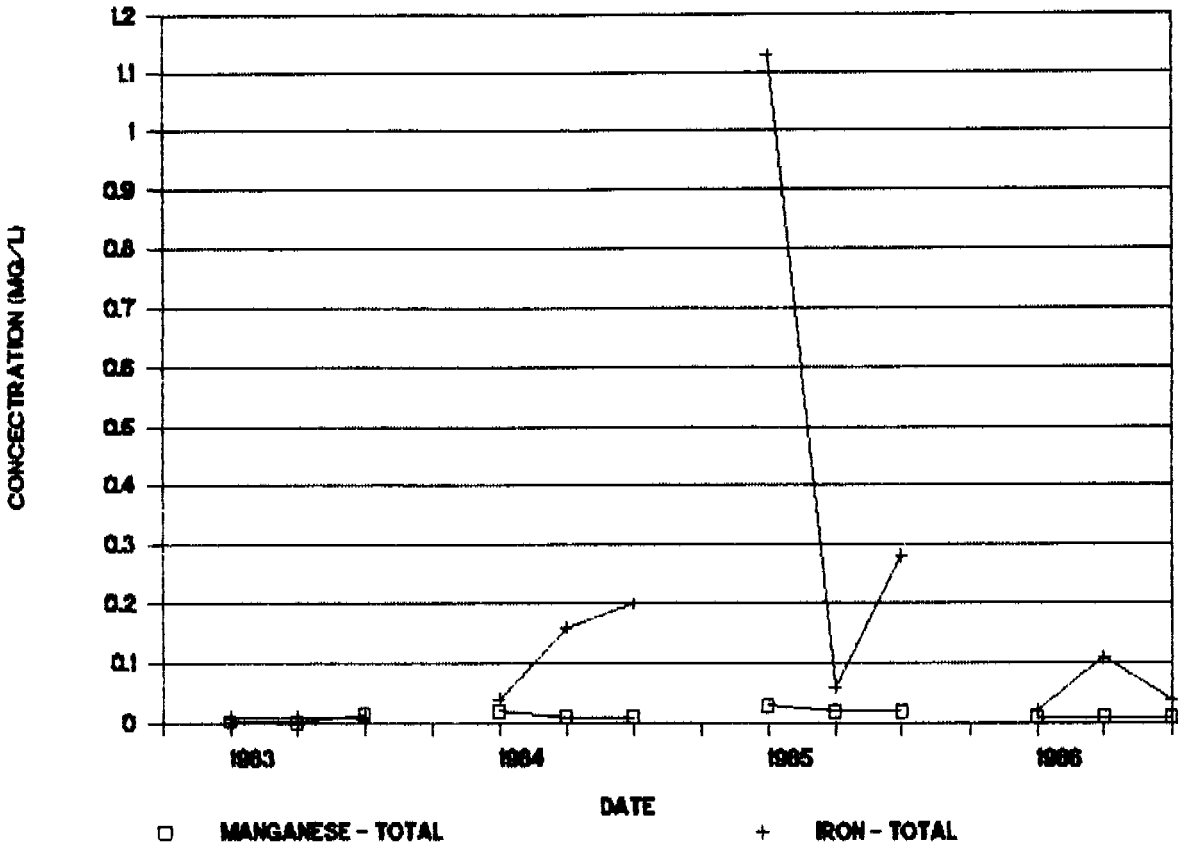

pH – SITE–001
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
pH (S.U.)
1983
1984
1985
1986
DATE


pH – SITE–001
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
6.7
6.6
pH (S.U.)
1987
1988
1989
1990
DATE

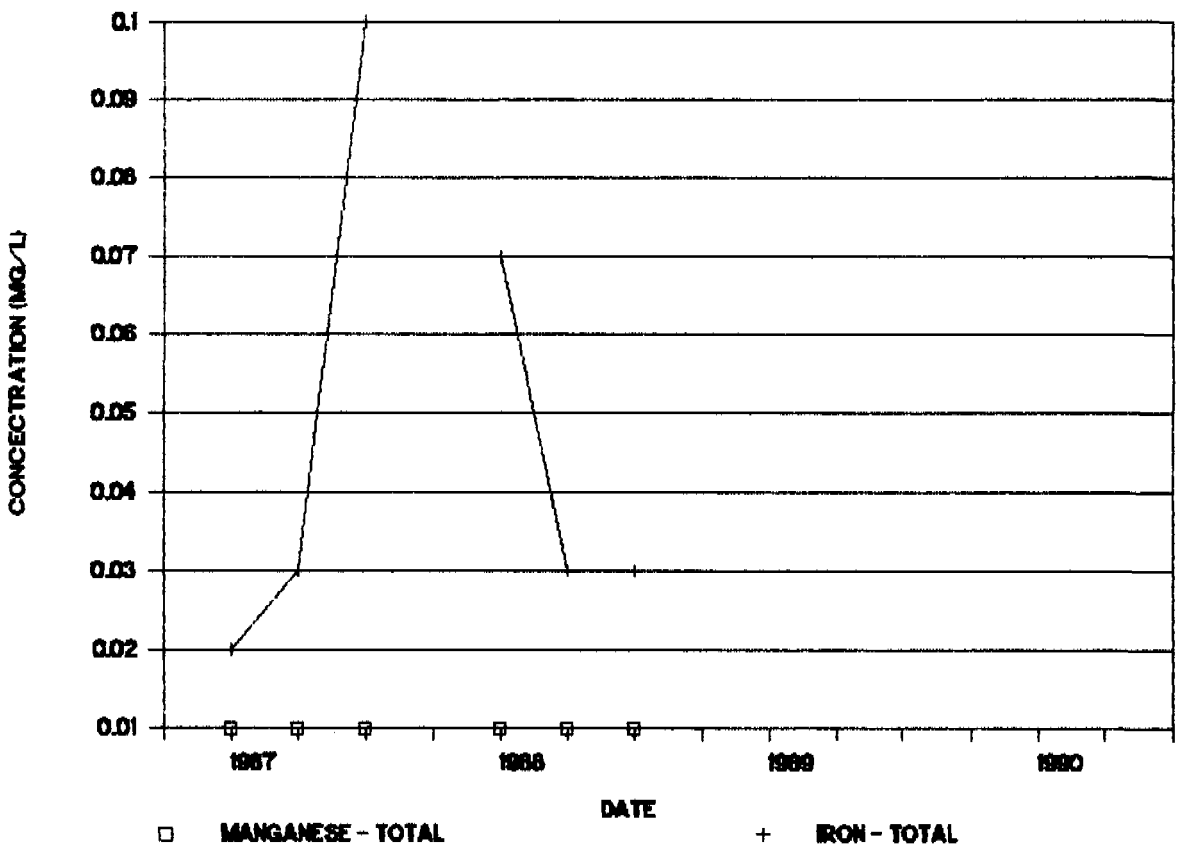

SOLIDS - SITE-001
CONCECTRATION (MG/L)
600
500
400
300
200
100
0
1983
1984
1985
1986
DATE
TOTAL DISS. SOLIDS


SOLIDS - SITE-001
CONCECTRATION (MG/L)
390
380
370
360
350
340
330
320
310
300
290
280
270
1987
1988
1989
1990
DATE
TOTAL DISS. SOLIDS

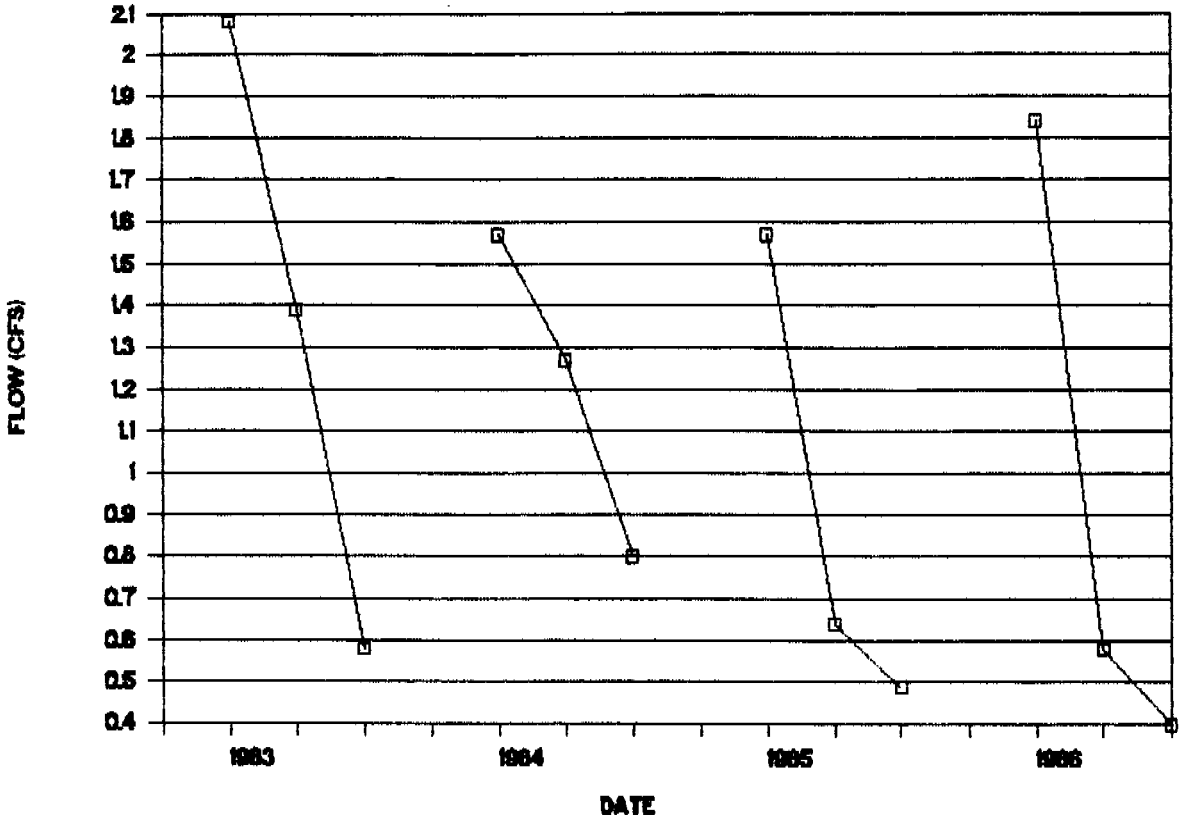
IRON/MANGANESE – SITE–001



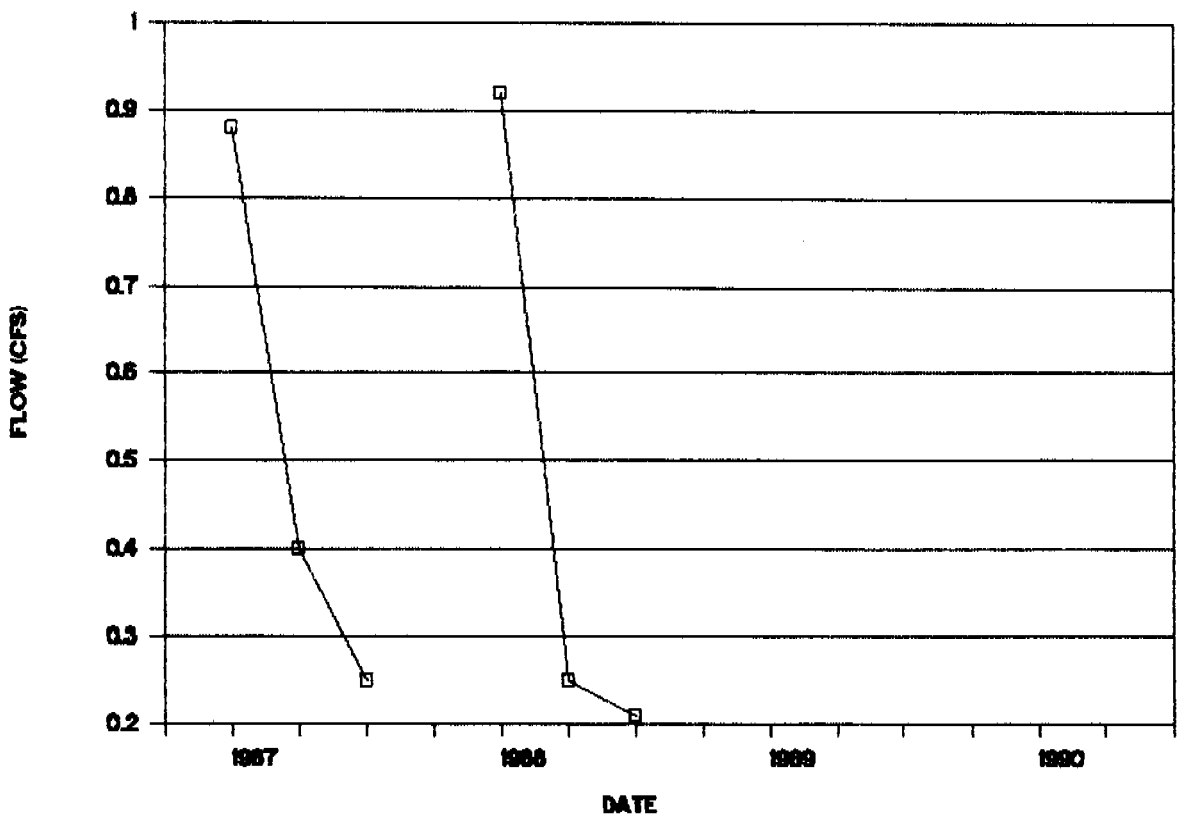
IRON/MANGANESE – SITE–001

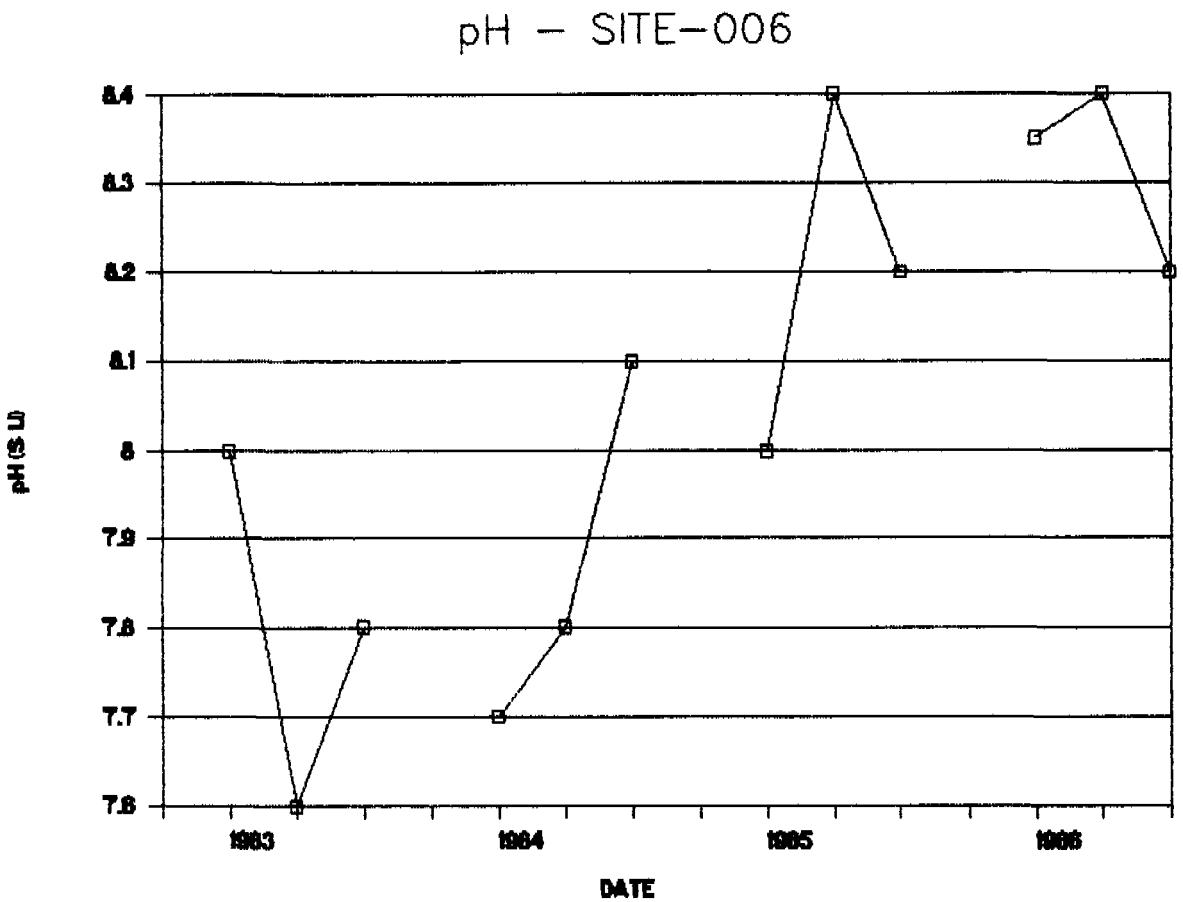


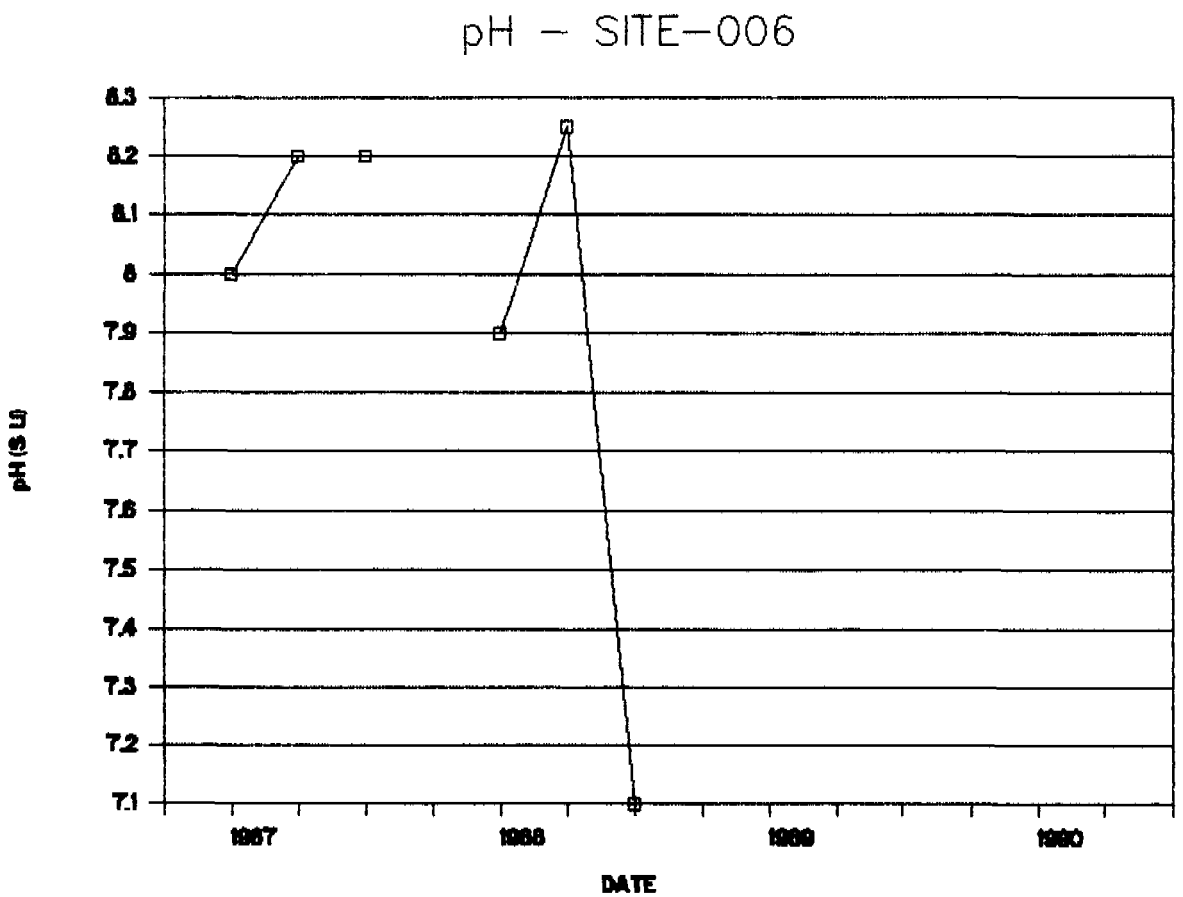
FLOW – SITE–006

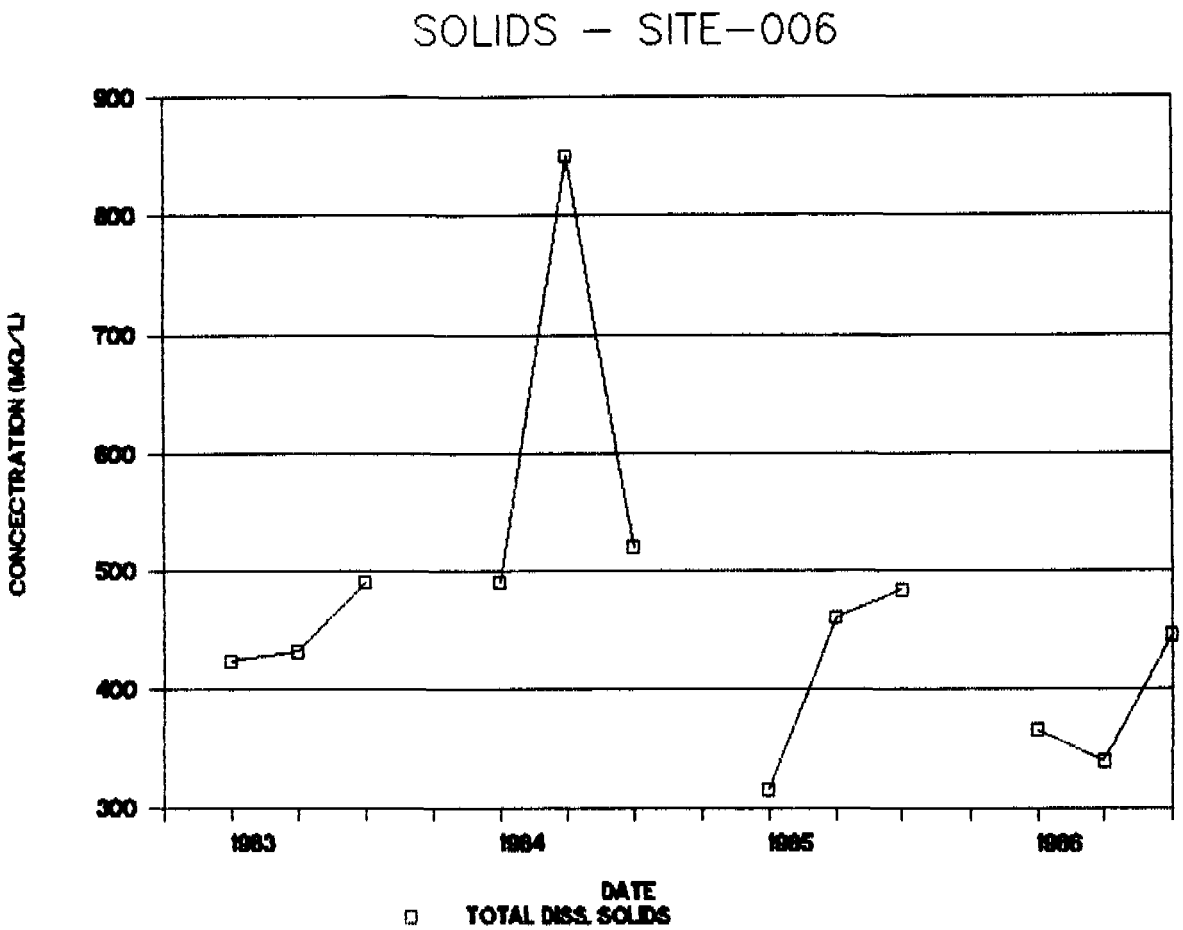


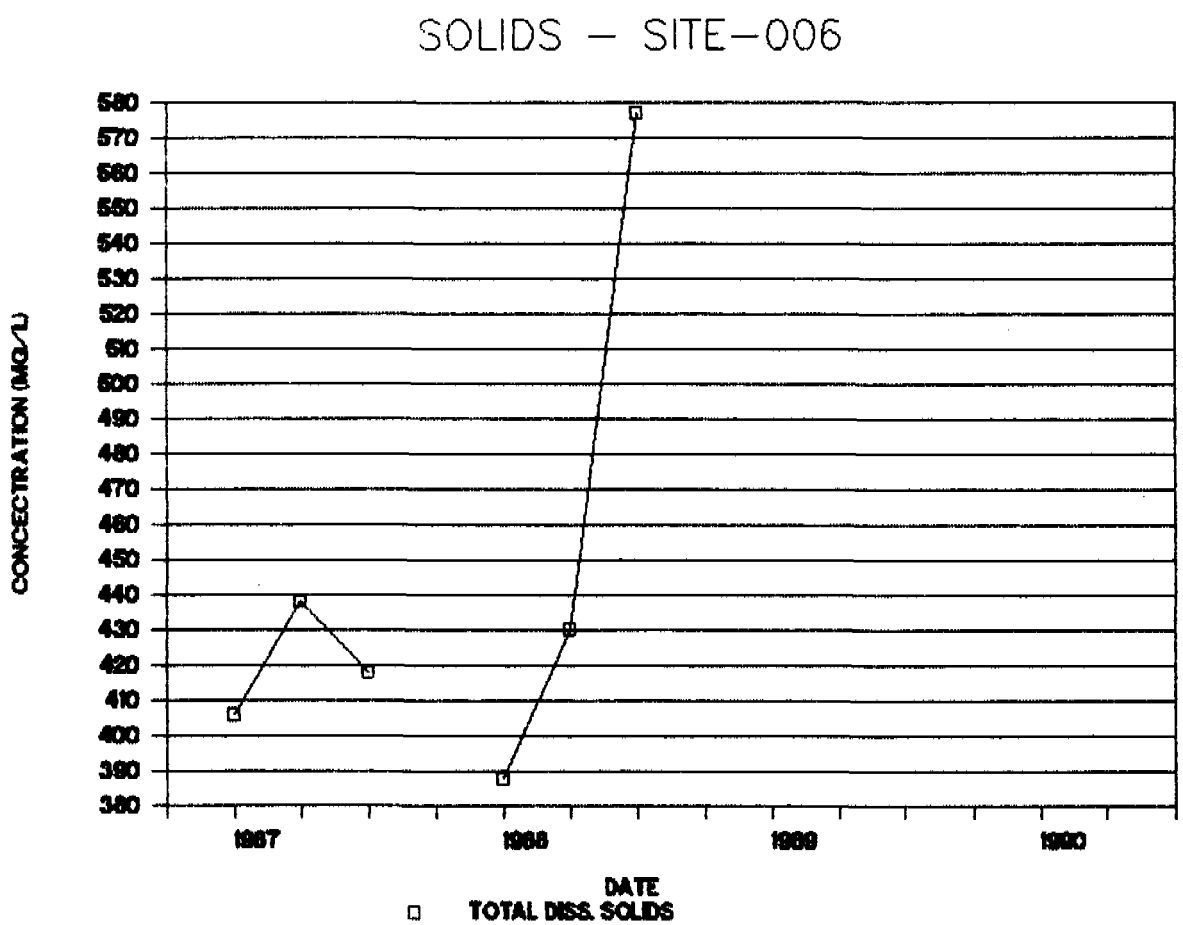
FLOW – SITE–006

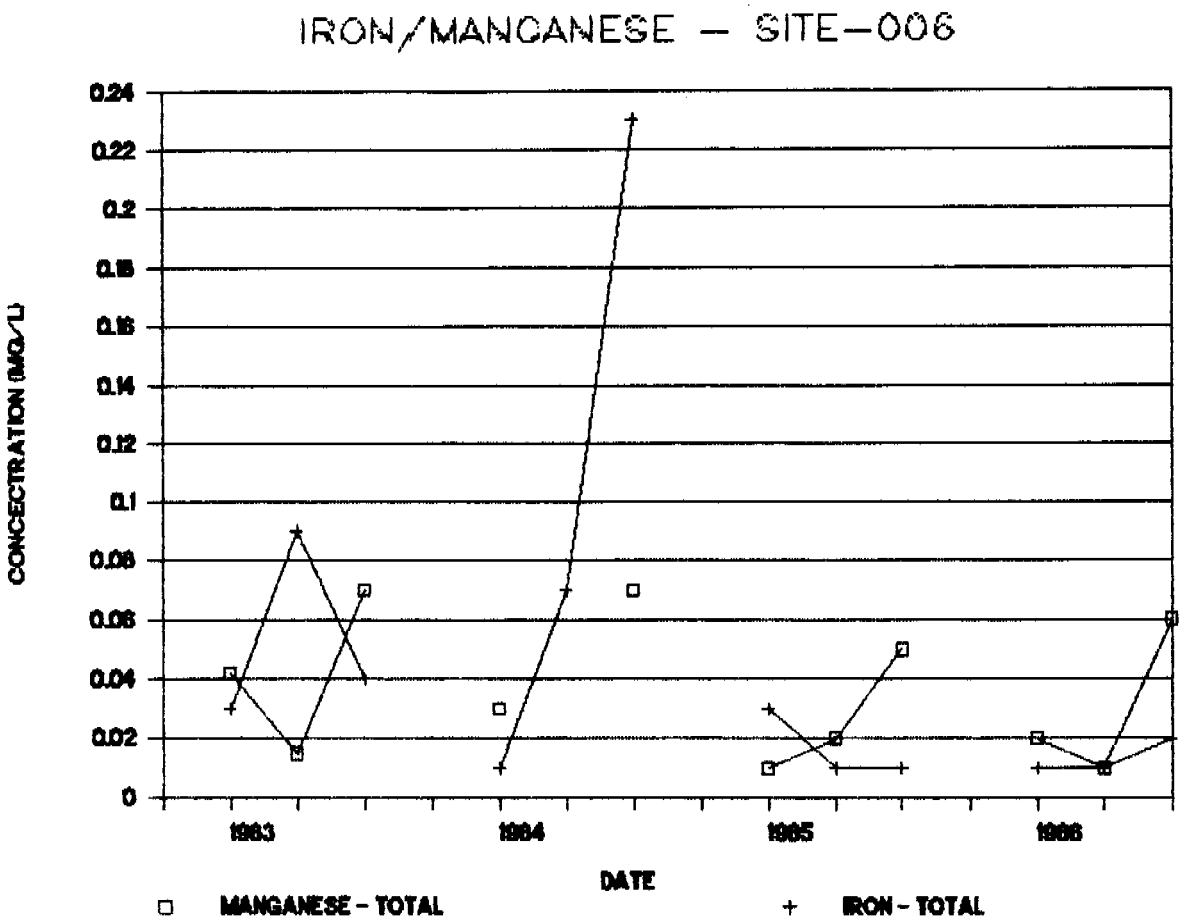


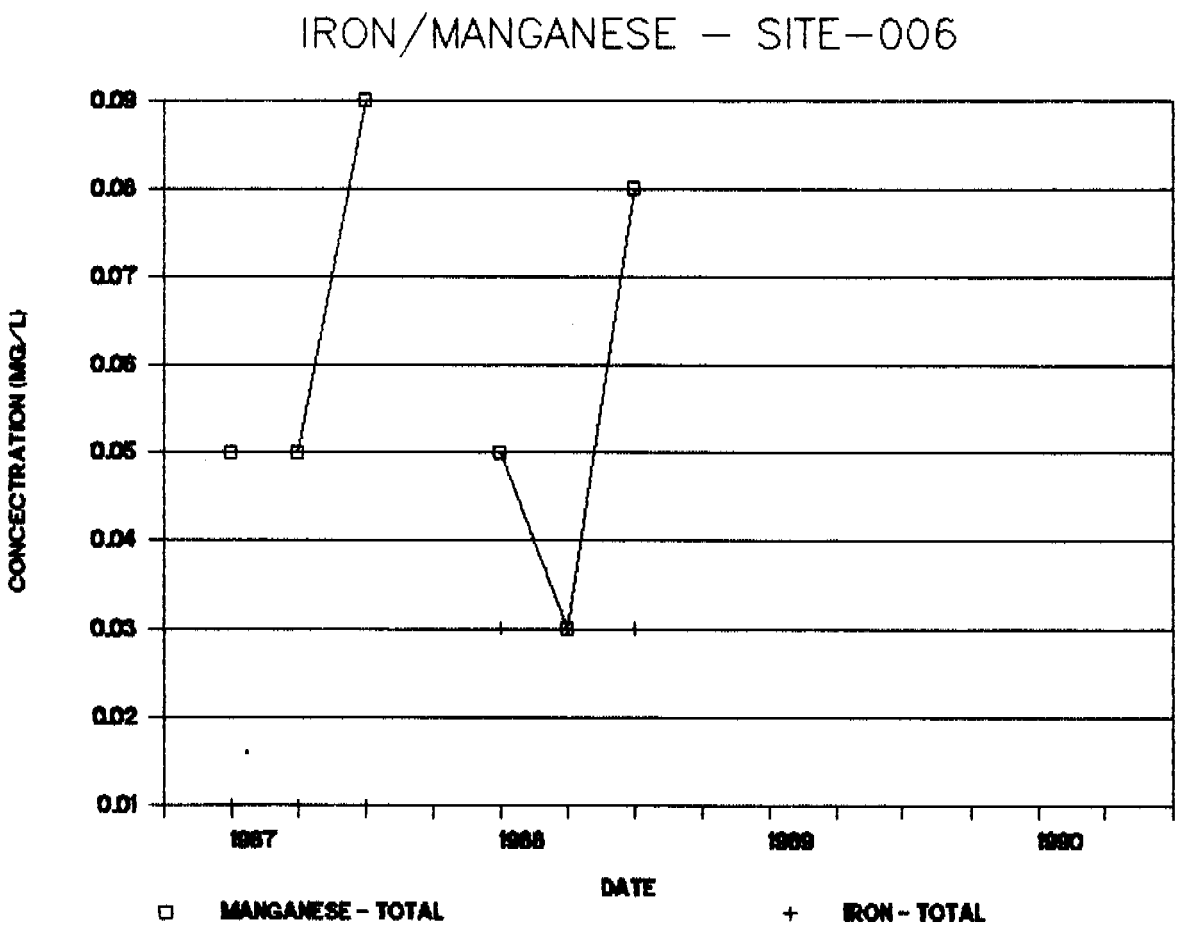

pH - SITE-006
8.4
8.3
8.2
8.1
8
7.9
7.8
7.7
7.6
pH (S.U.)
1983
1984
1985
1986
DATE


pH - SITE-006
8.3
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
pH (S.U.)
1987
1988
1989
1990
DATE

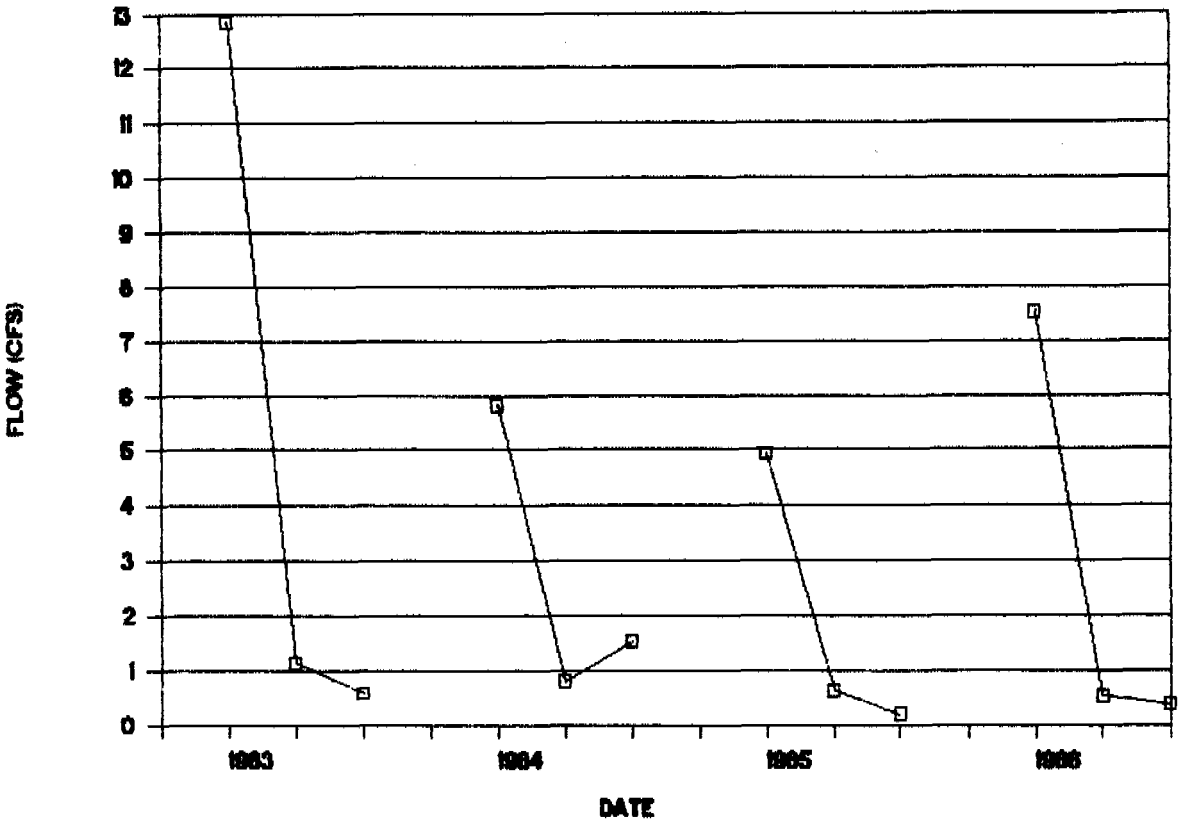

SOLIDS – SITE–006
CONCECTRATION (MG/L)
900
800
700
600
500
400
300
1983
1984
1985
1986
DATE
TOTAL DISS. SOLIDS


SOLIDS – SITE–006
CONCECTRATION (MG/L)
580
570
560
550
540
530
520
510
500
490
480
470
460
450
440
430
420
410
400
390
380
1987
1988
1989
1990
DATE
TOTAL DISS. SOLIDS

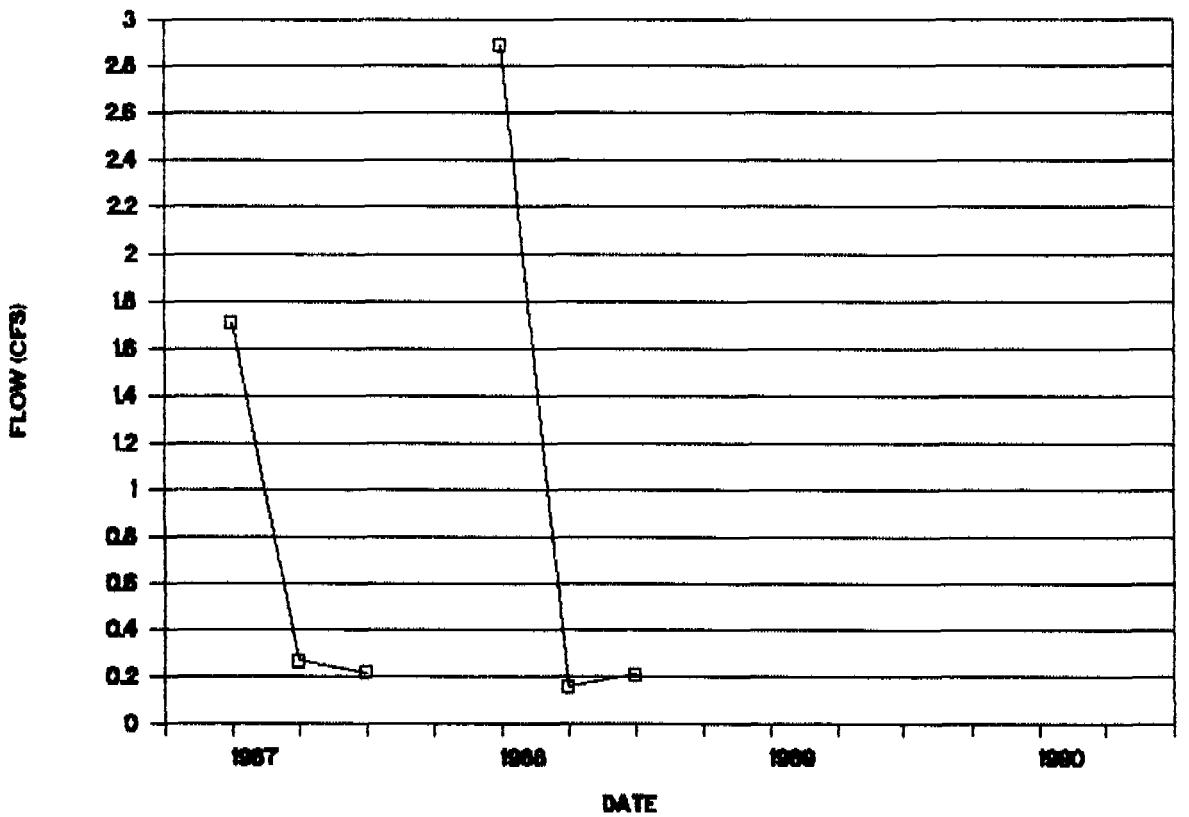

IRON/MANGANESE — SITE—006
CONCENTRATION (MG/L)
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL

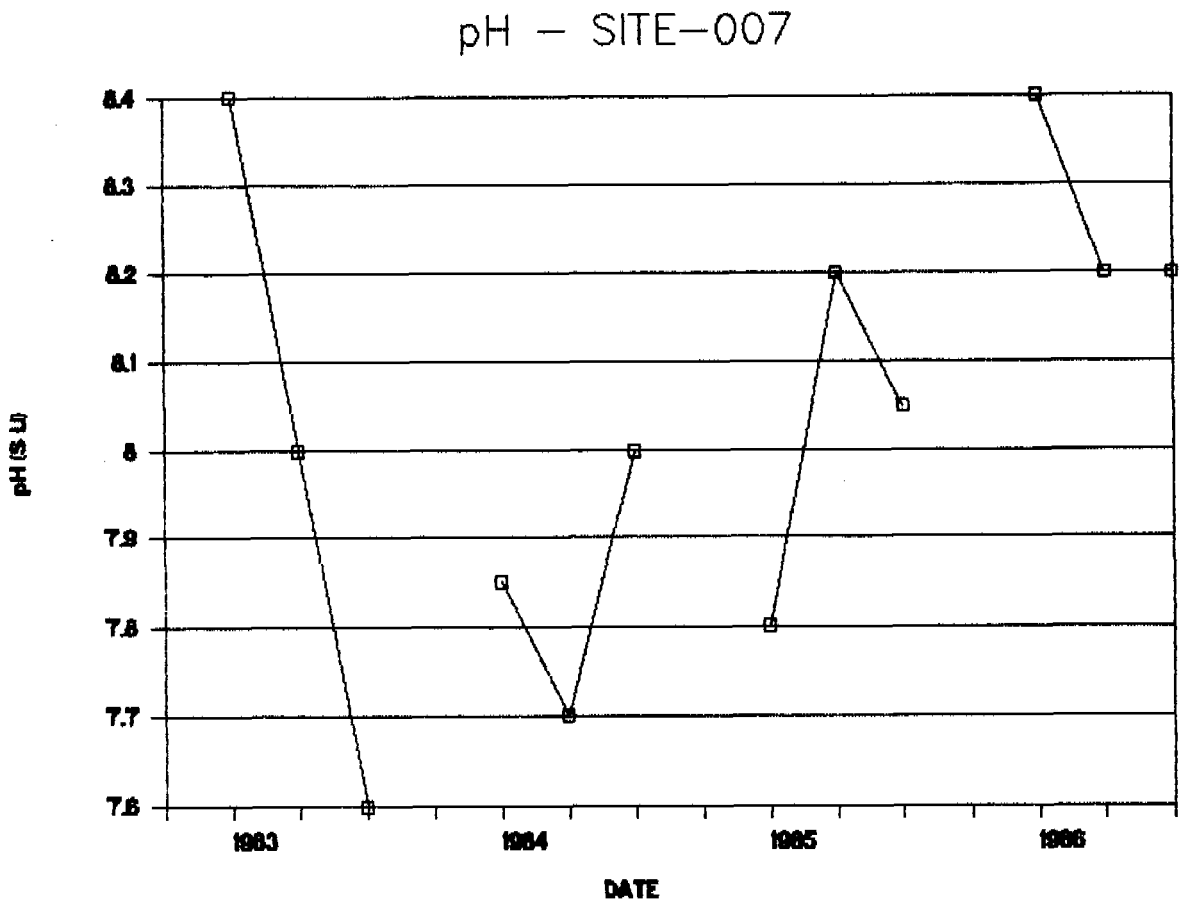

IRON/MANGANESE — SITE—006
CONCENTRATION (MG/L)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

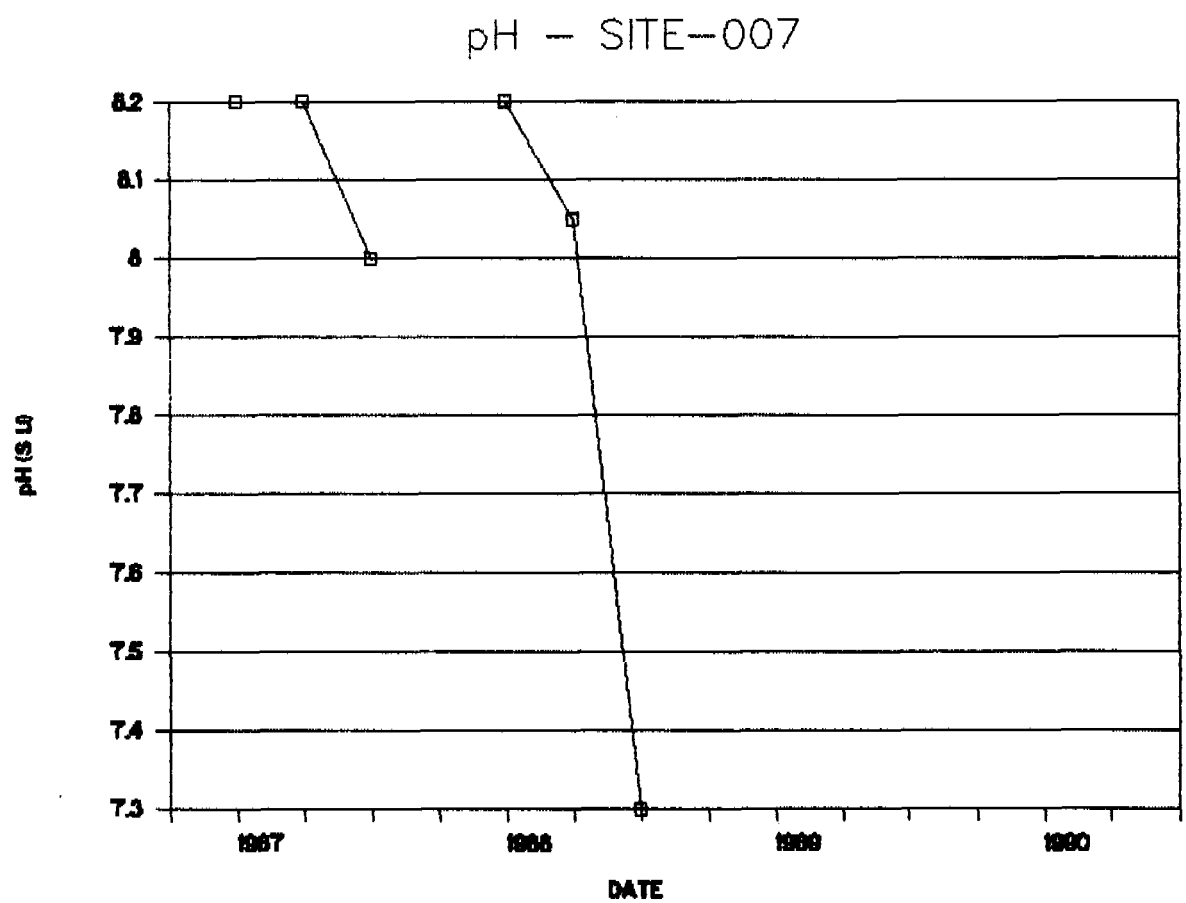
FLOW – SITE–007



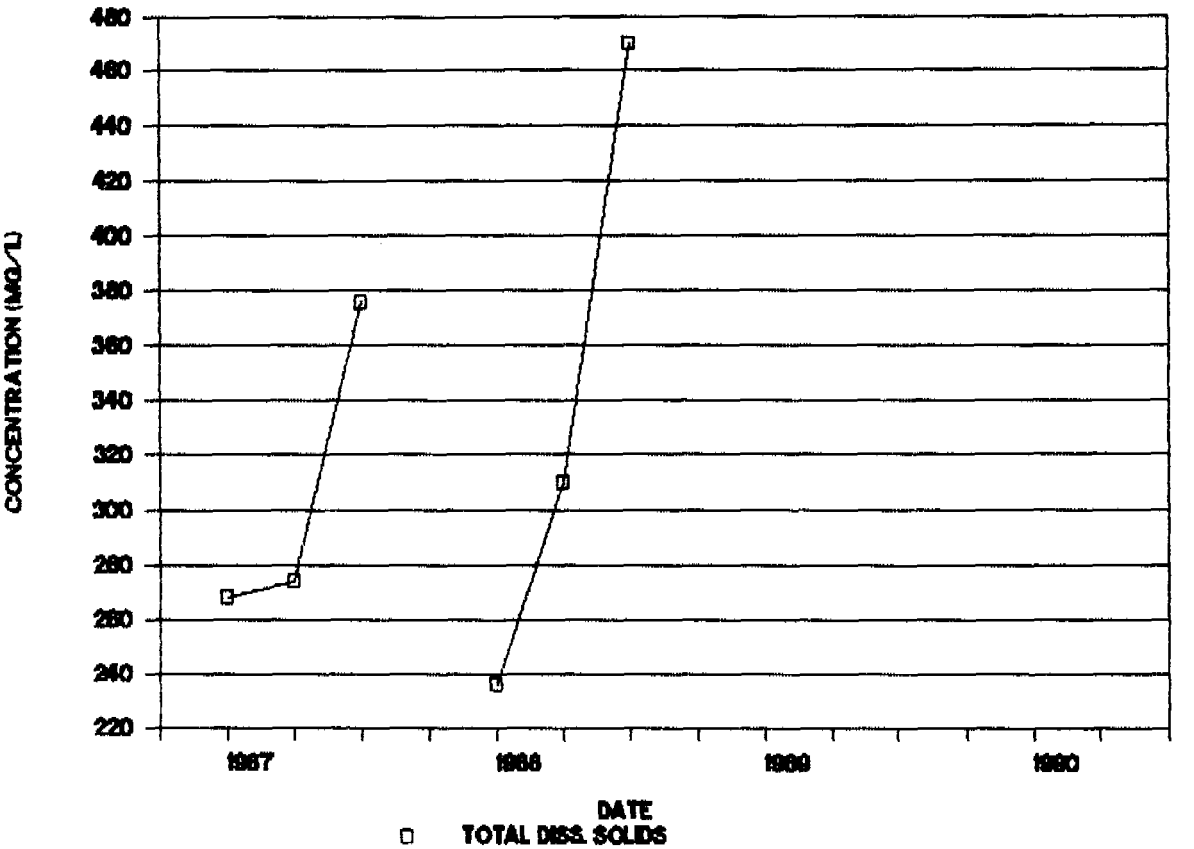
FLOW – SITE–007



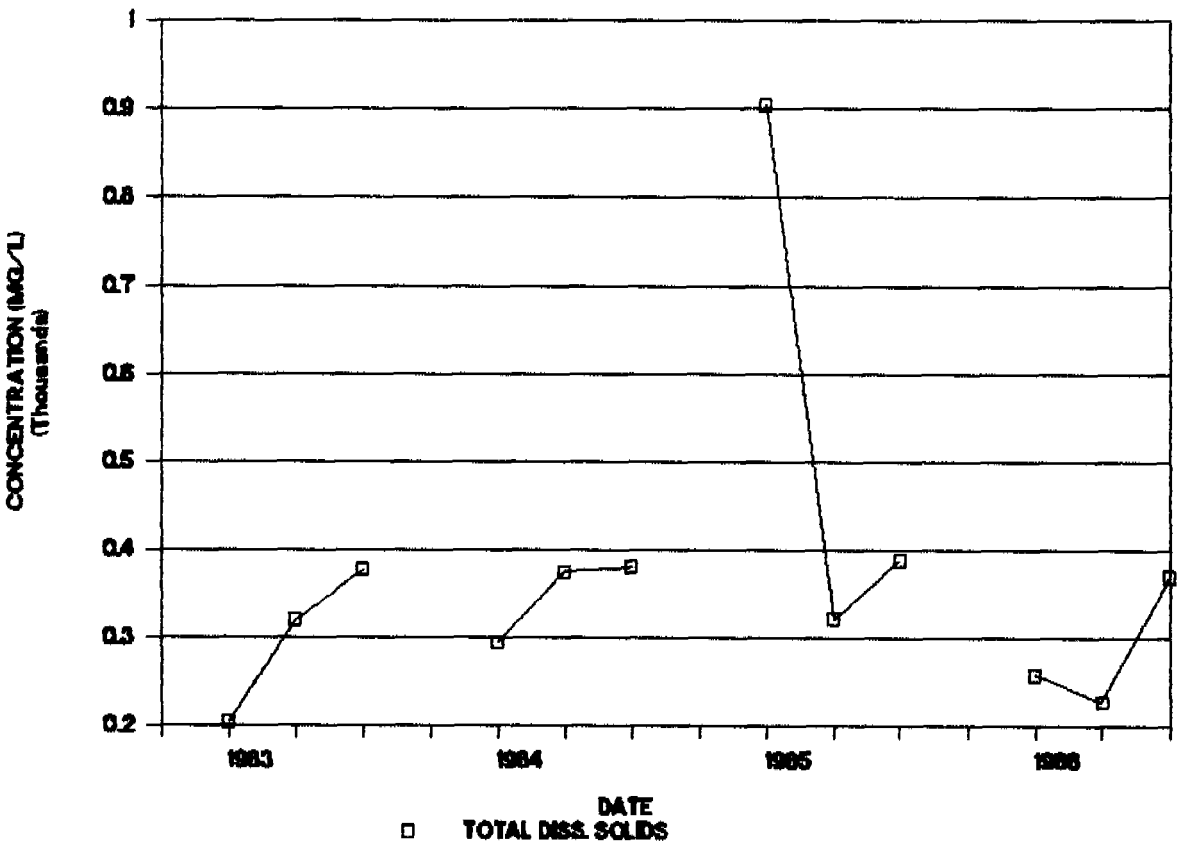

pH – SITE–007
8.4
8.3
8.2
8.1
8
7.9
7.8
7.7
7.6
pH (S U)
1983
1984
1985
1986
DATE

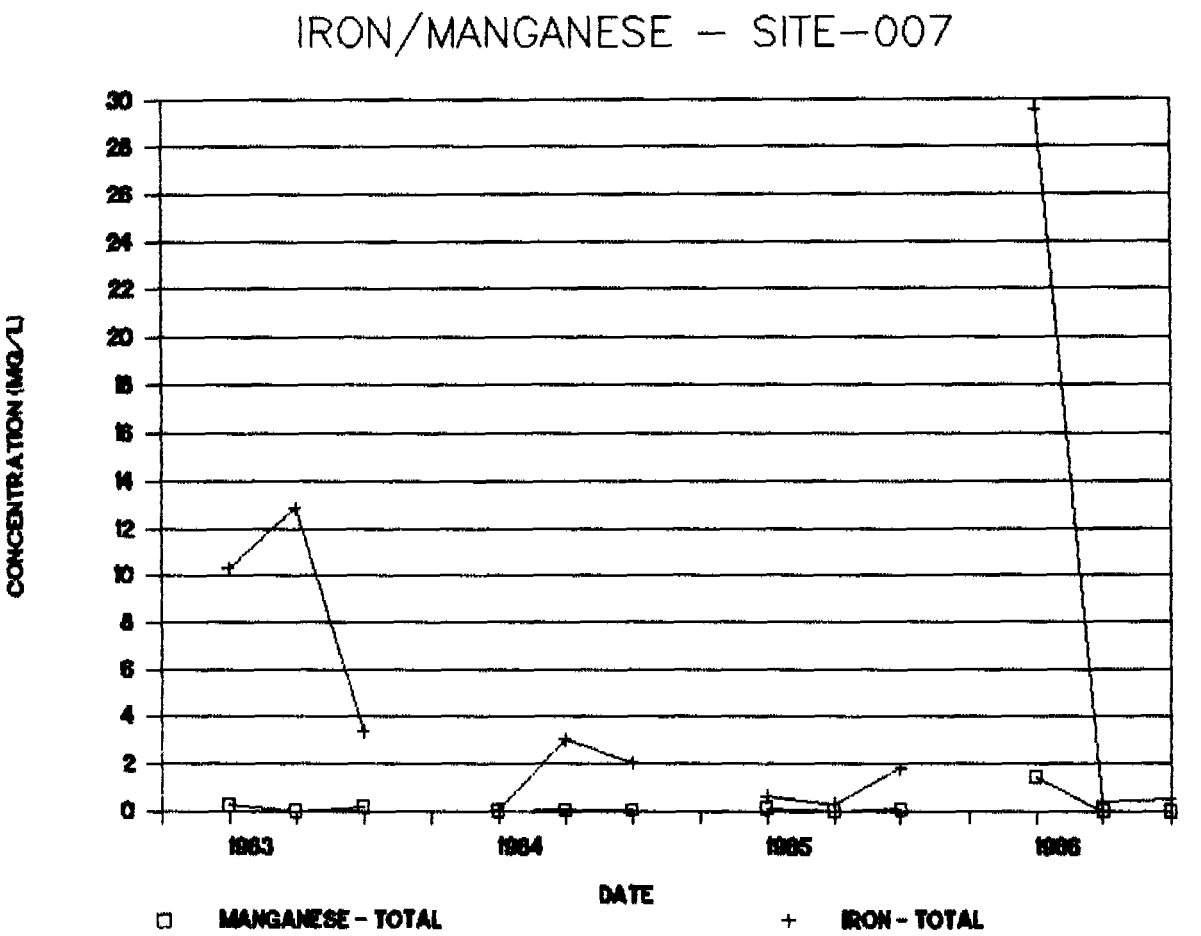

pH – SITE–007
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
pH (S U)
1987
1988
1989
1990
DATE

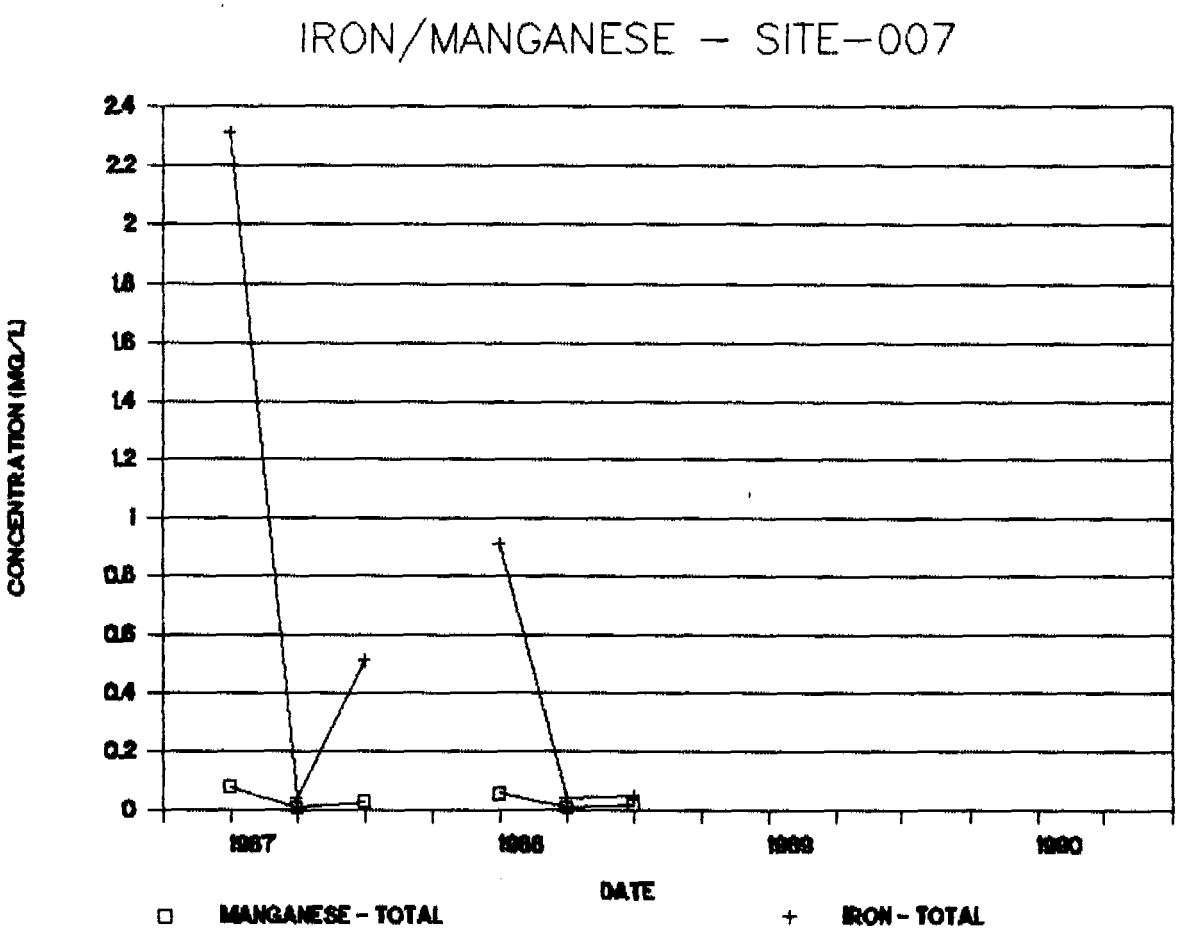
SOLIDS – SITE–007



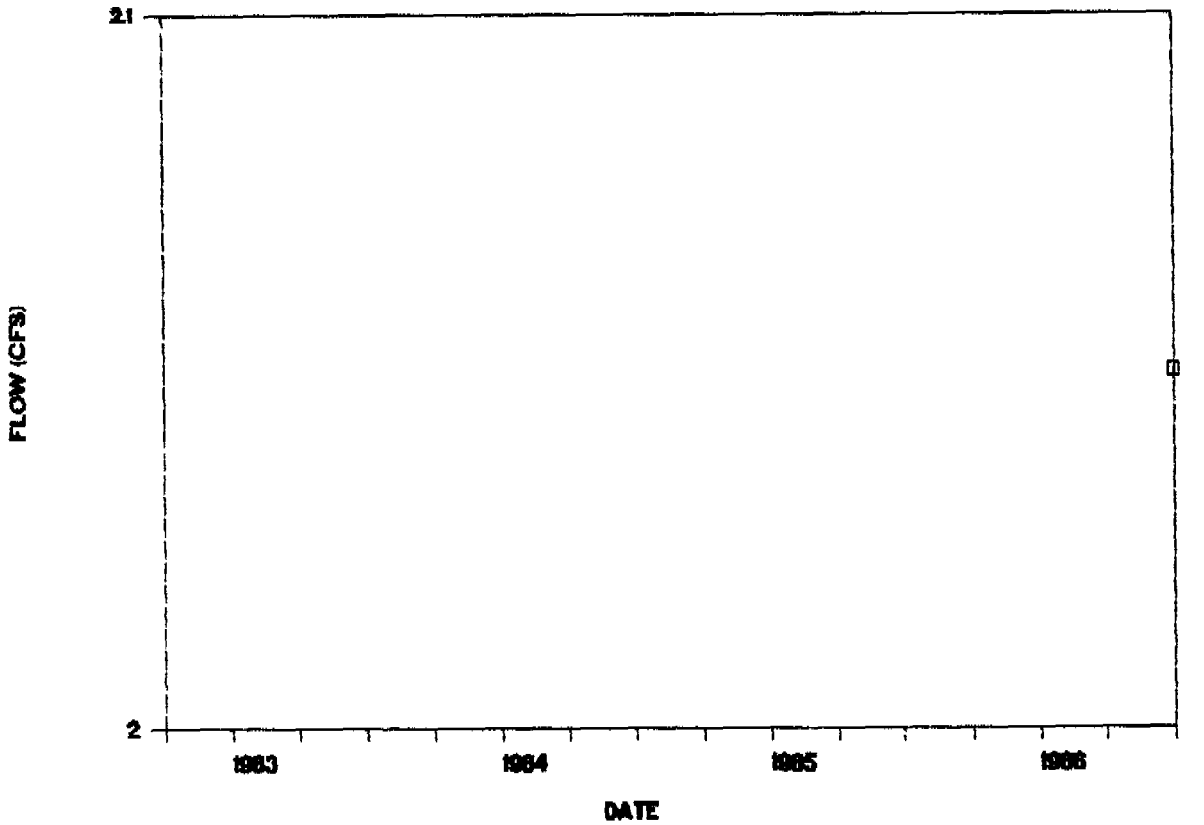
SOLIDS – SITE–007



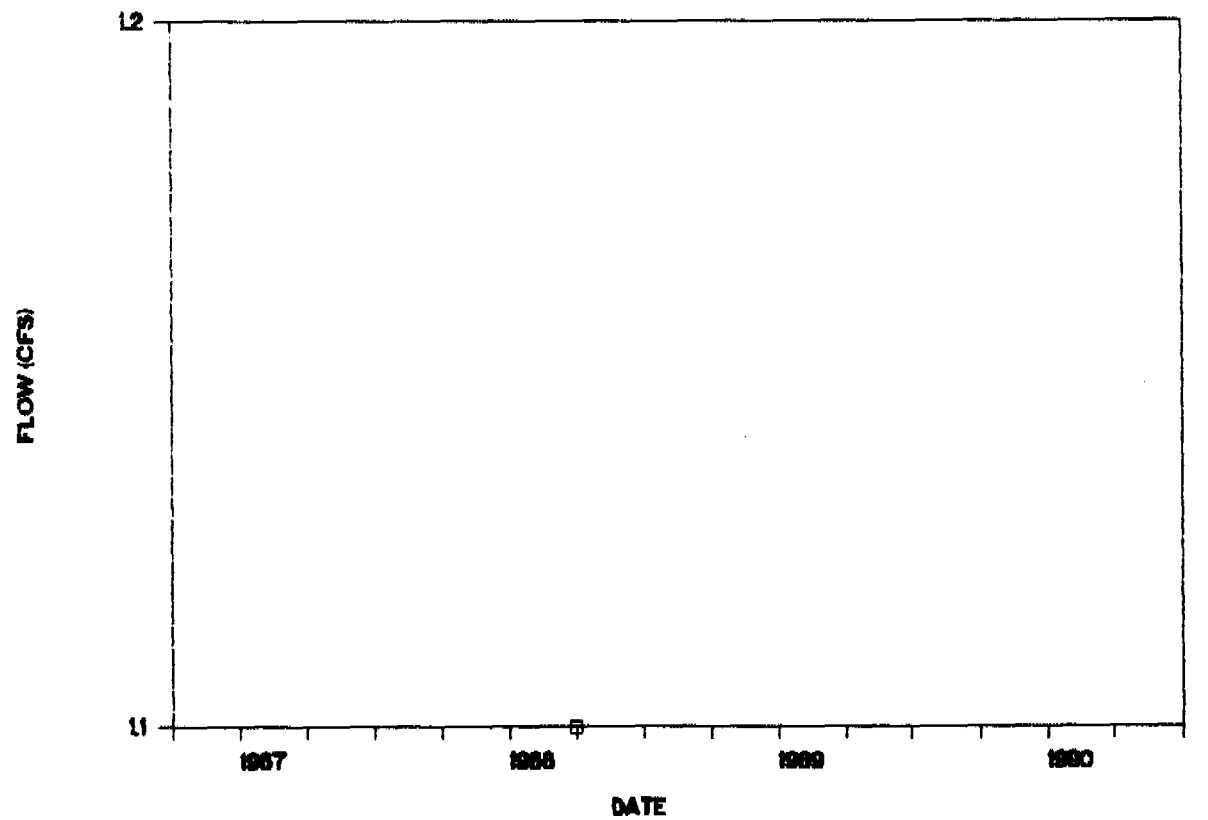

IRON/MANGANESE – SITE–007
CONCENTRATION (MG/L)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL

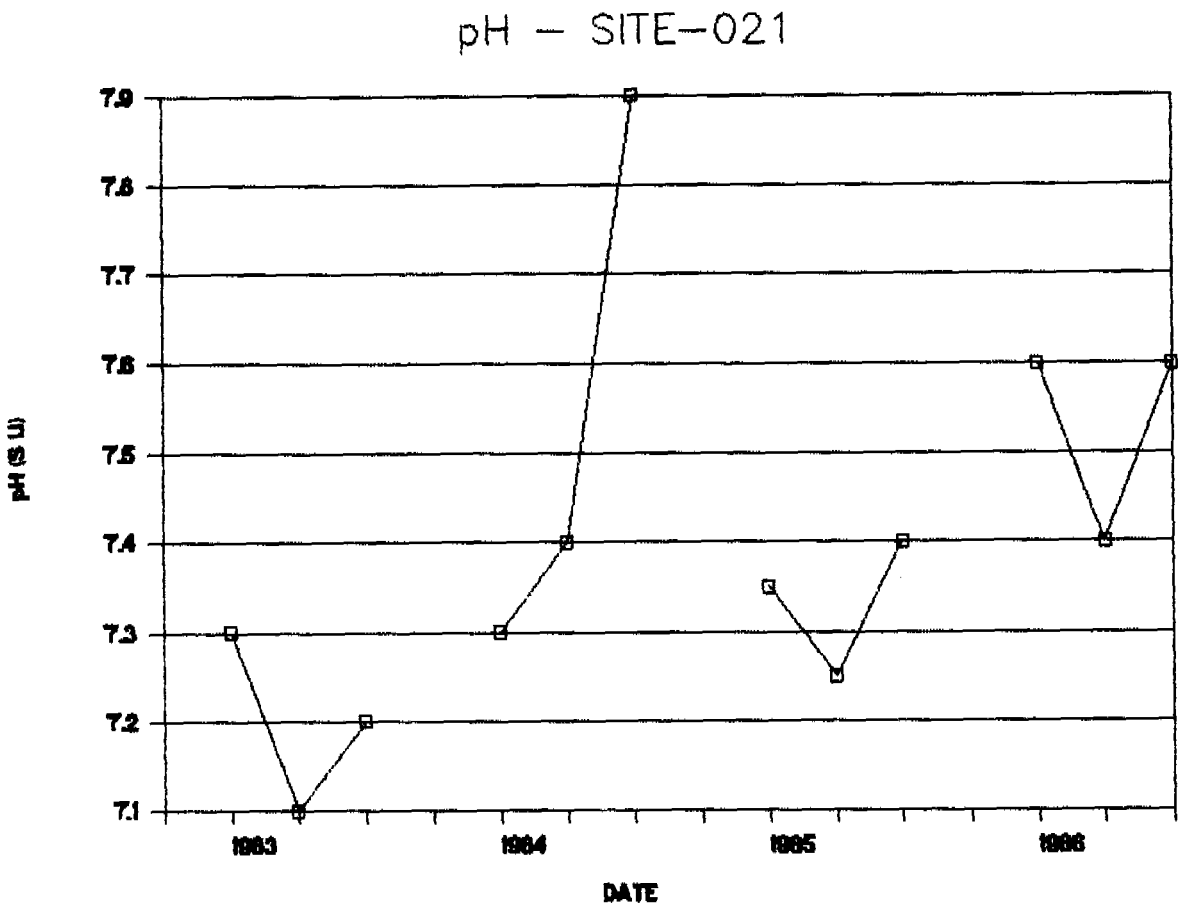

IRON/MANGANESE – SITE–007
CONCENTRATION (MG/L)
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

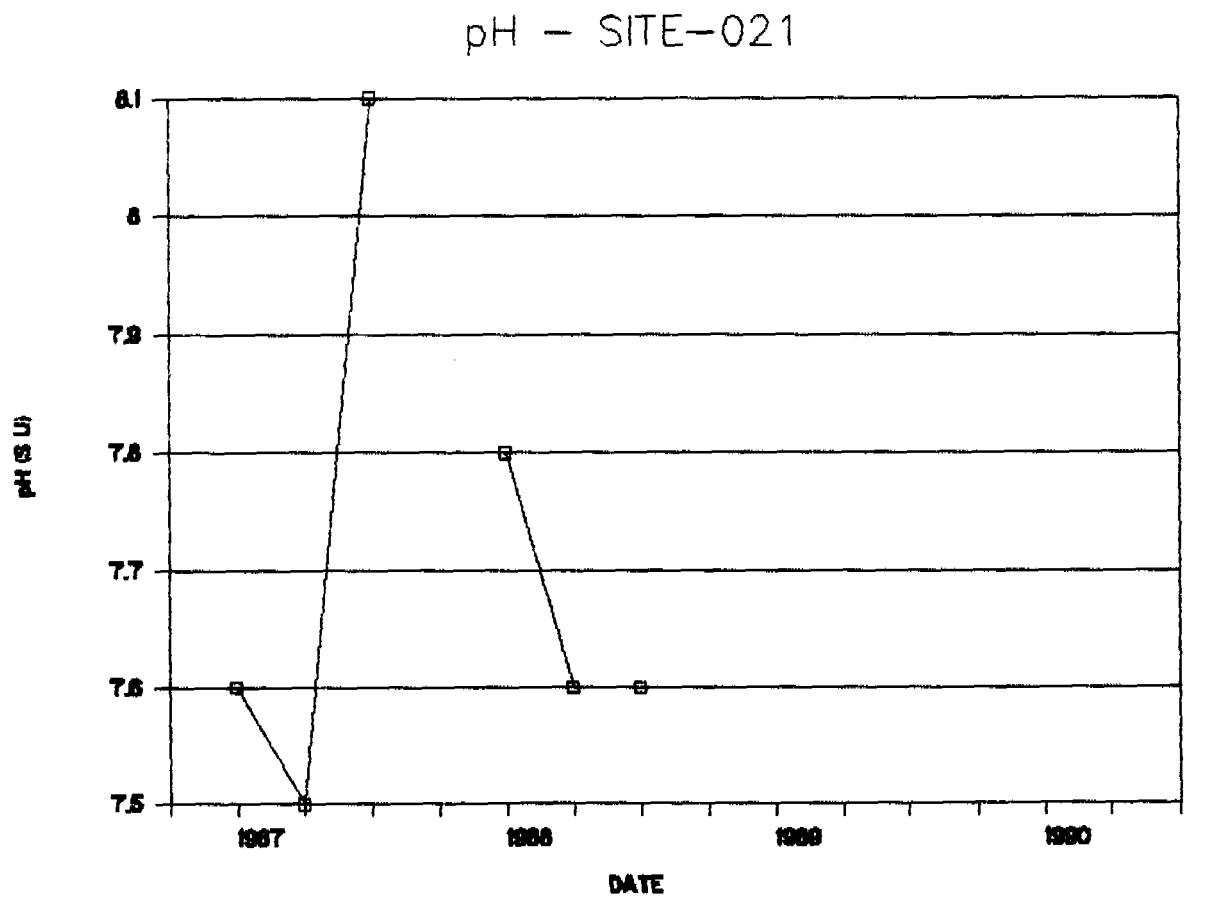
FLOW – SITE–021

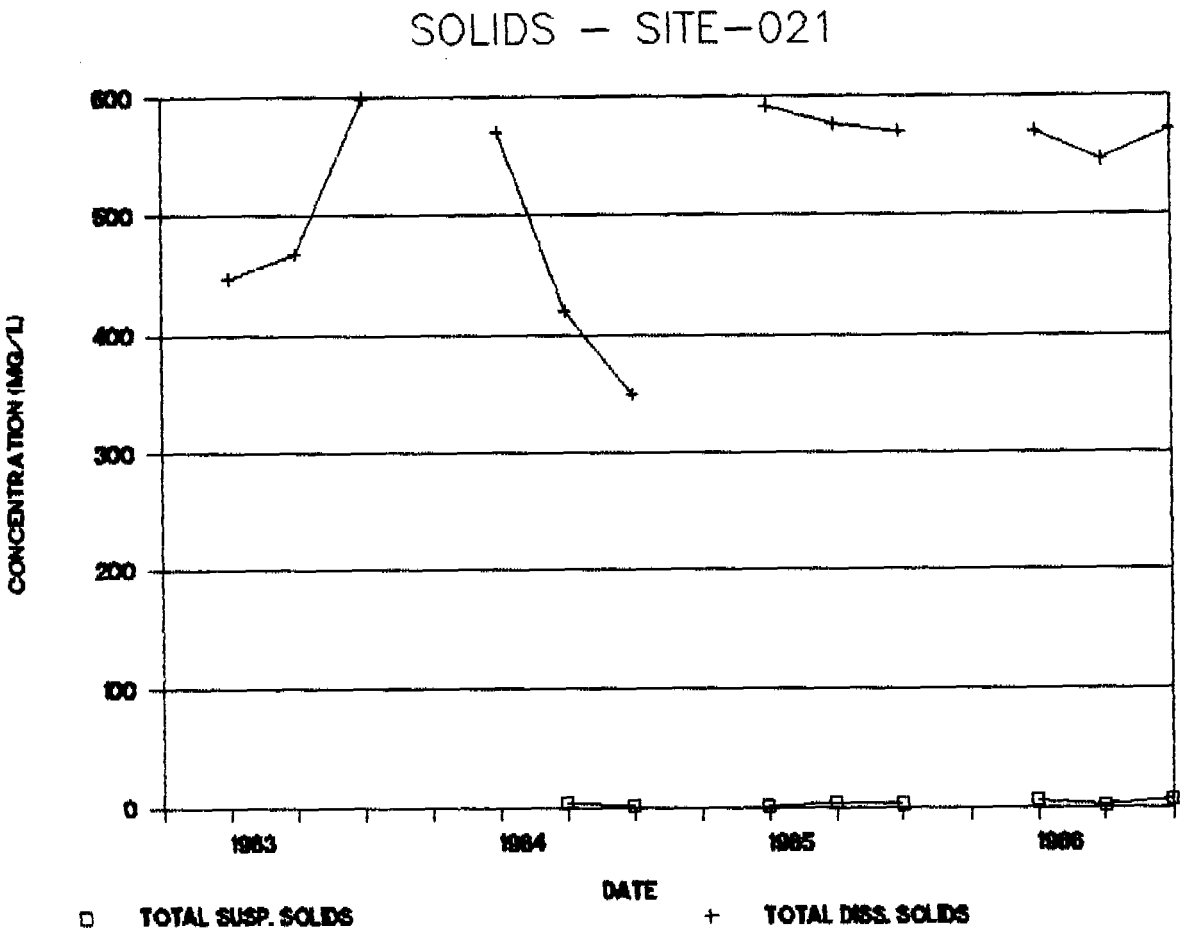


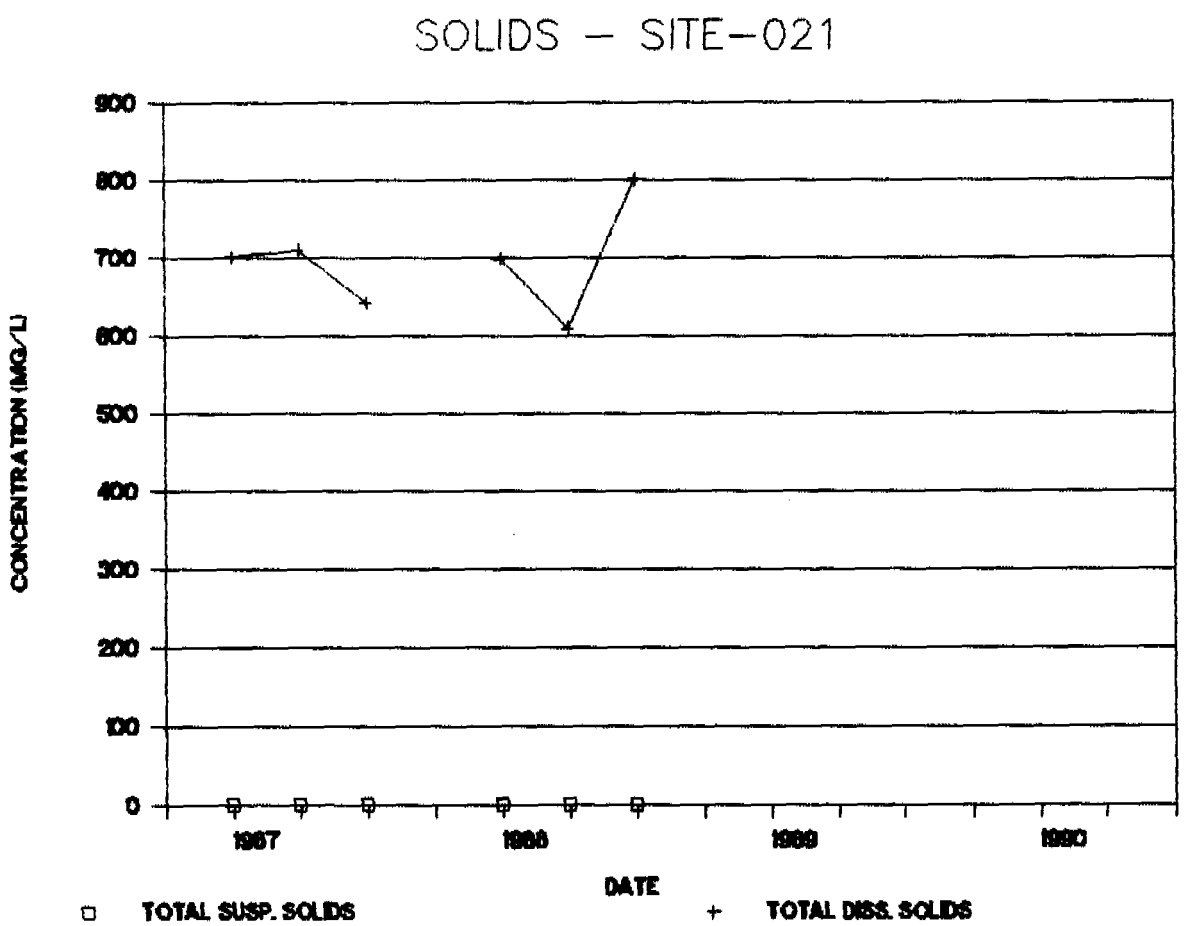
FLOW – SITE–021

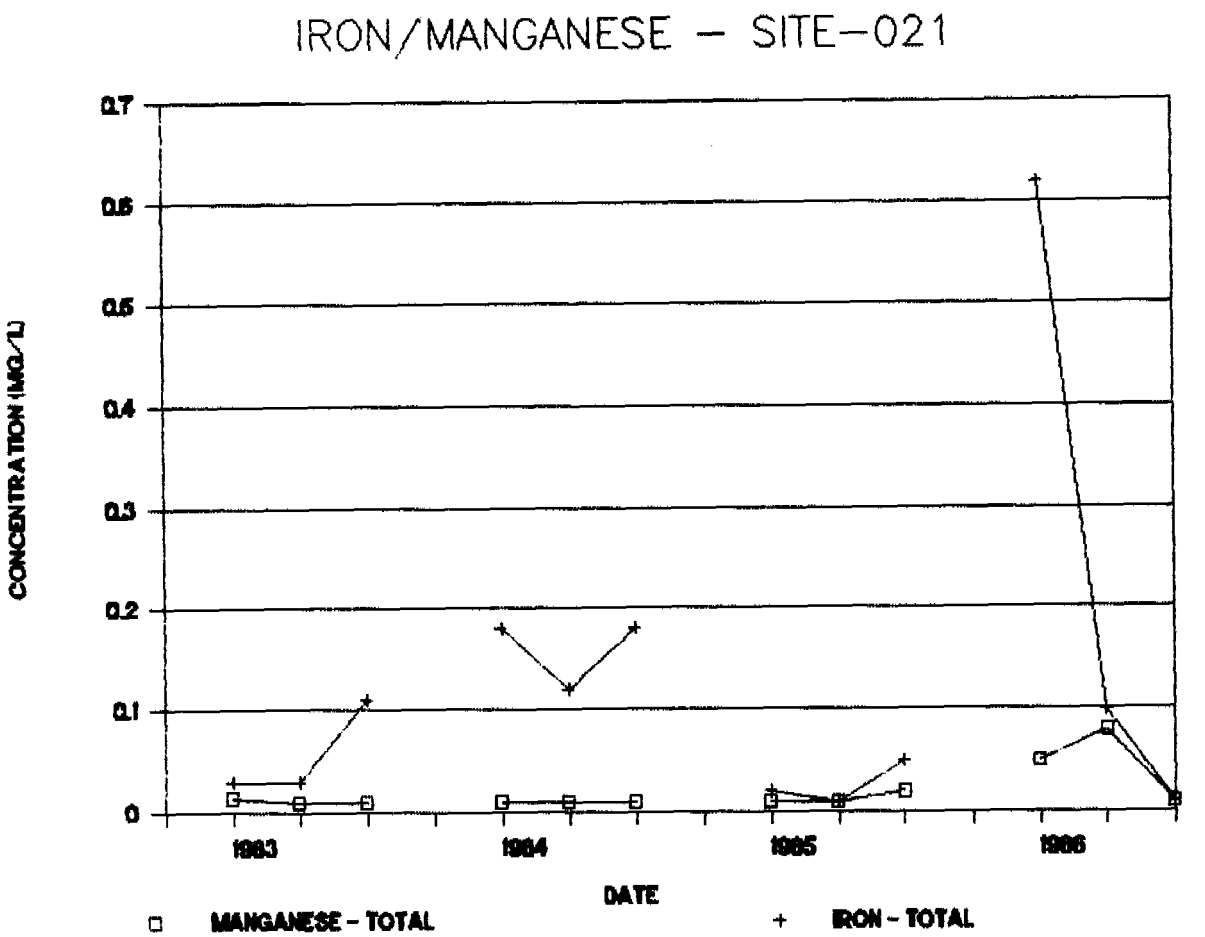


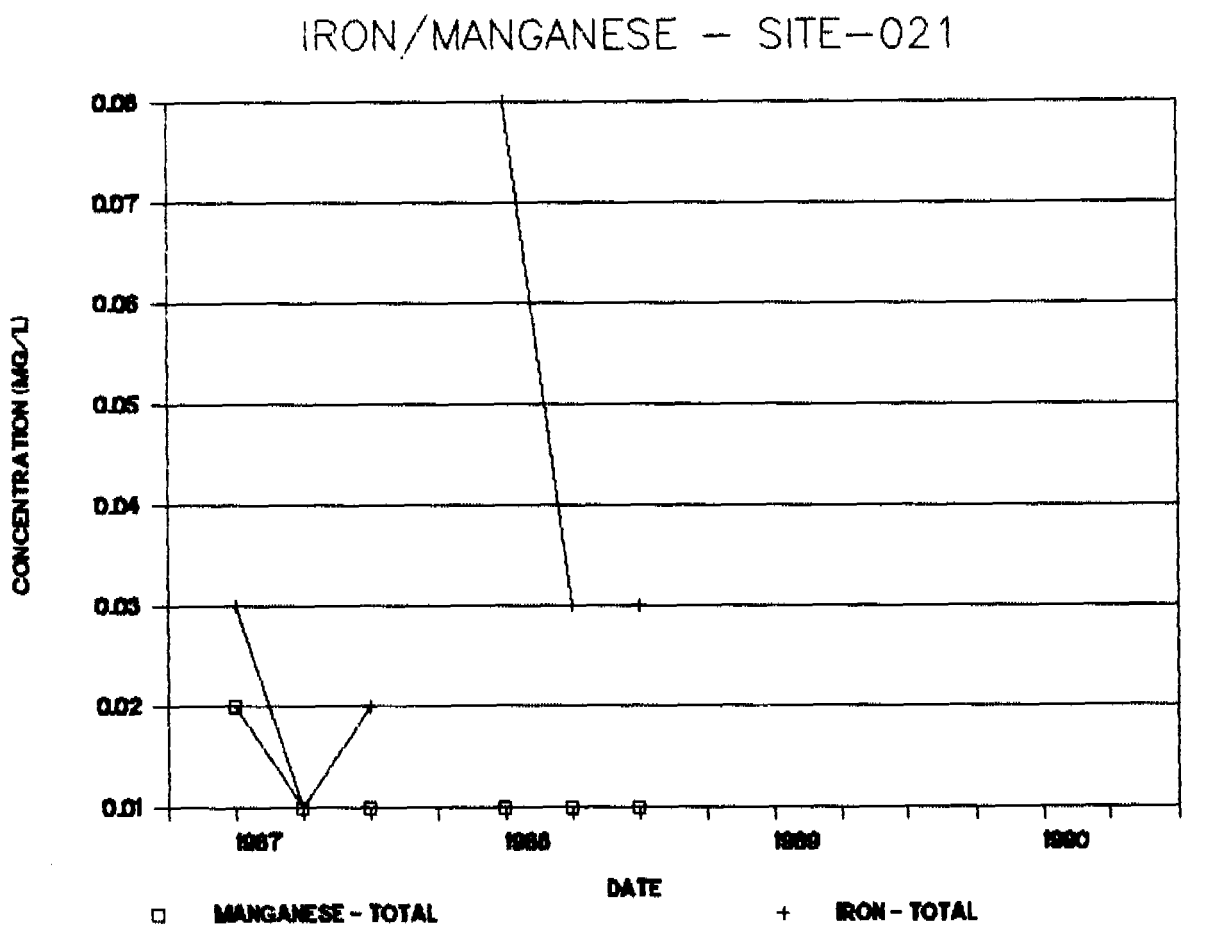

pH – SITE–021
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
pH (S.U.)
1983
1984
1985
1986
DATE


pH – SITE–021
8.1
8
7.9
7.8
7.7
7.6
7.5
pH (S.U.)
1987
1988
1989
1990
DATE

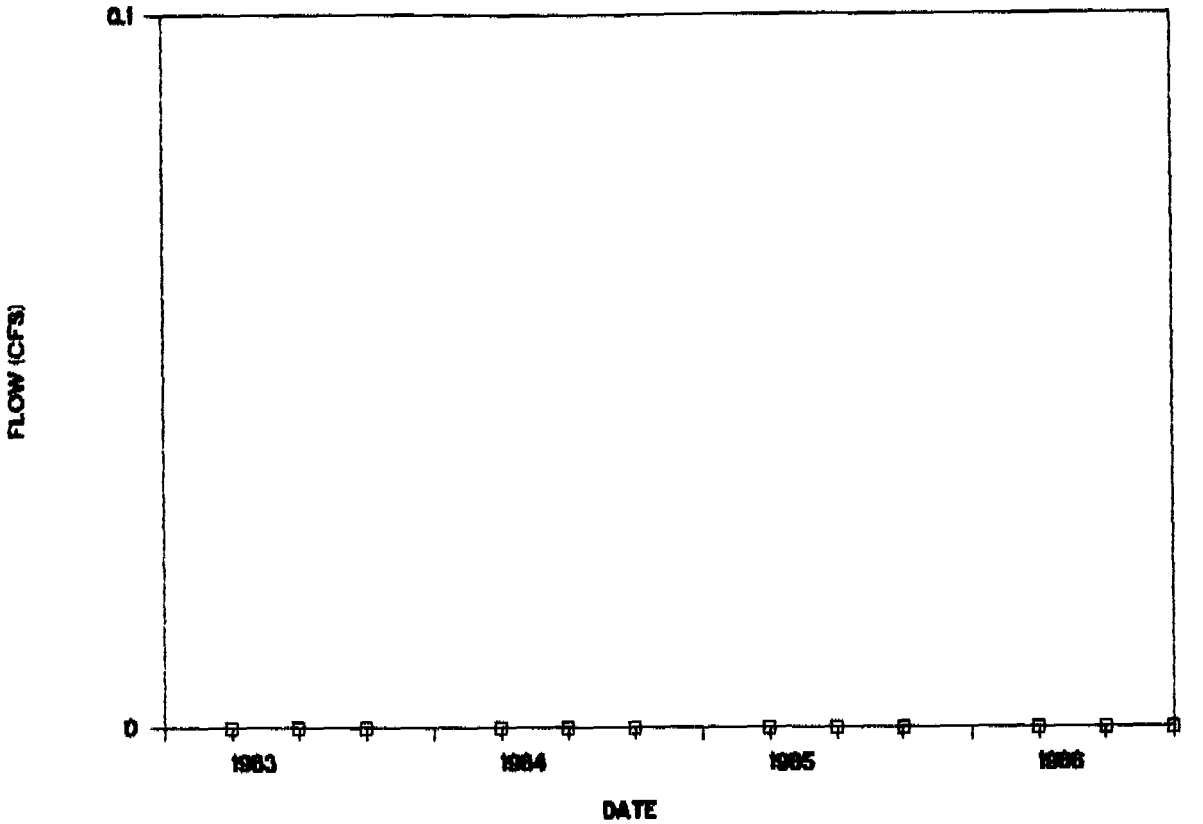

SOLIDS – SITE–021
CONCENTRATION (MG/L)
600
500
400
300
200
100
0
1983
1984
1985
1986
DATE
TOTAL SUSP. SOLIDS
TOTAL DISS. SOLIDS


SOLIDS – SITE–021
CONCENTRATION (MG/L)
900
800
700
600
500
400
300
200
100
0
1987
1988
1989
1990
DATE
TOTAL SUSP. SOLIDS
TOTAL DISS. SOLIDS

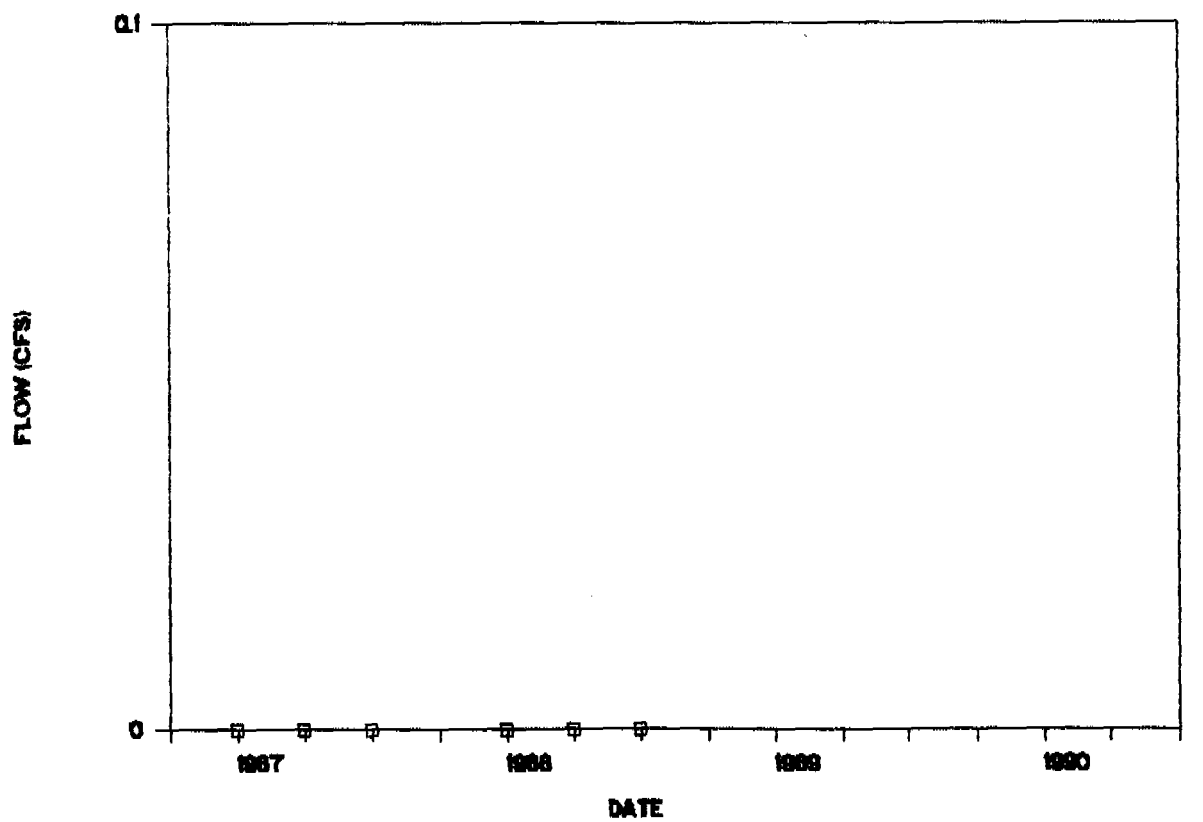

IRON/MANGANESE – SITE–021
CONCENTRATION (MG/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL


IRON/MANGANESE – SITE–021
CONCENTRATION (MG/L)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

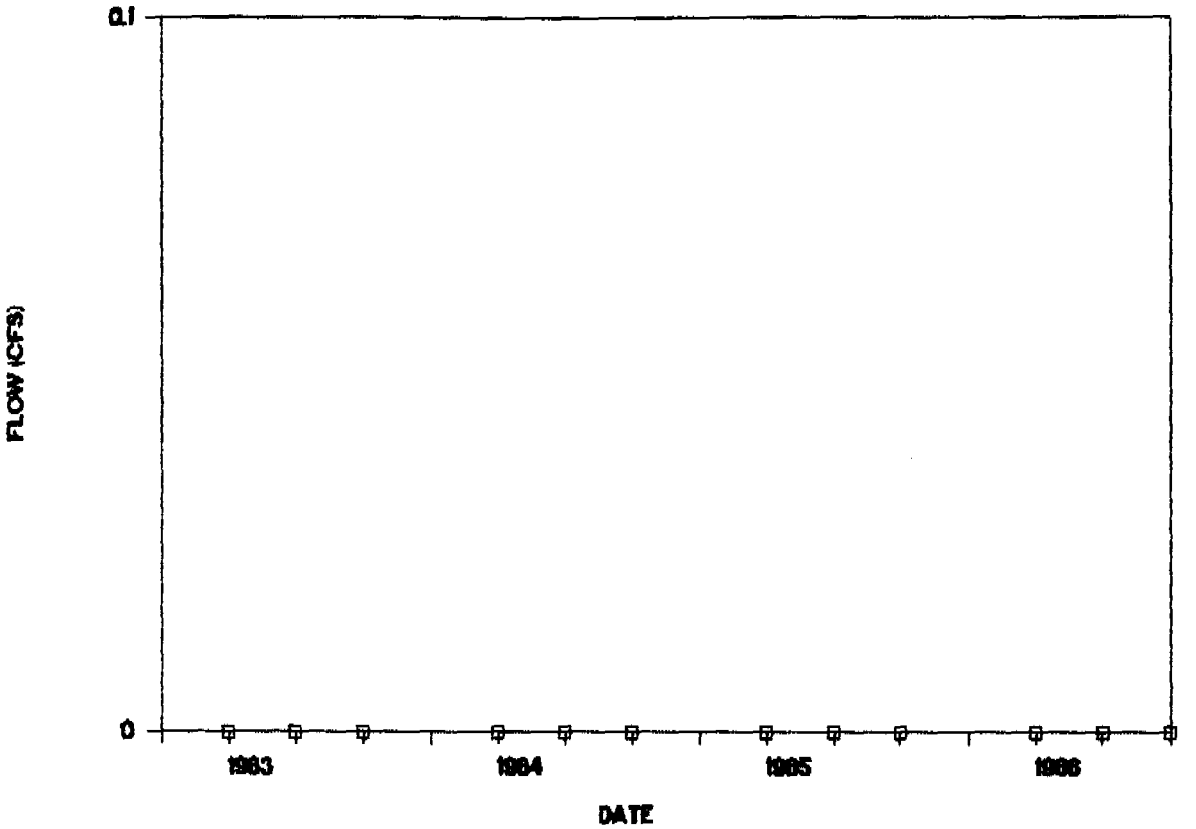
FLOW — SITE—022



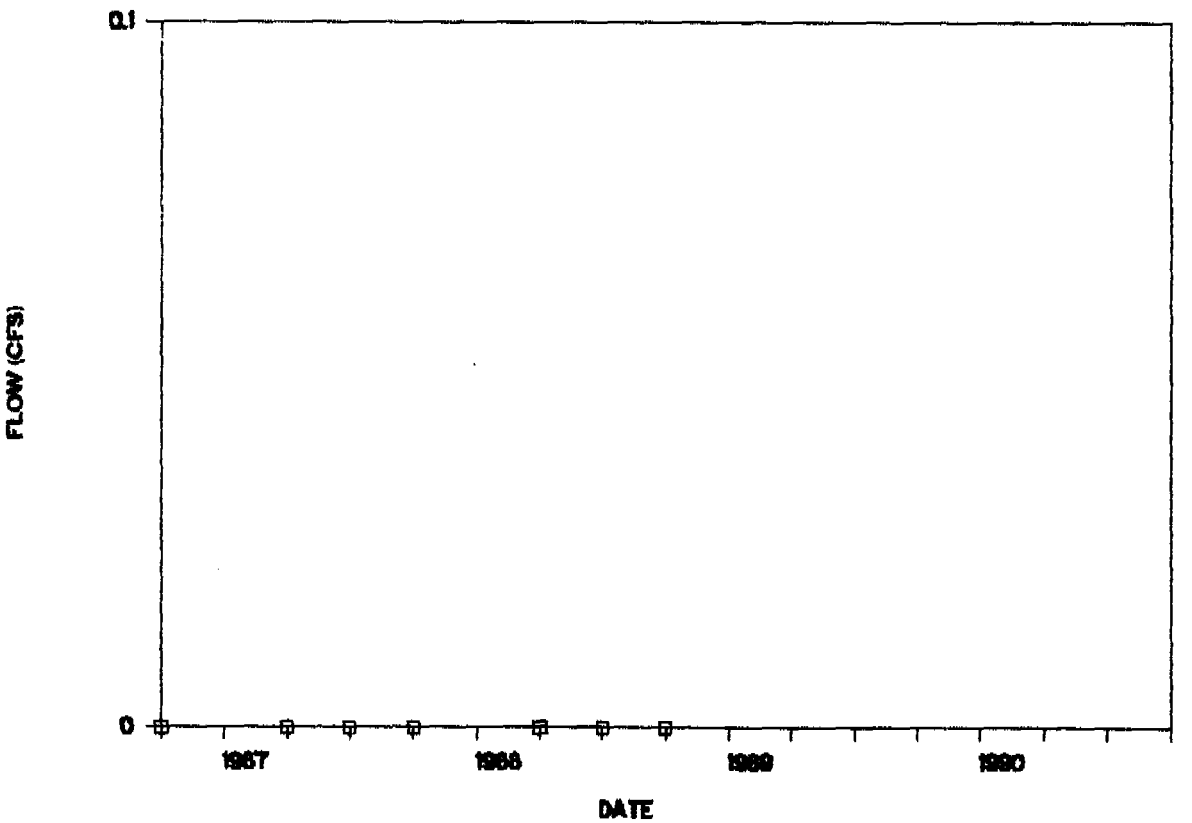
FLOW — SITE—022



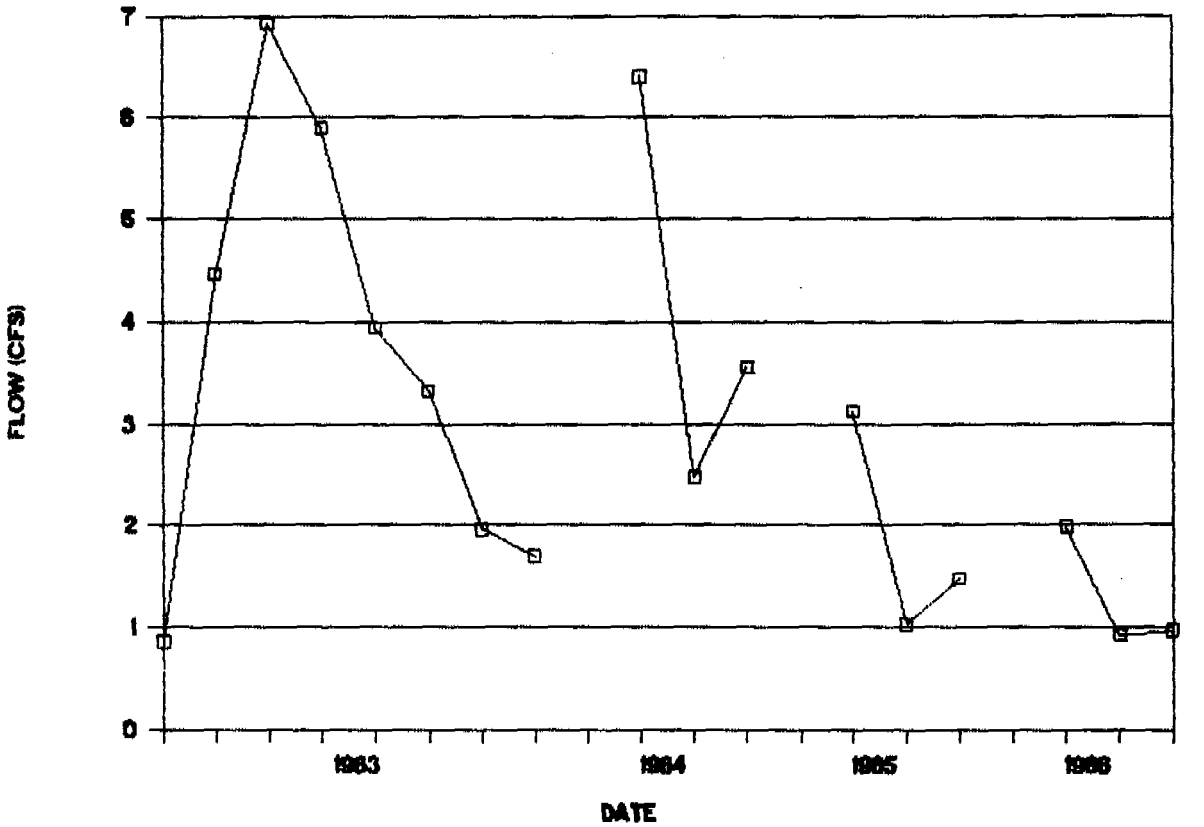
FLOW – SITE–030



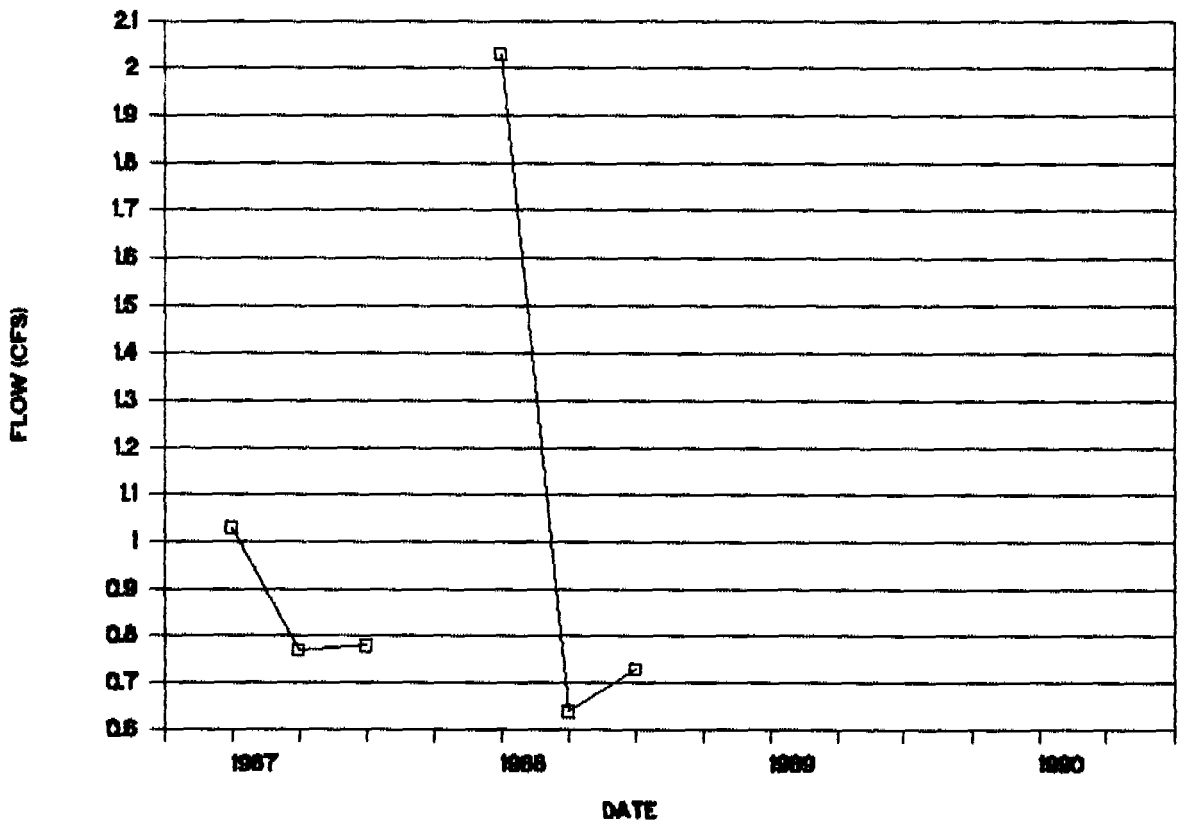
FLOW – SITE–030

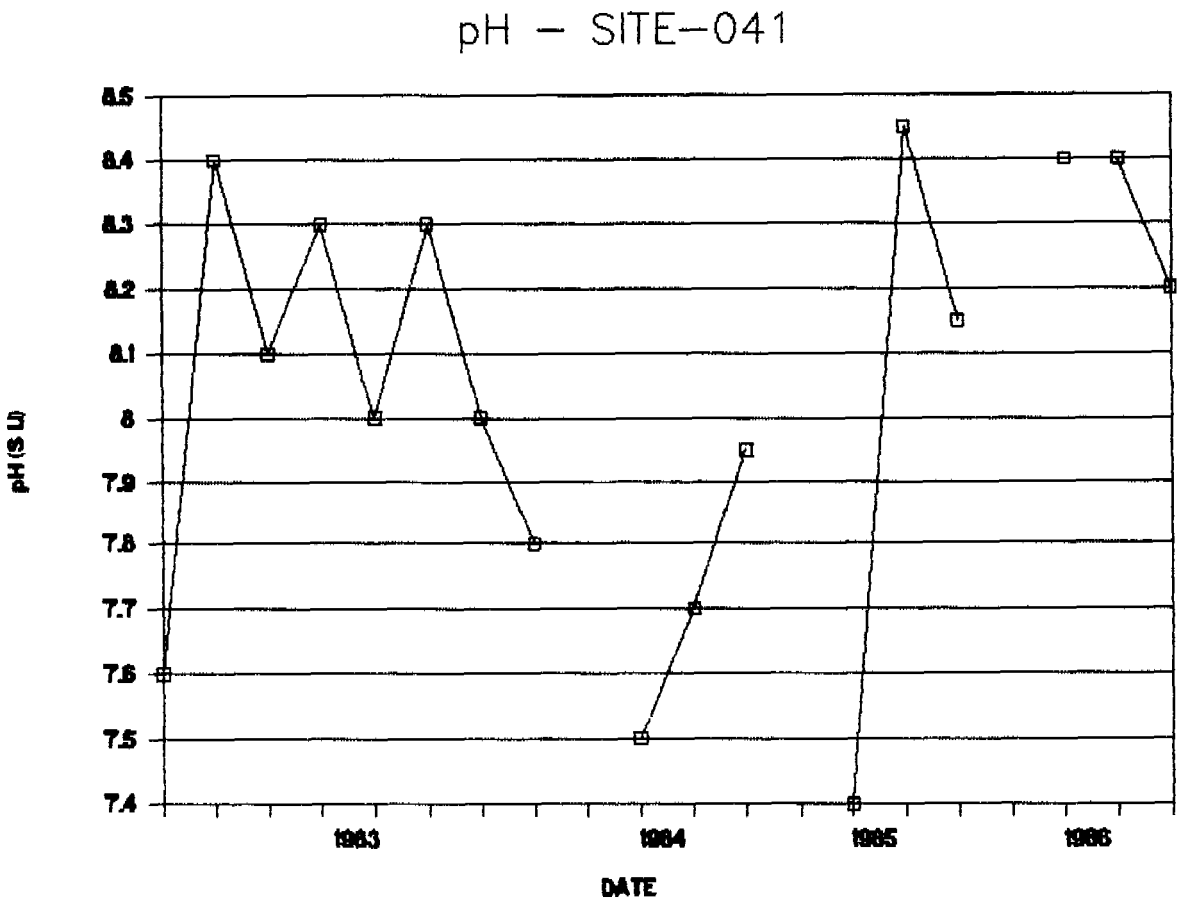


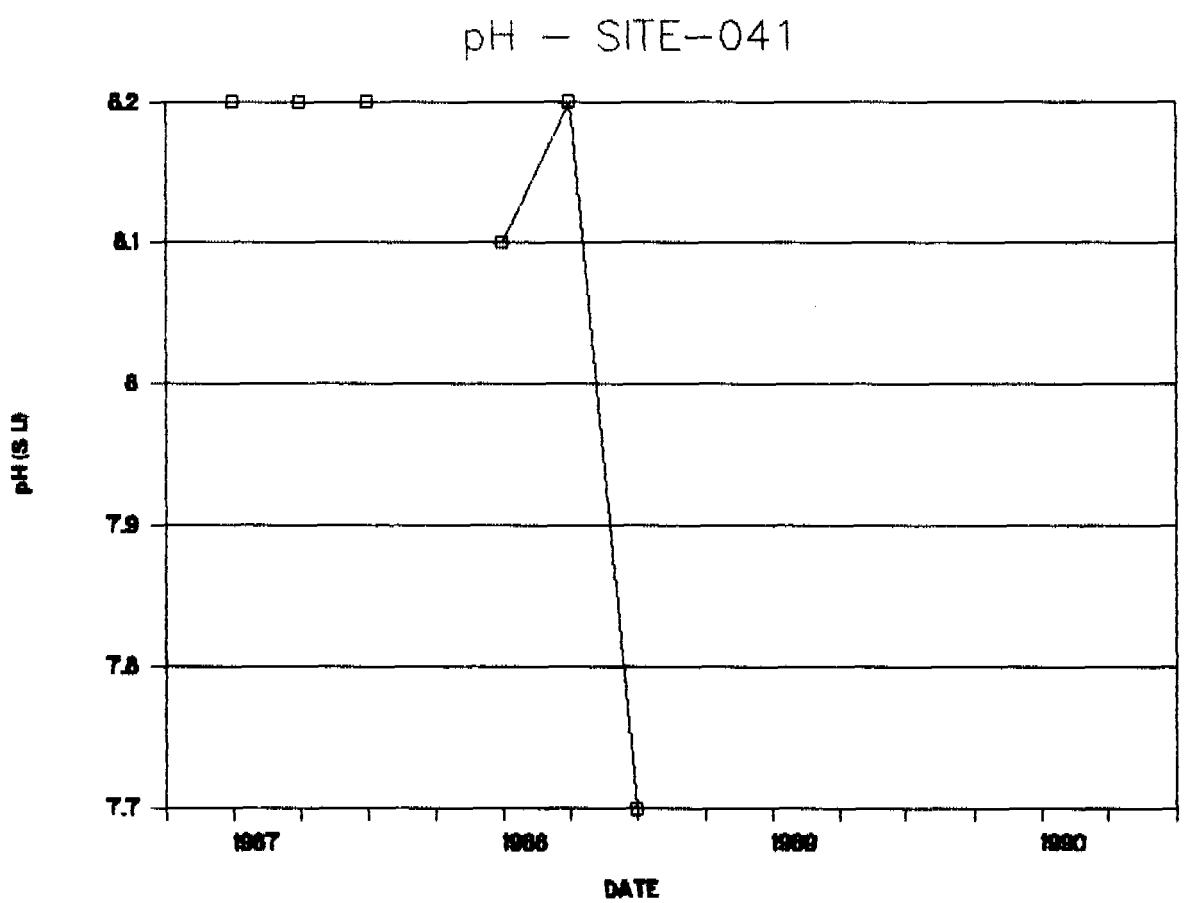
FLOW – SITE–041



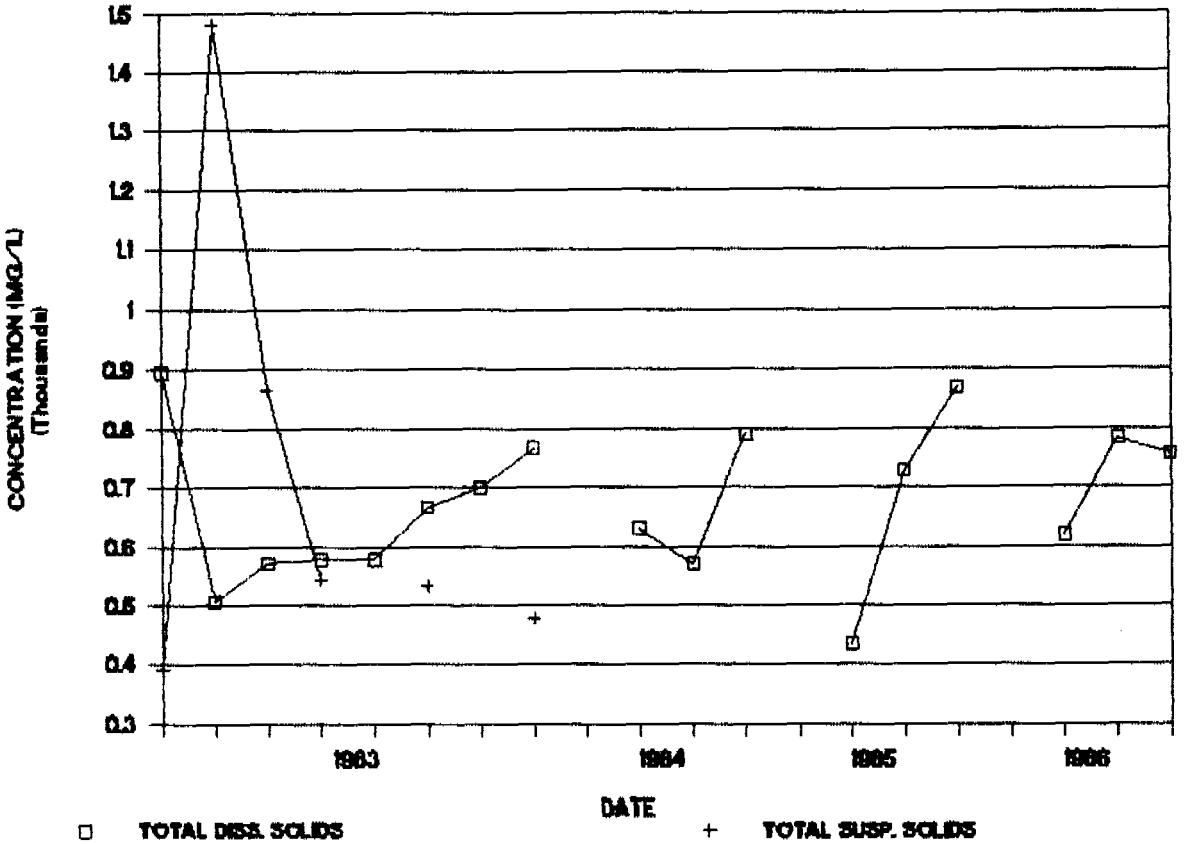
FLOW – SITE–041



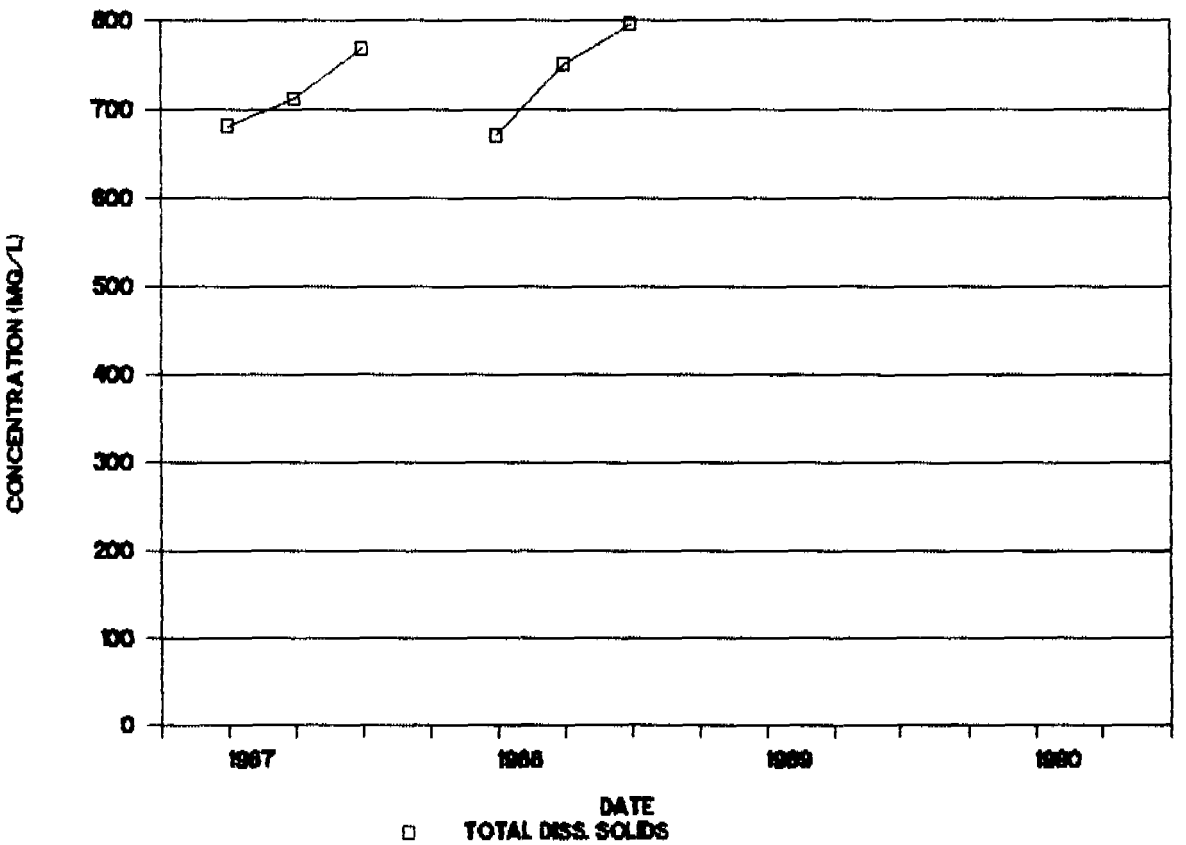

pH – SITE–041
8.5
8.4
8.3
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
7.4
pH (S.U.)
1983
1984
1985
1986
DATE


pH – SITE–041
8.2
8.1
8
7.9
7.8
7.7
pH (S.U.)
1987
1988
1989
1990
DATE

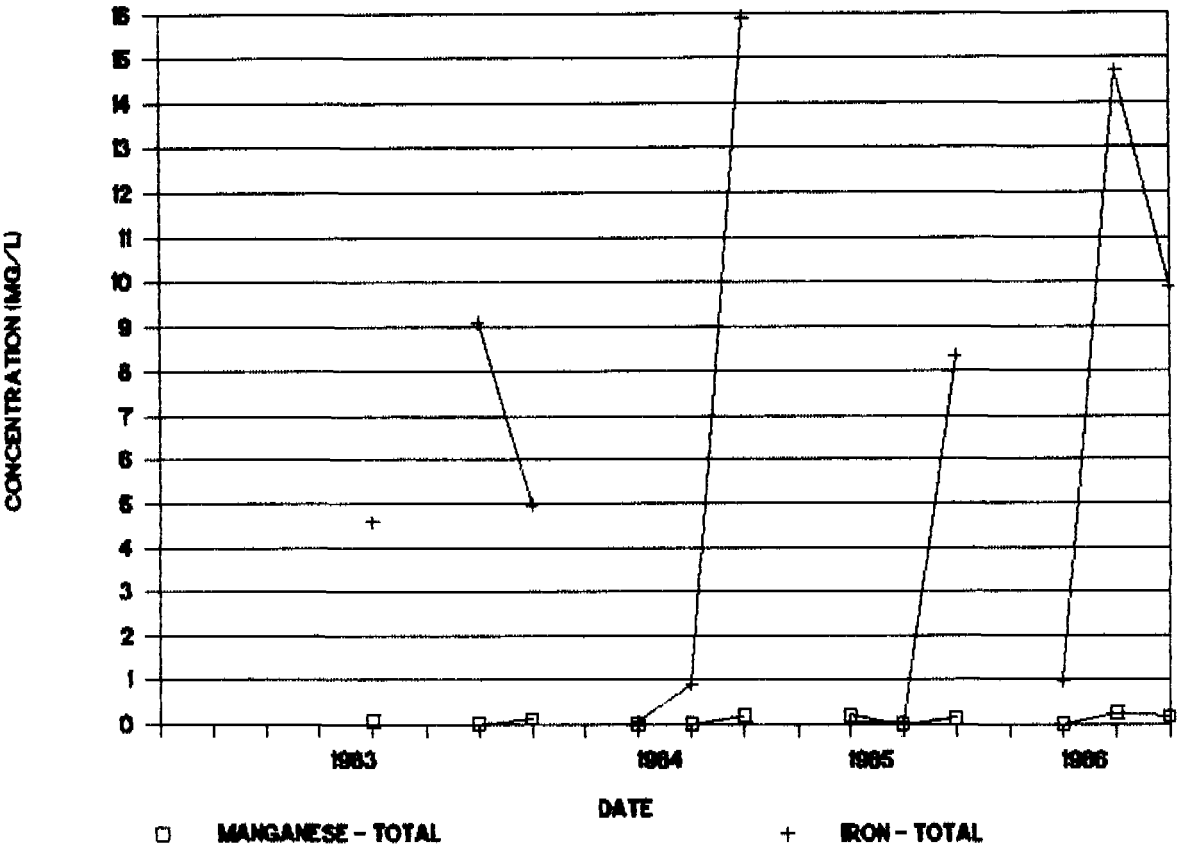
SOLIDS – SITE–041



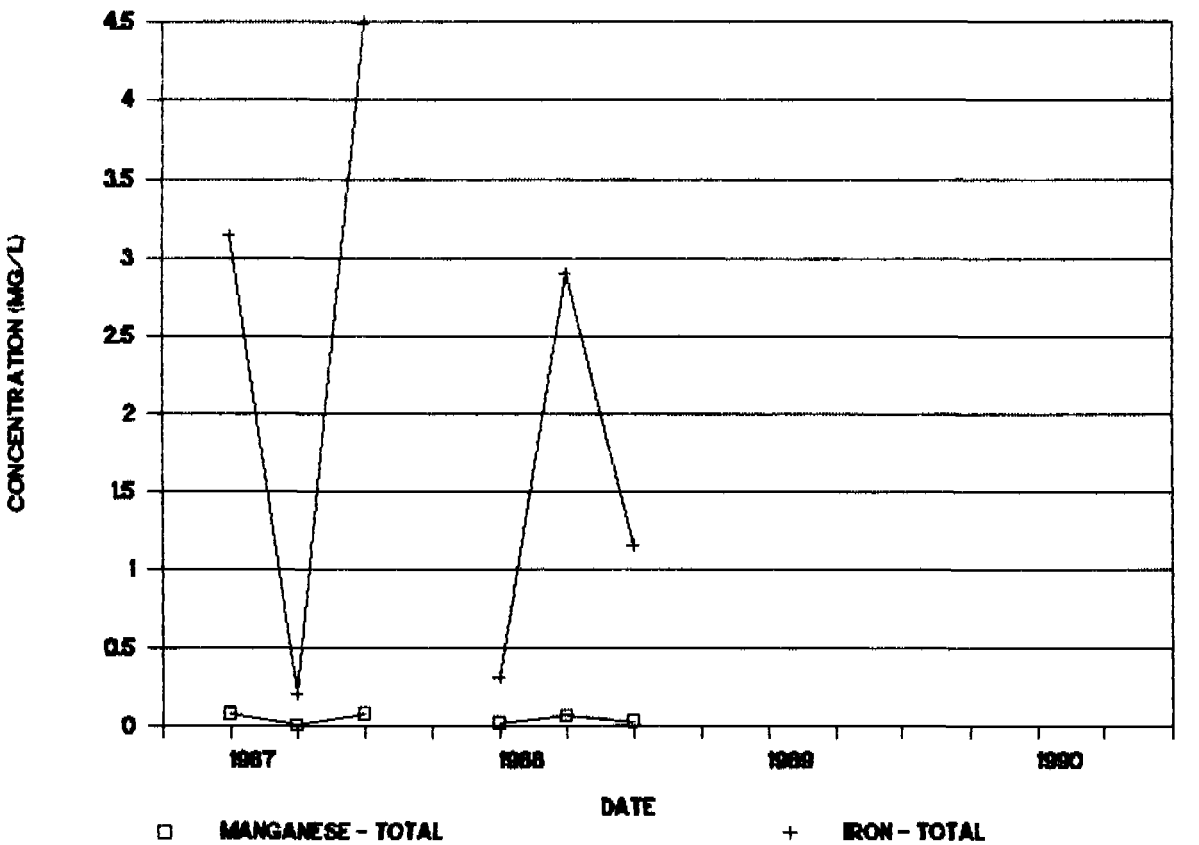
SOLIDS – SITE–041



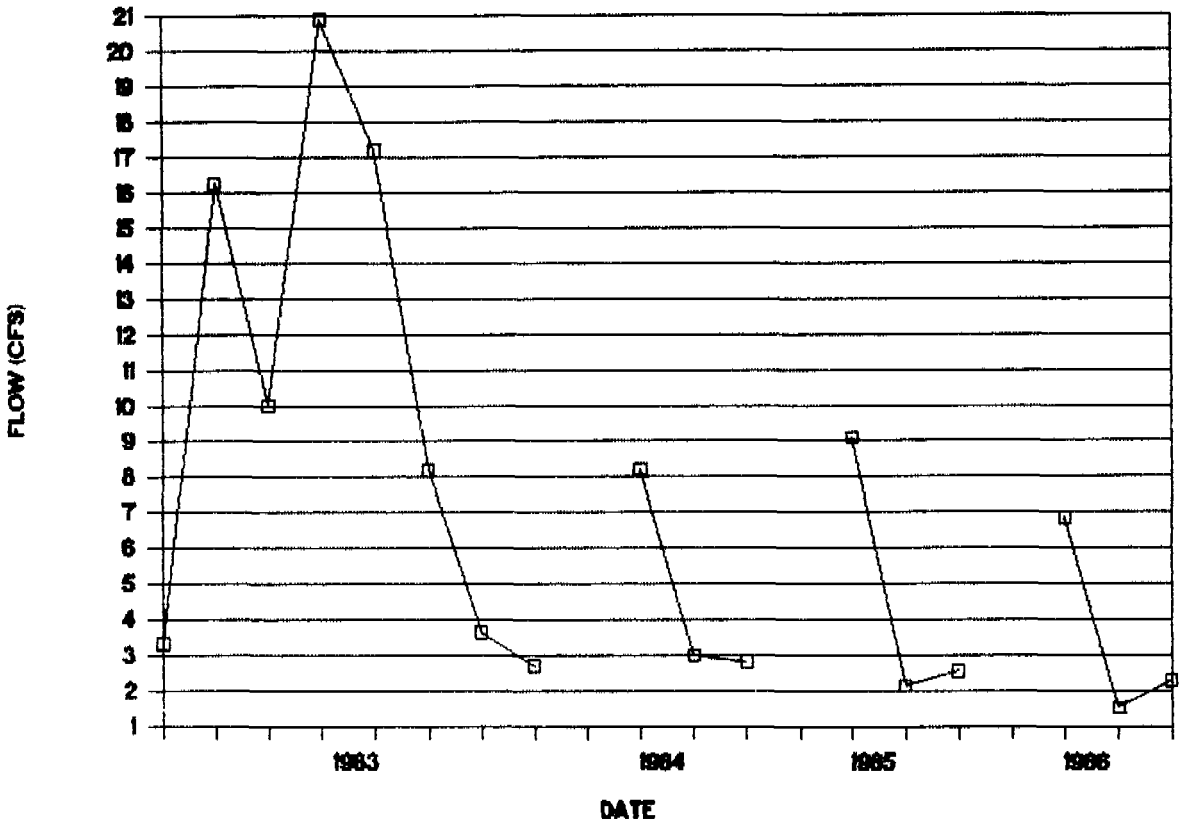
IRON/MANGANESE – SITE–041



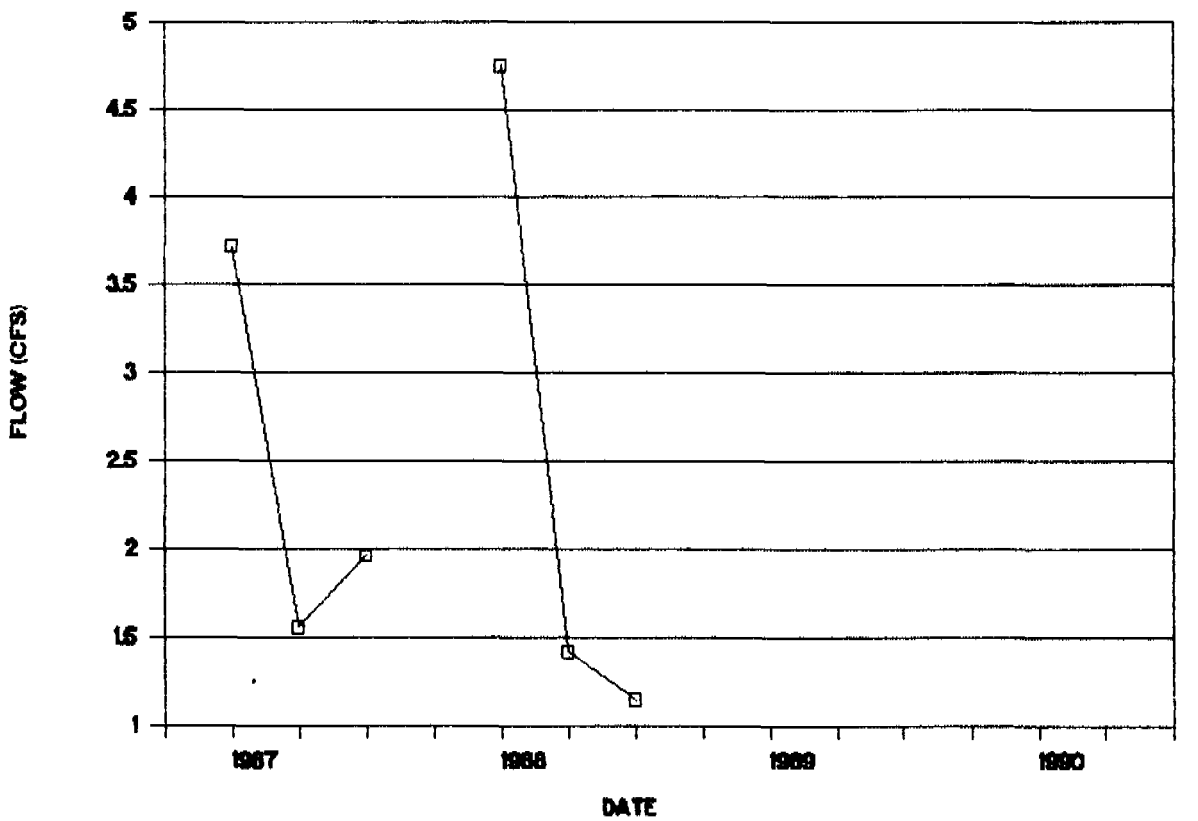
IRON/MANGANESE – SITE–041

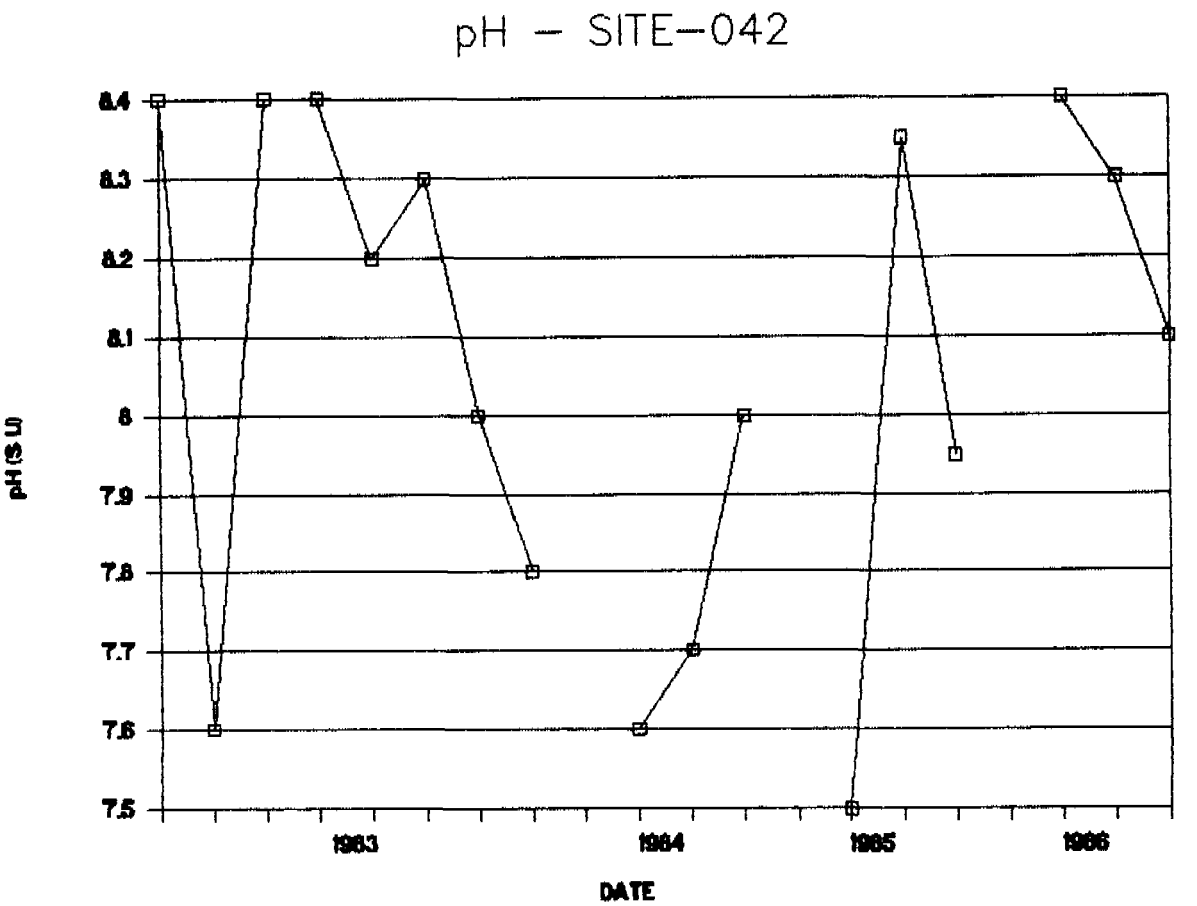


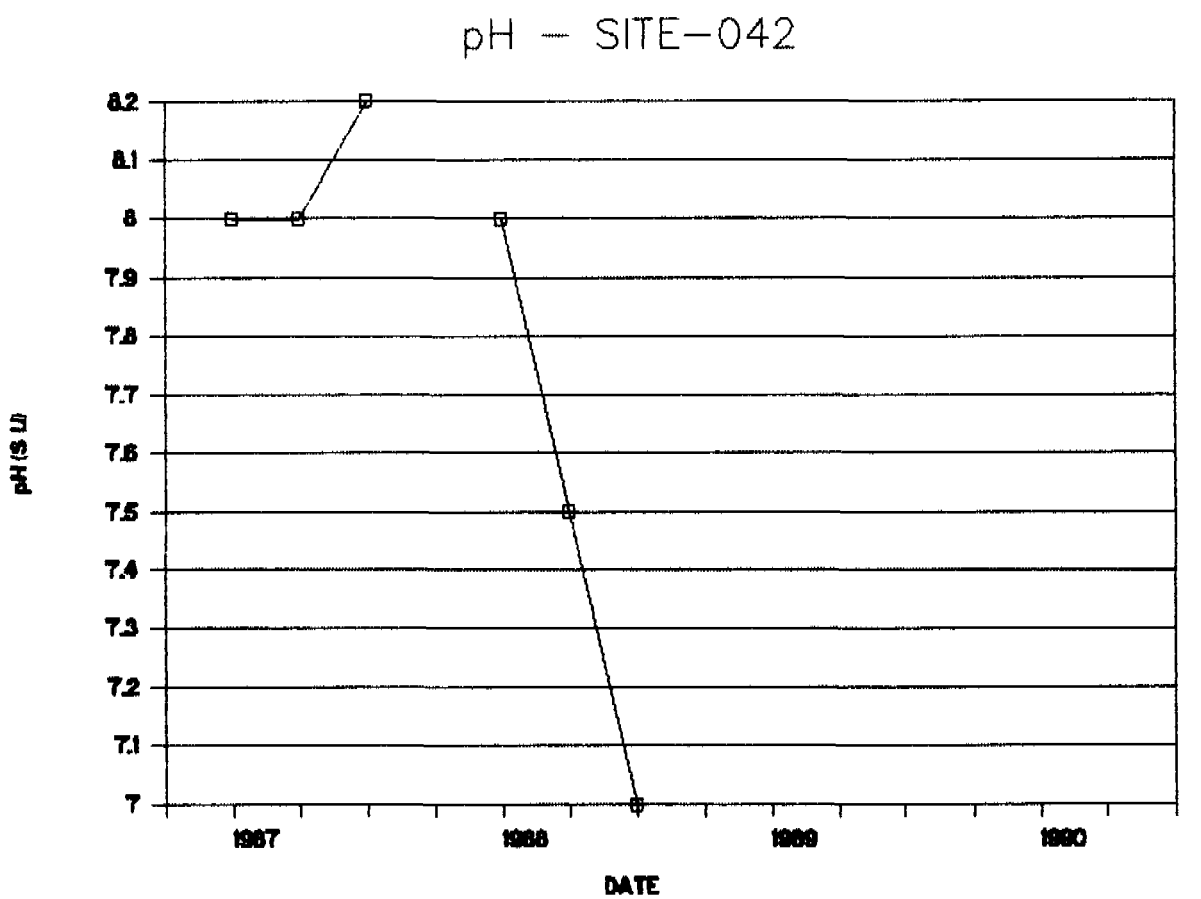
FLOW – SITE–042



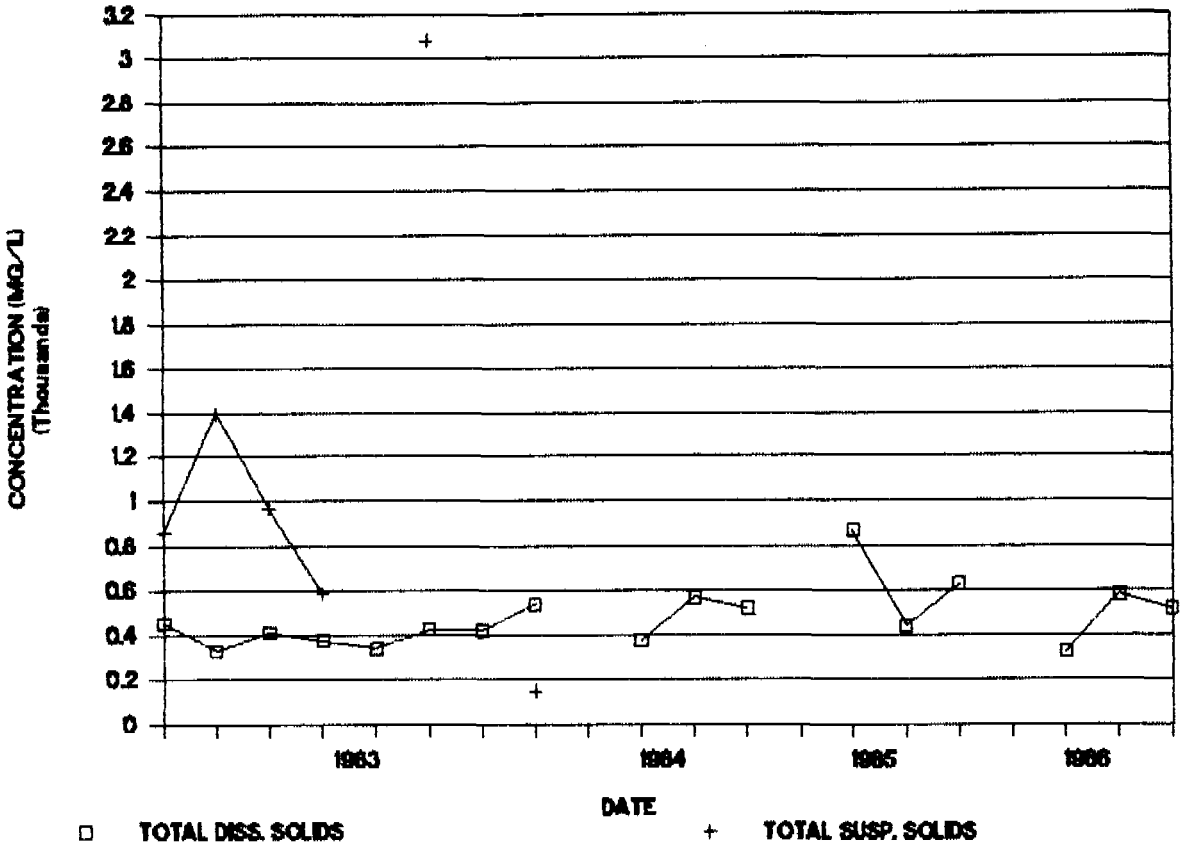
FLOW – SITE–042



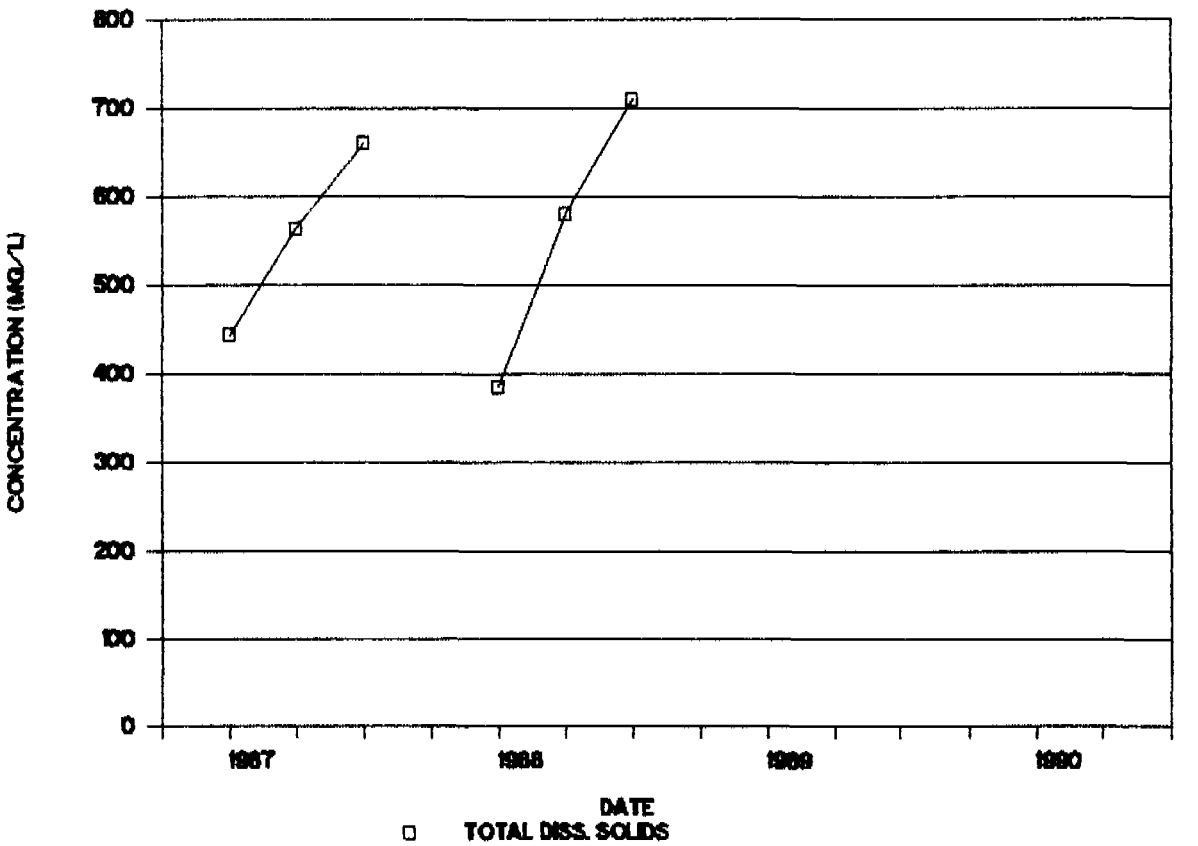

pH - SITE-042
8.4
8.3
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
pH (S.U.)
1983
1984
1985
1986
DATE

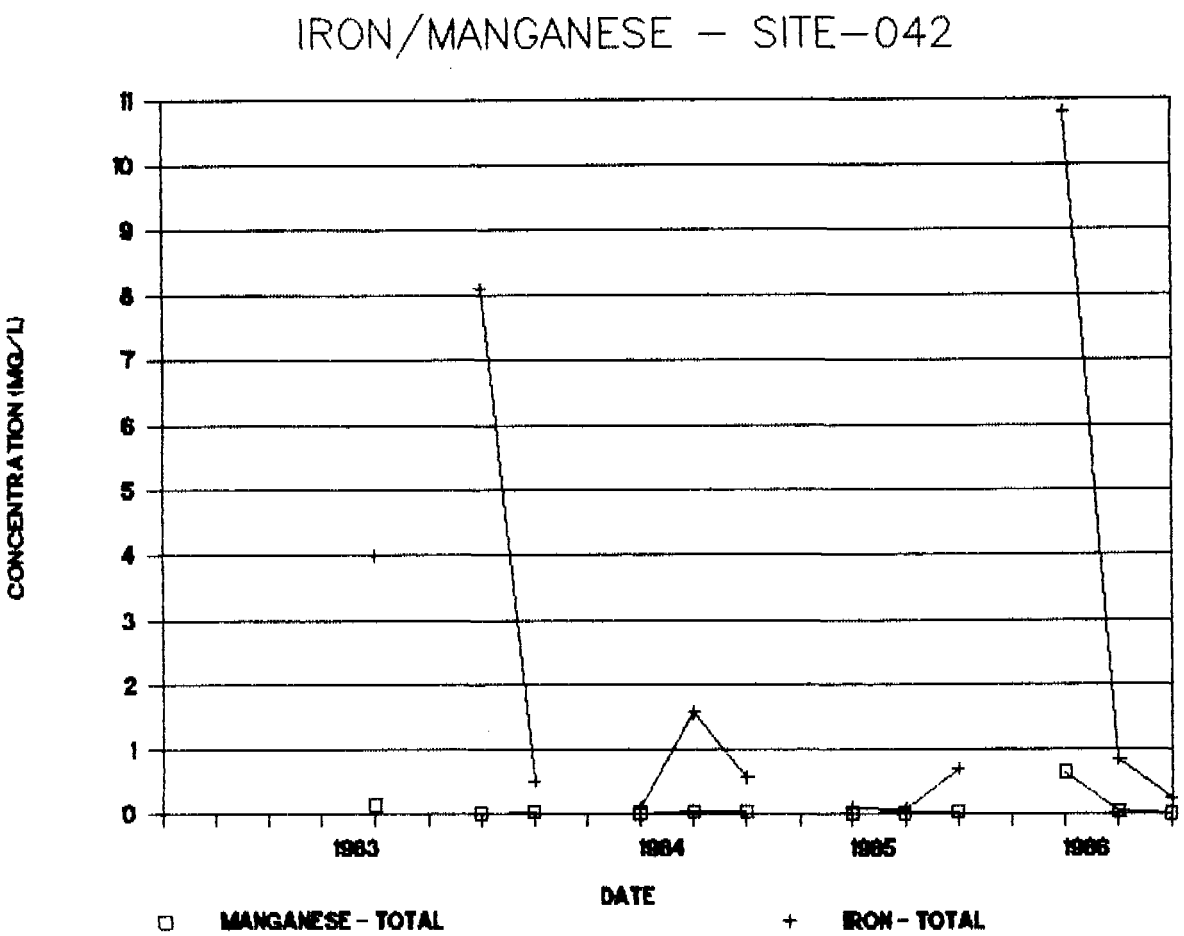

pH - SITE-042
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7
pH (S.U.)
1987
1988
1989
1990
DATE

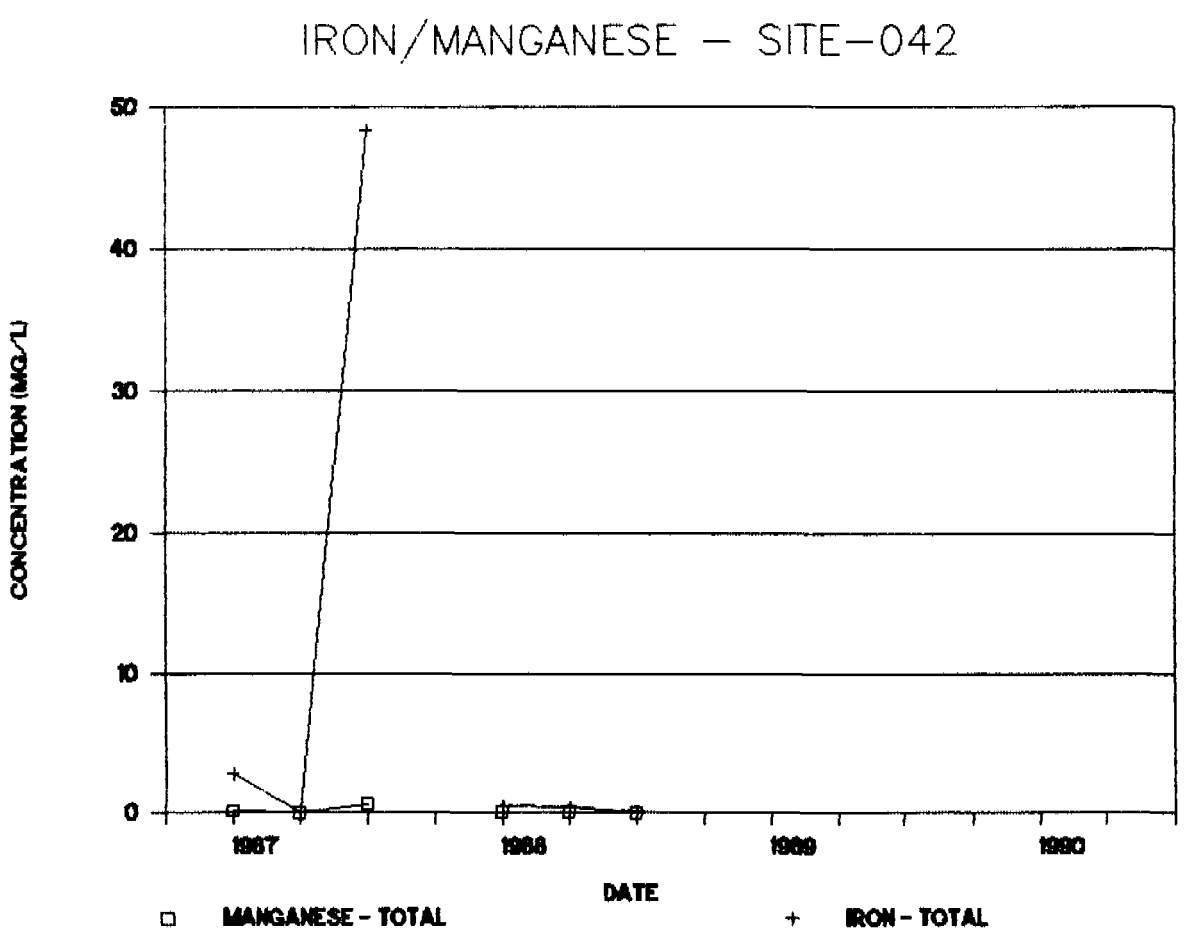
SOLIDS – SITE–042



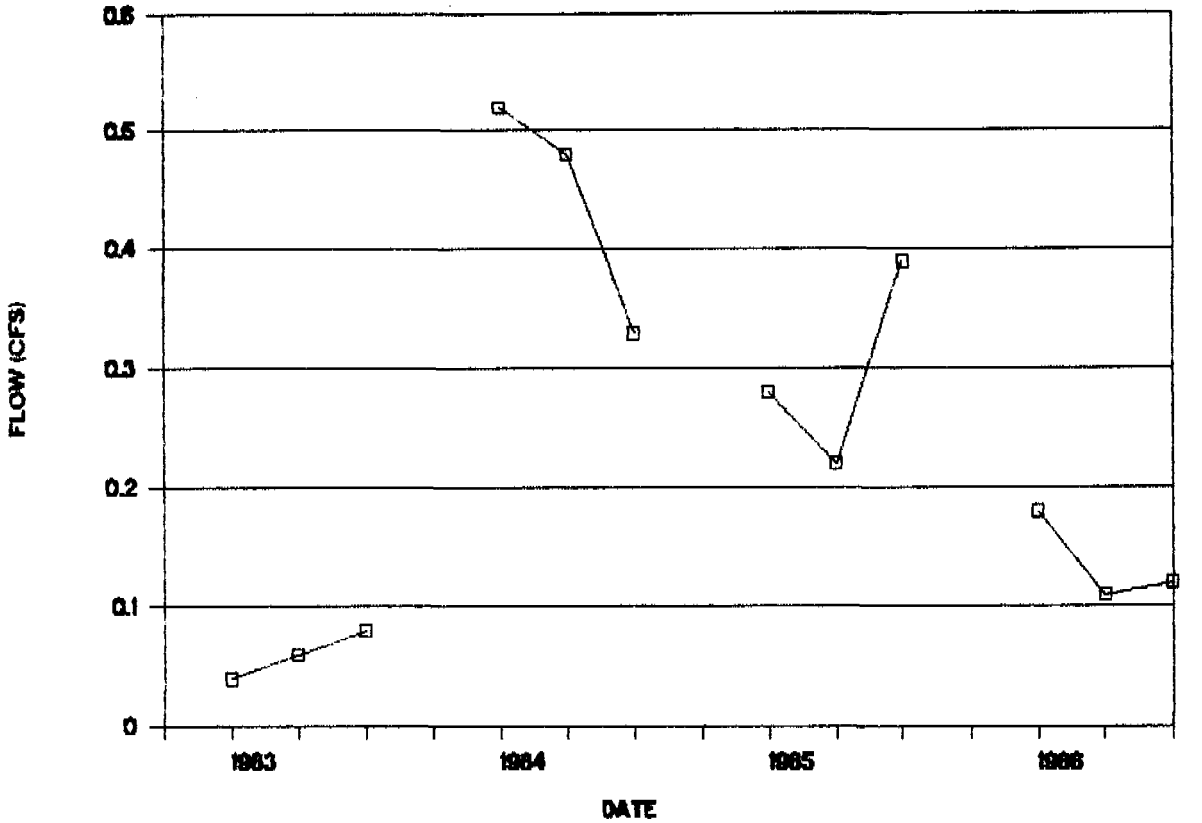
SOLIDS – SITE–042



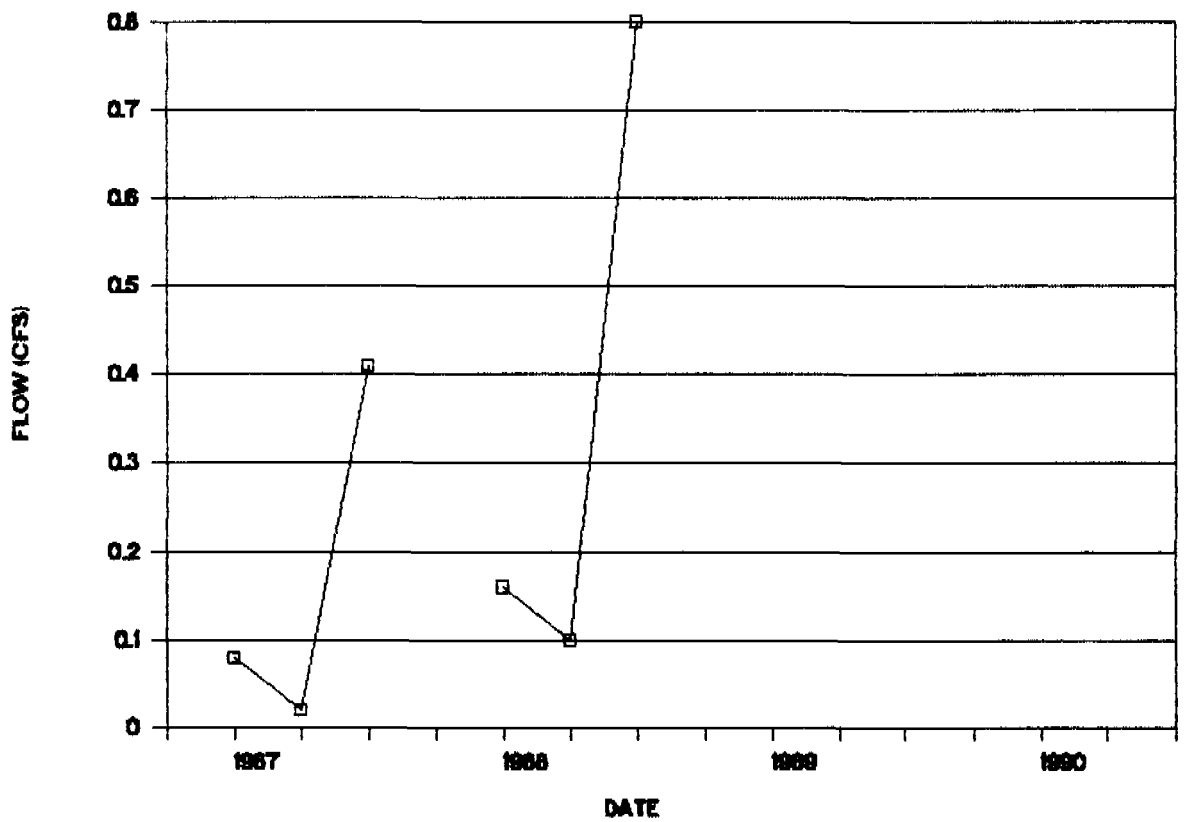

IRON/MANGANESE – SITE–042
CONCENTRATION (MG/L)
11
10
9
8
7
6
5
4
3
2
1
0
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL

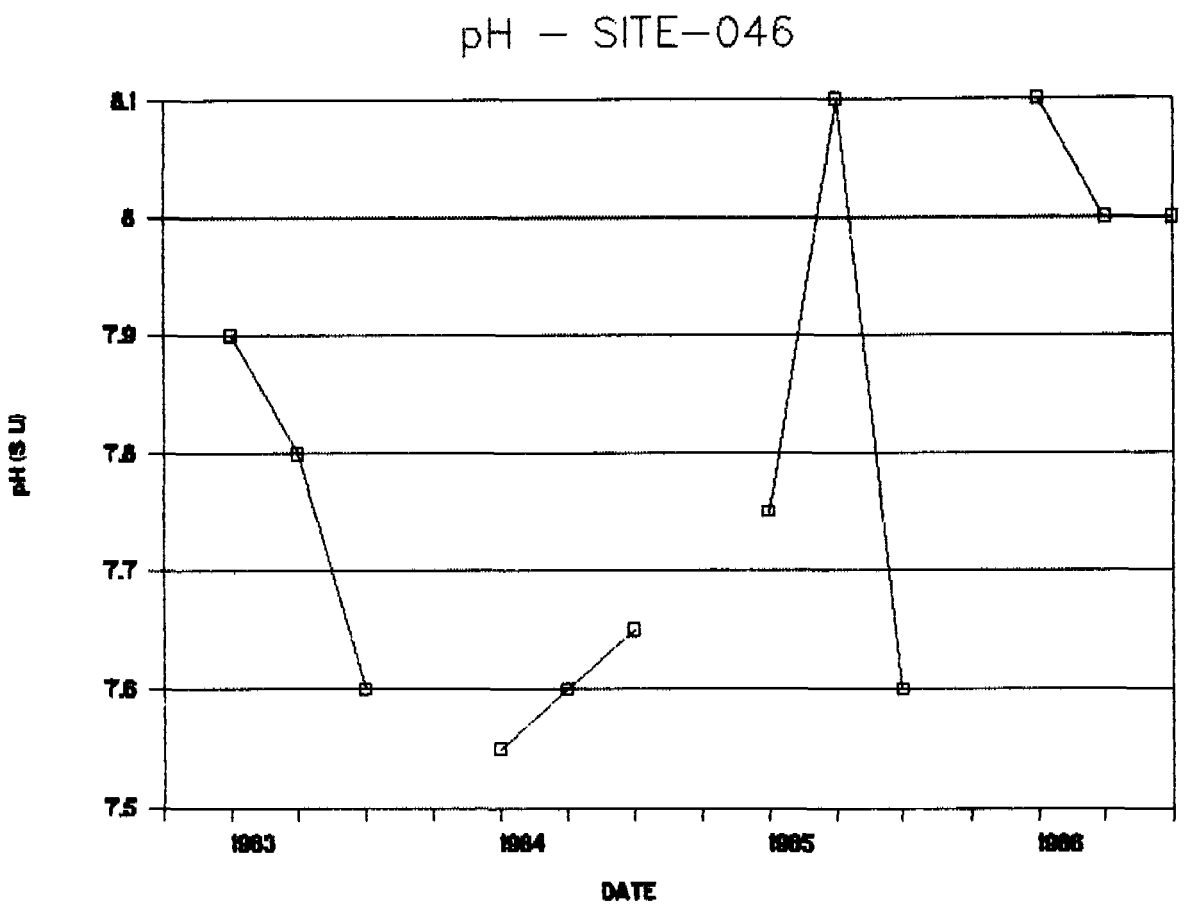

IRON/MANGANESE – SITE–042
CONCENTRATION (MG/L)
50
40
30
20
10
0
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

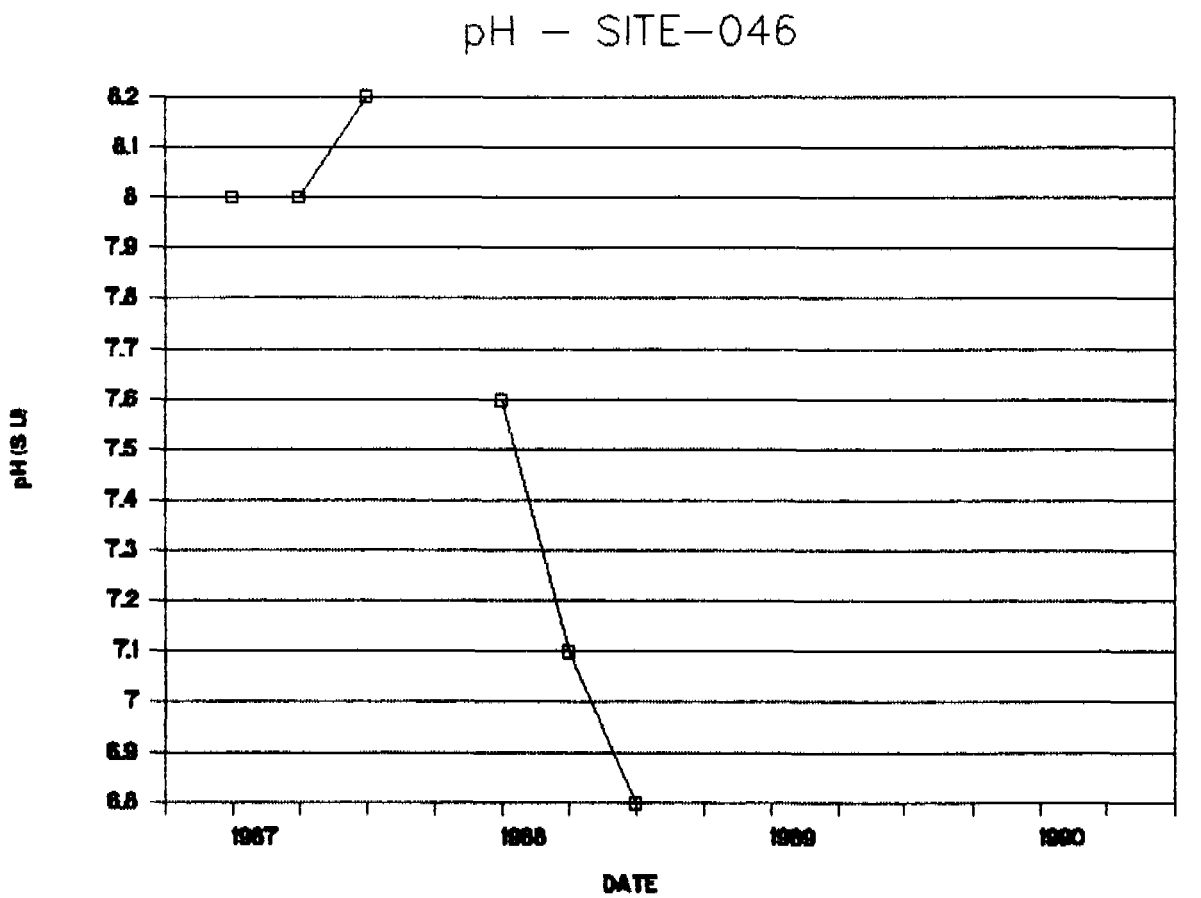
FLOW – SITE–046

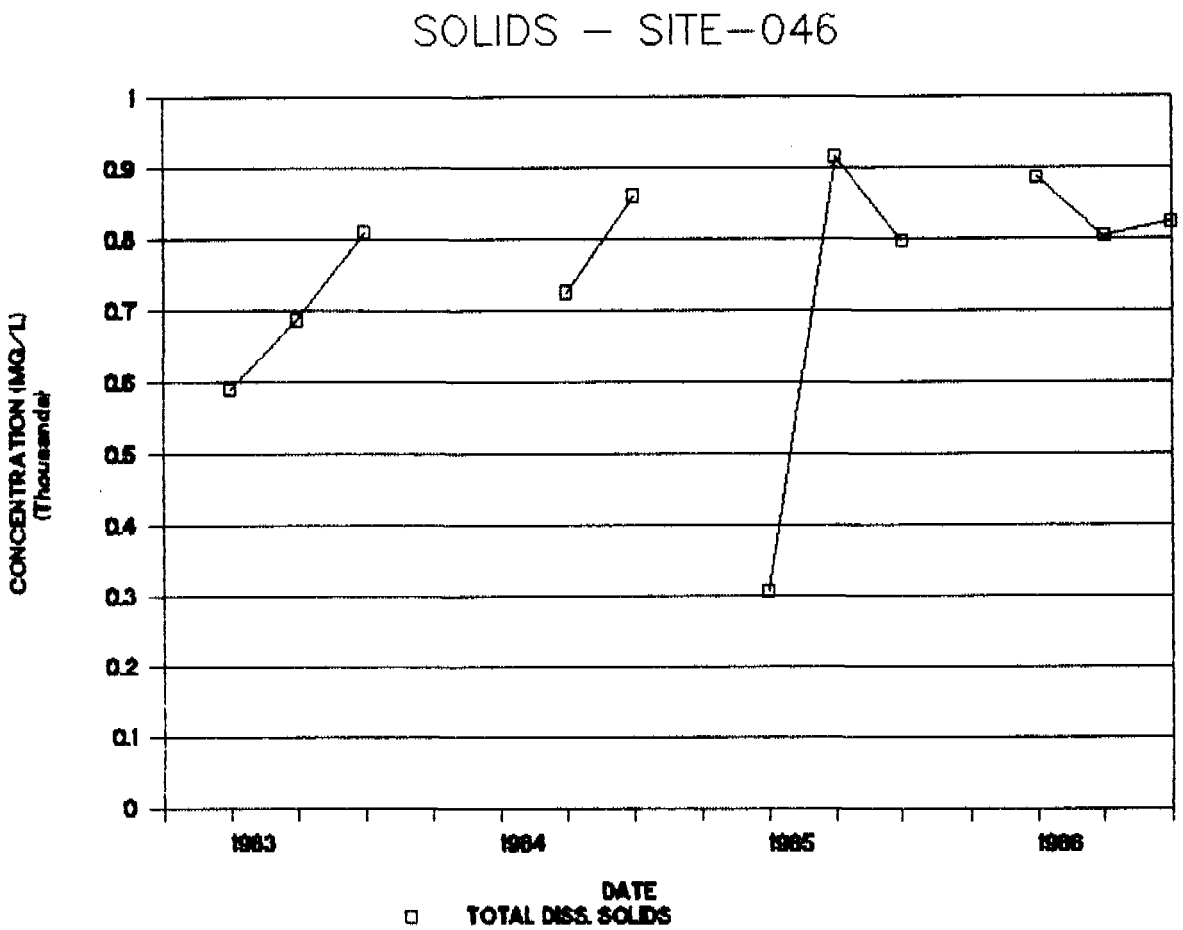


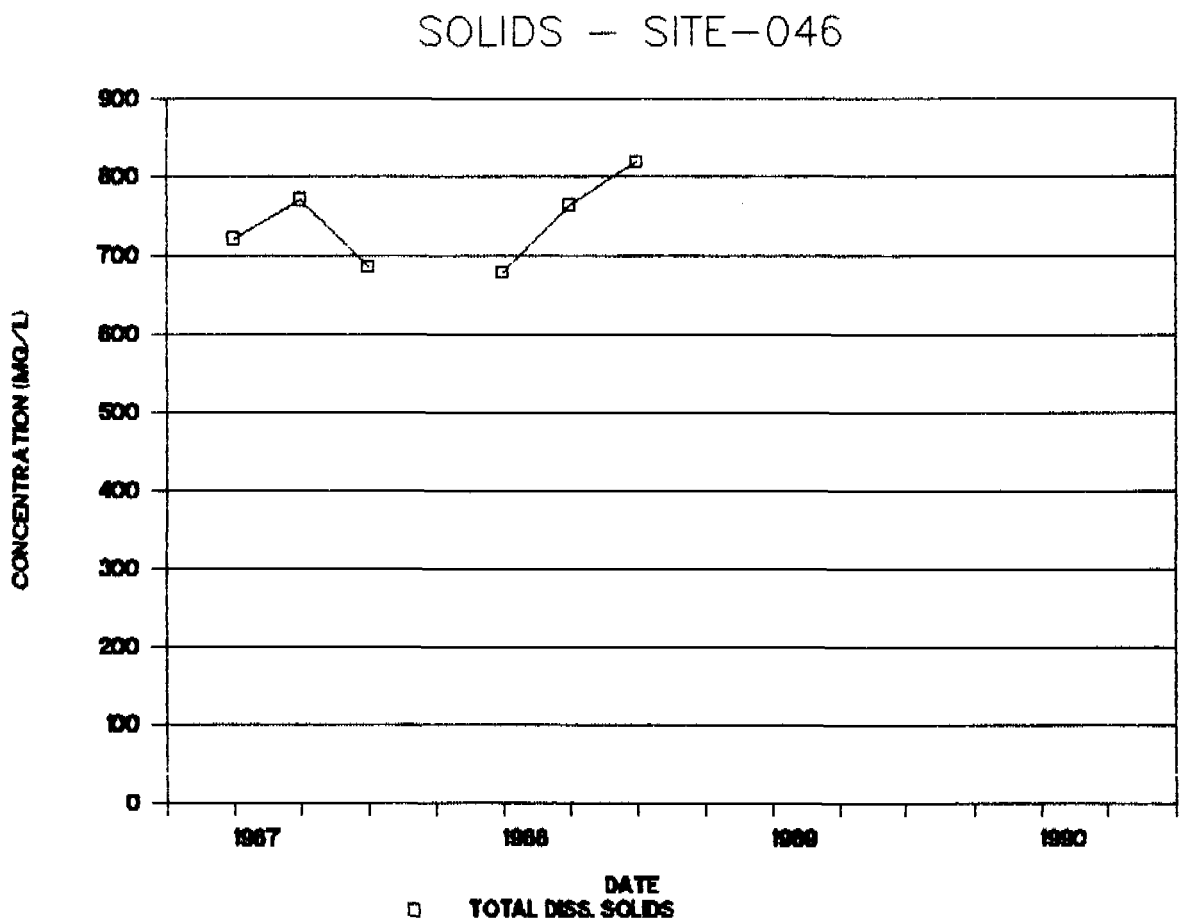
FLOW – SITE–046

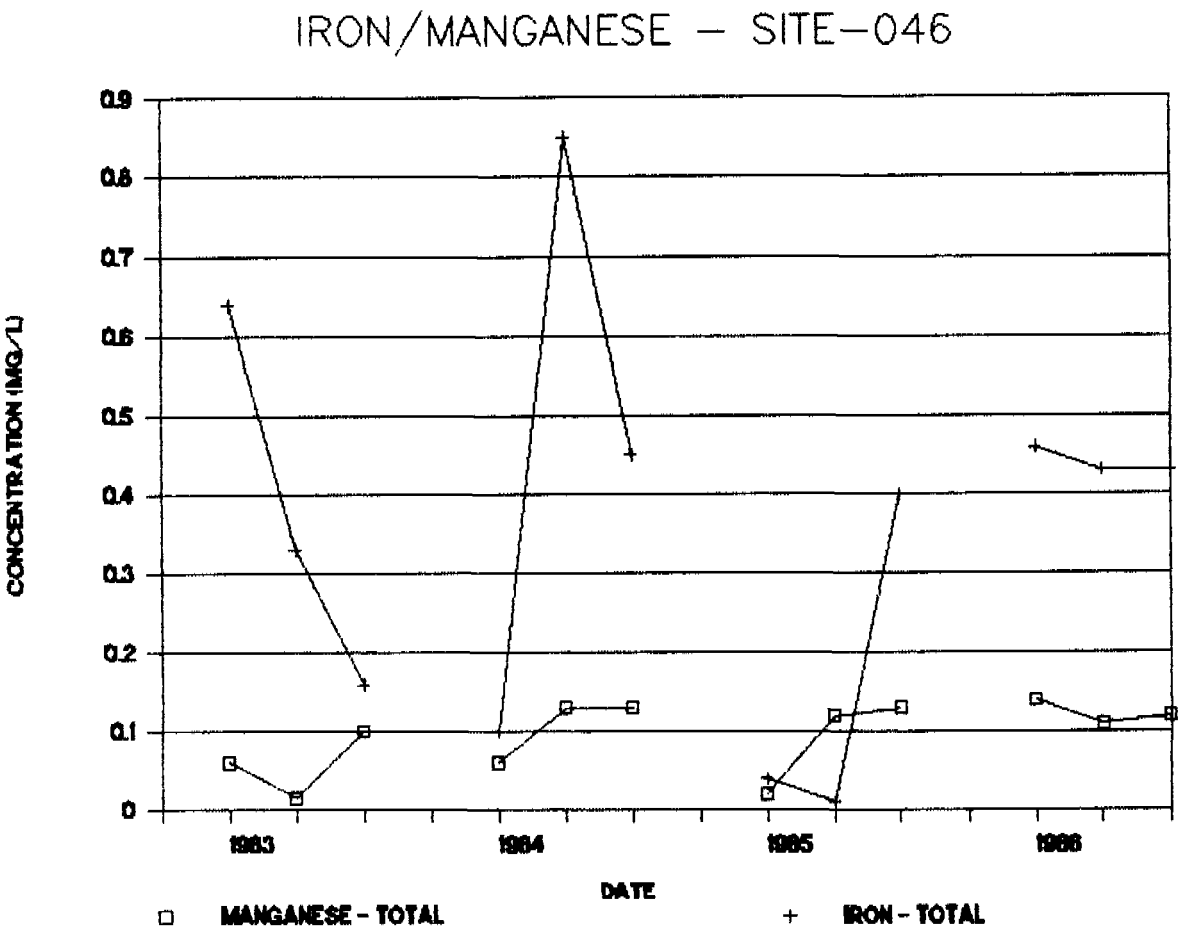


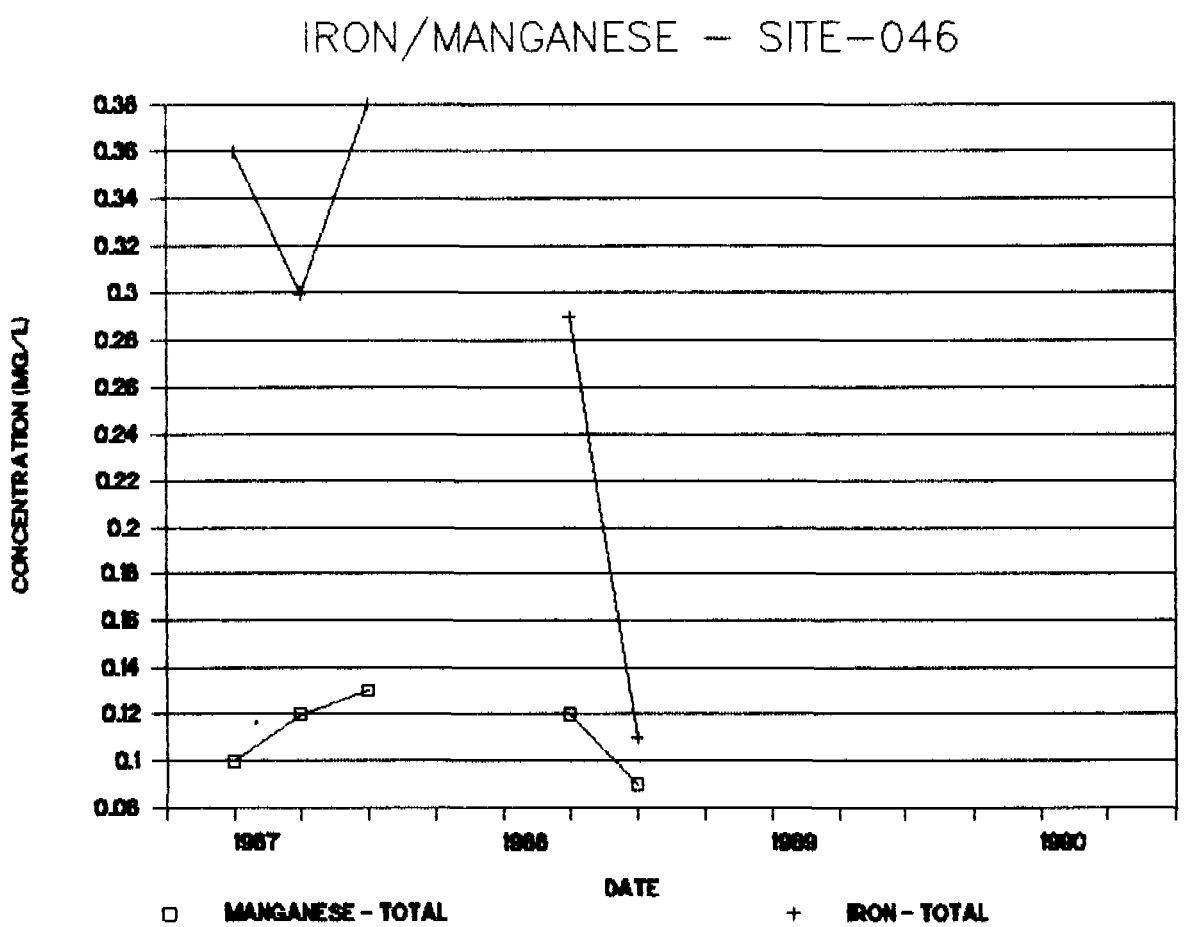

pH – SITE–046
8.1
8
7.9
7.8
7.7
7.6
7.5
pH (S.U.)
1983
1984
1985
1986
DATE


pH – SITE–046
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
pH (S.U.)
1987
1988
1989
1990
DATE

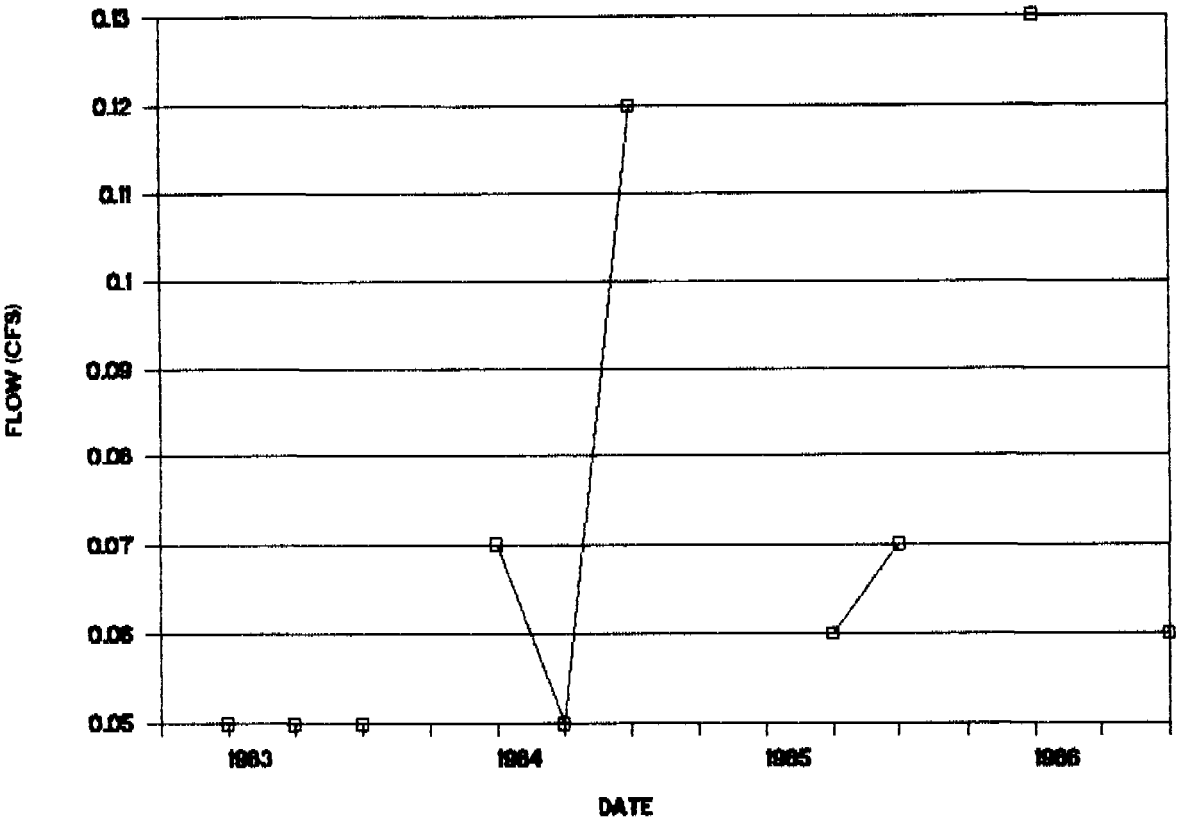

SOLIDS – SITE–046
CONCENTRATION (MG/L)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
1984
1985
1986
DATE
TOTAL DISS. SOLIDS


SOLIDS – SITE–046
CONCENTRATION (MG/L)
900
800
700
600
500
400
300
200
100
0
1987
1988
1989
1990
DATE
TOTAL DISS. SOLIDS

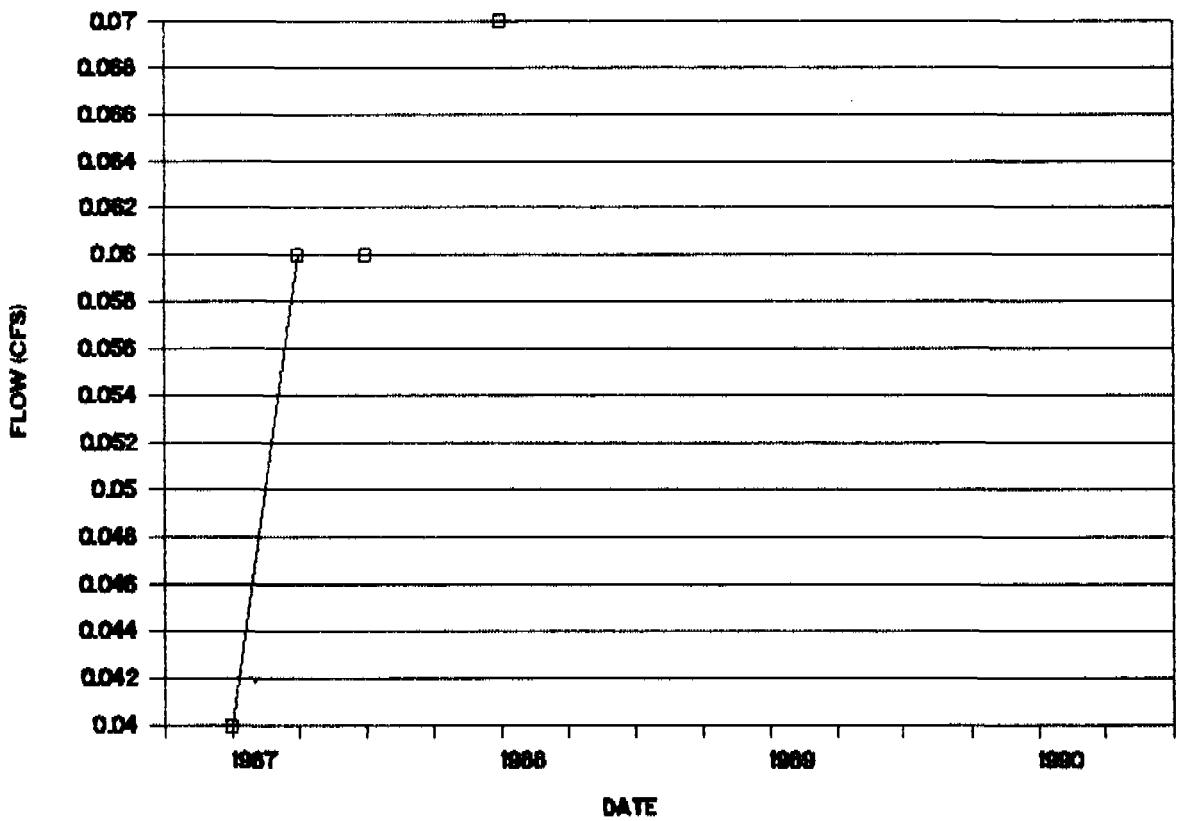

IRON/MANGANESE – SITE–046
CONCENTRATION (MG/L)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL

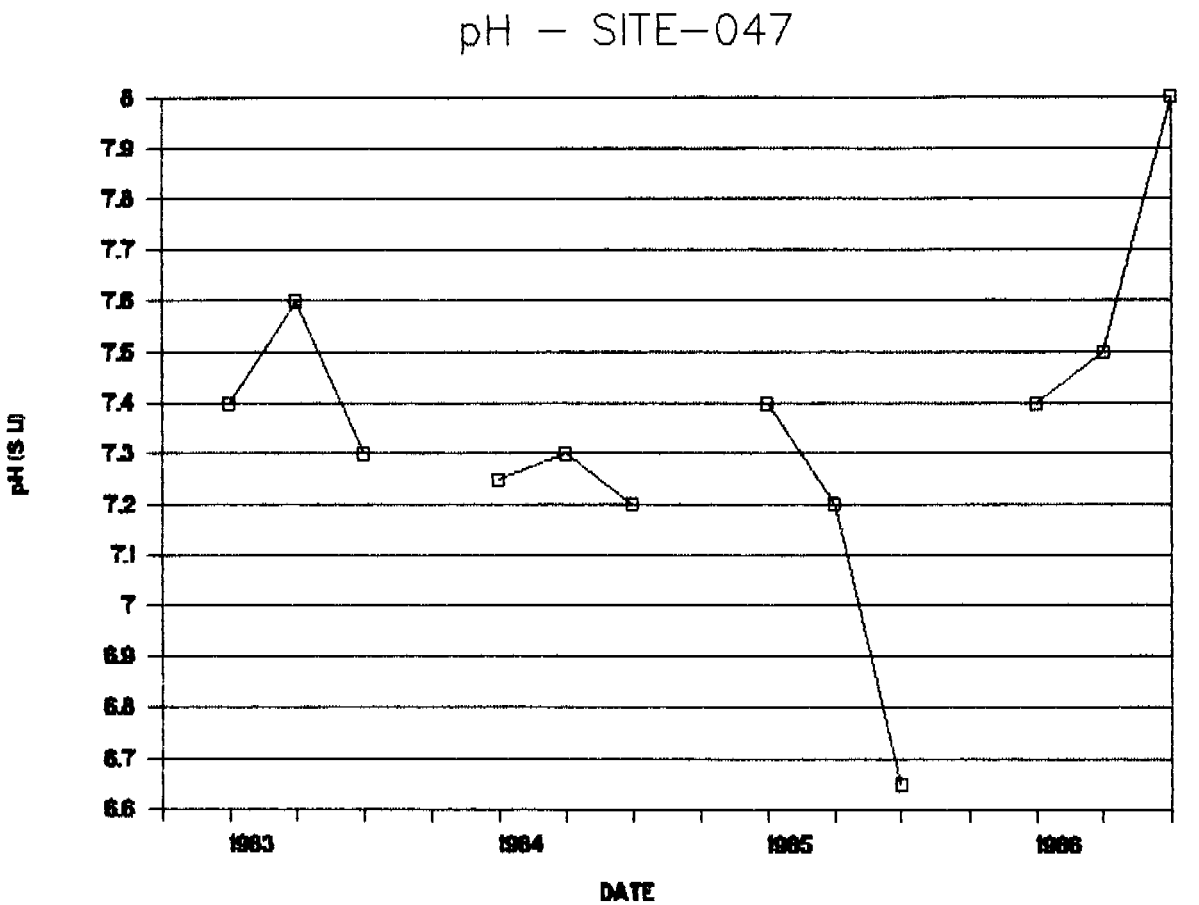

IRON/MANGANESE – SITE–046
CONCENTRATION (MG/L)
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

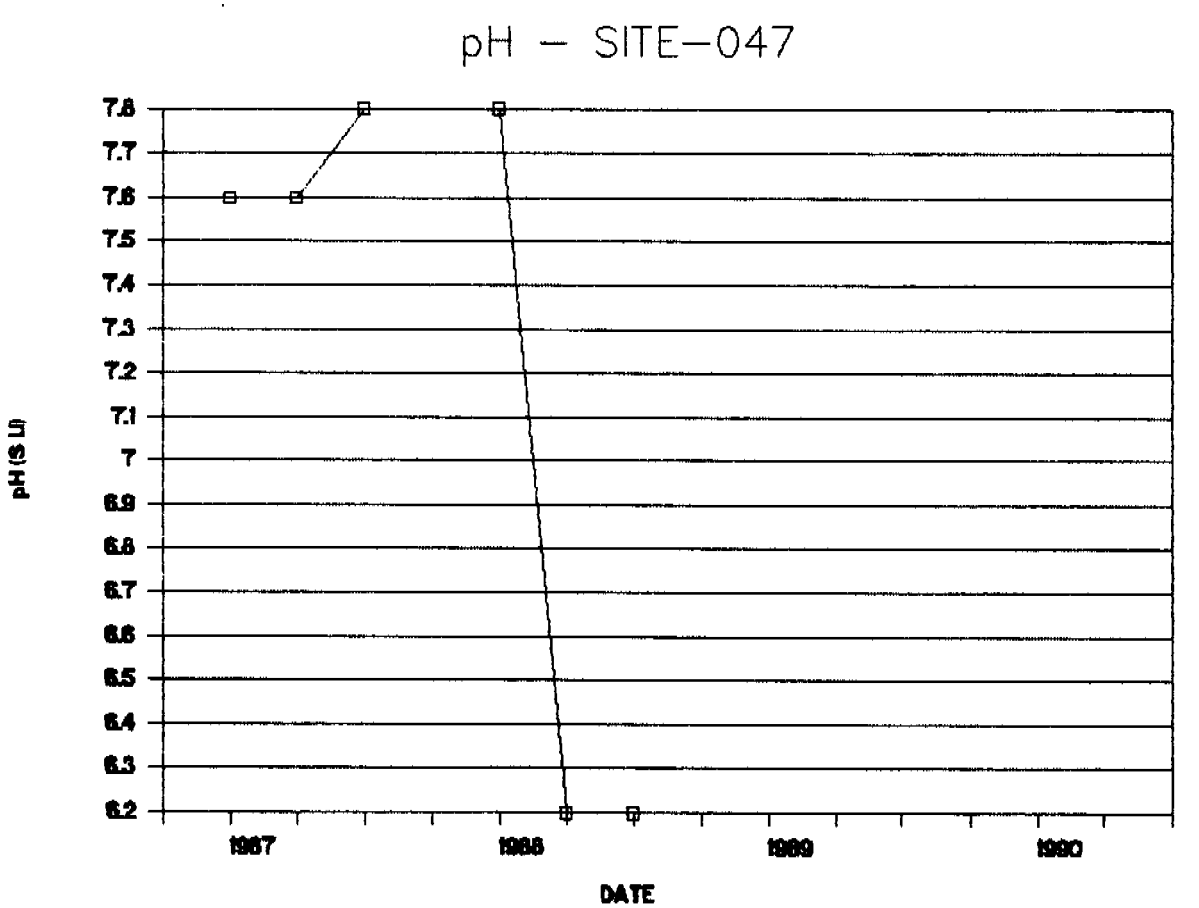
FLOW – SITE–047

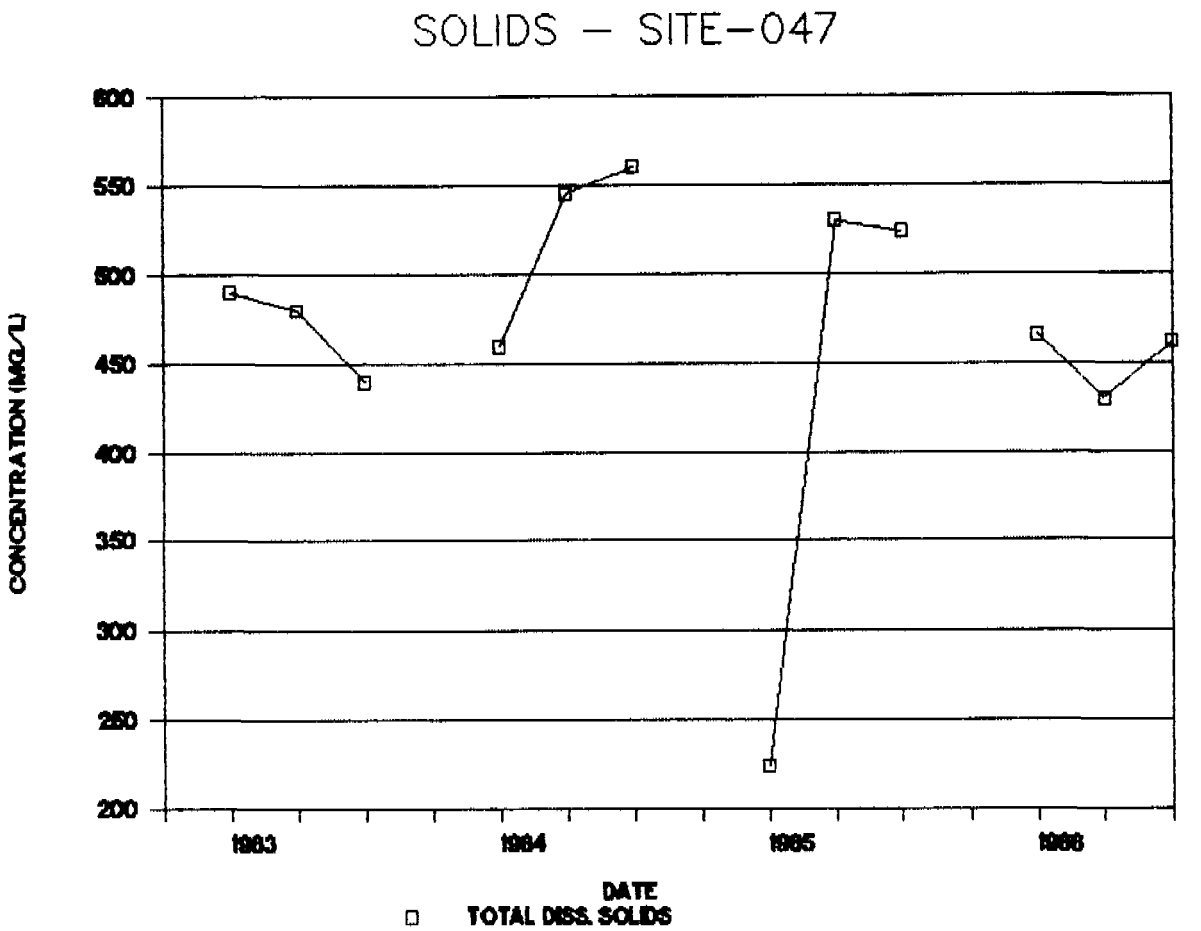


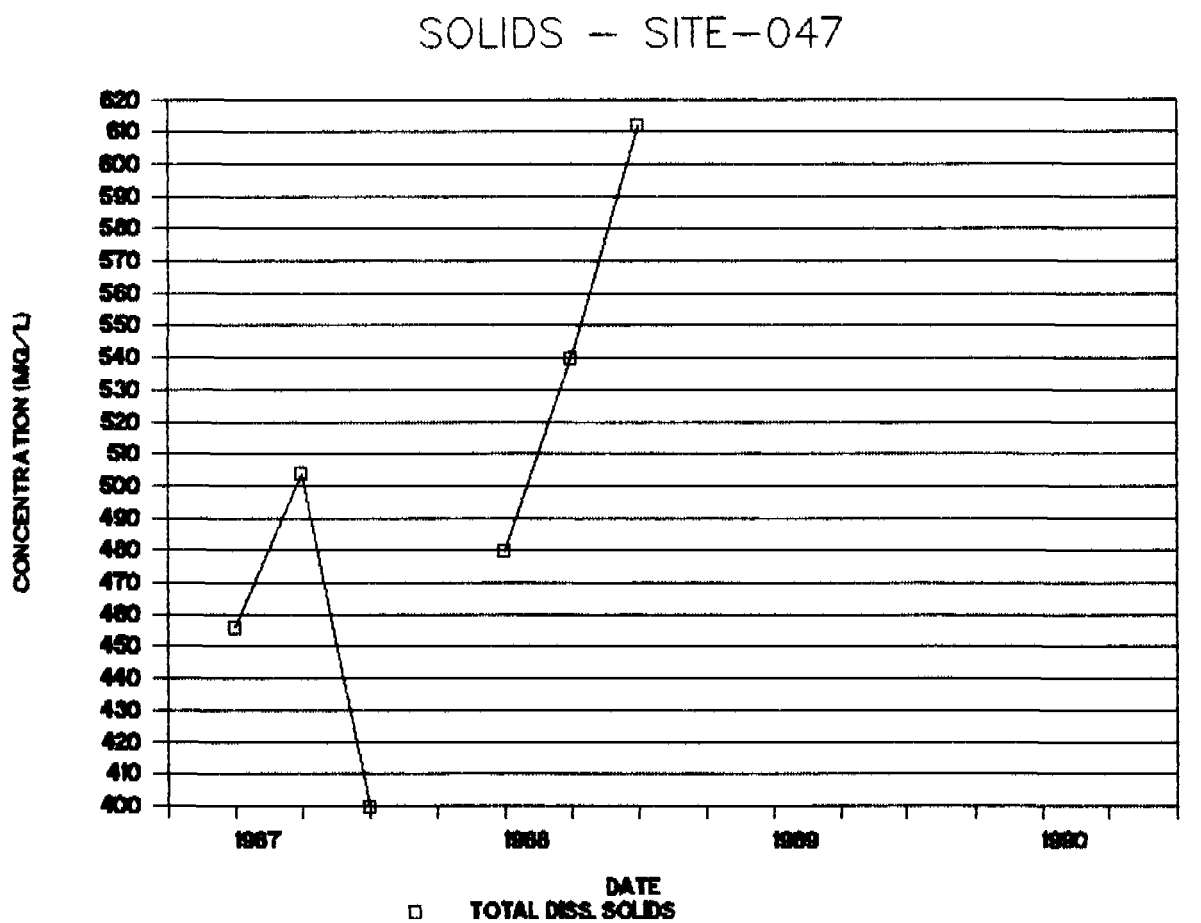
FLOW – SITE–047

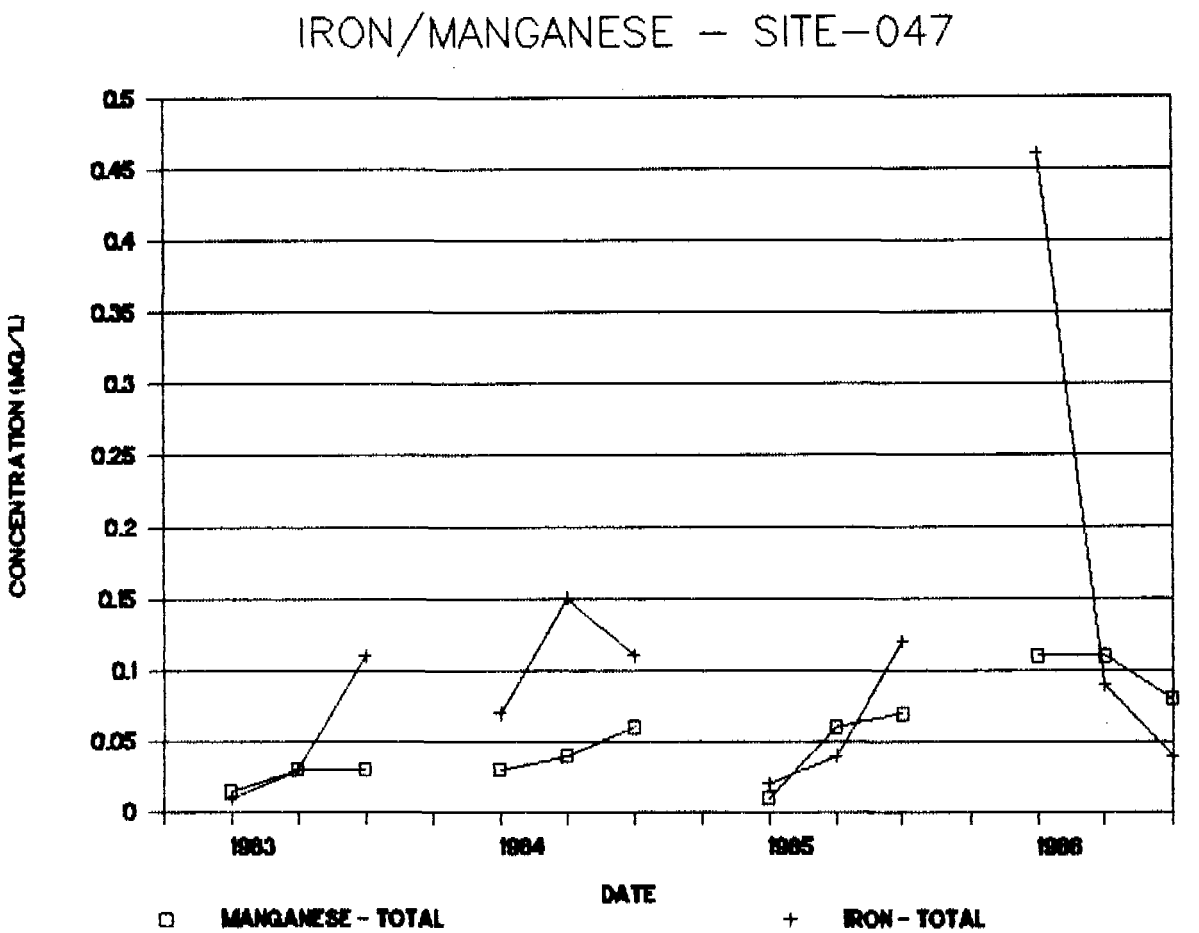


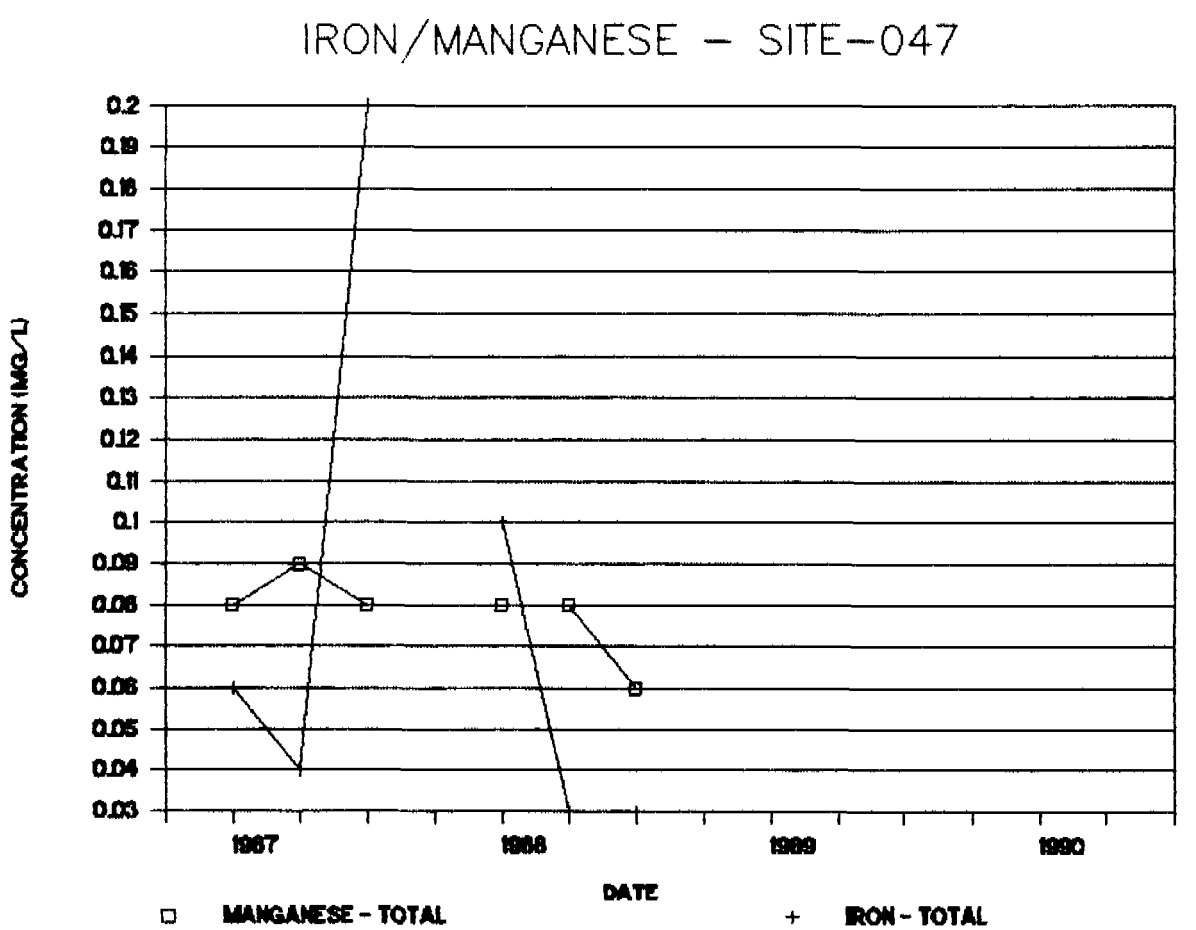

pH – SITE–047
pH (S U)
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
6.7
6.6
1983
1984
1985
1986
DATE


pH – SITE–047
pH (S U)
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
6.7
6.6
6.5
6.4
6.3
6.2
1987
1988
1989
1990
DATE

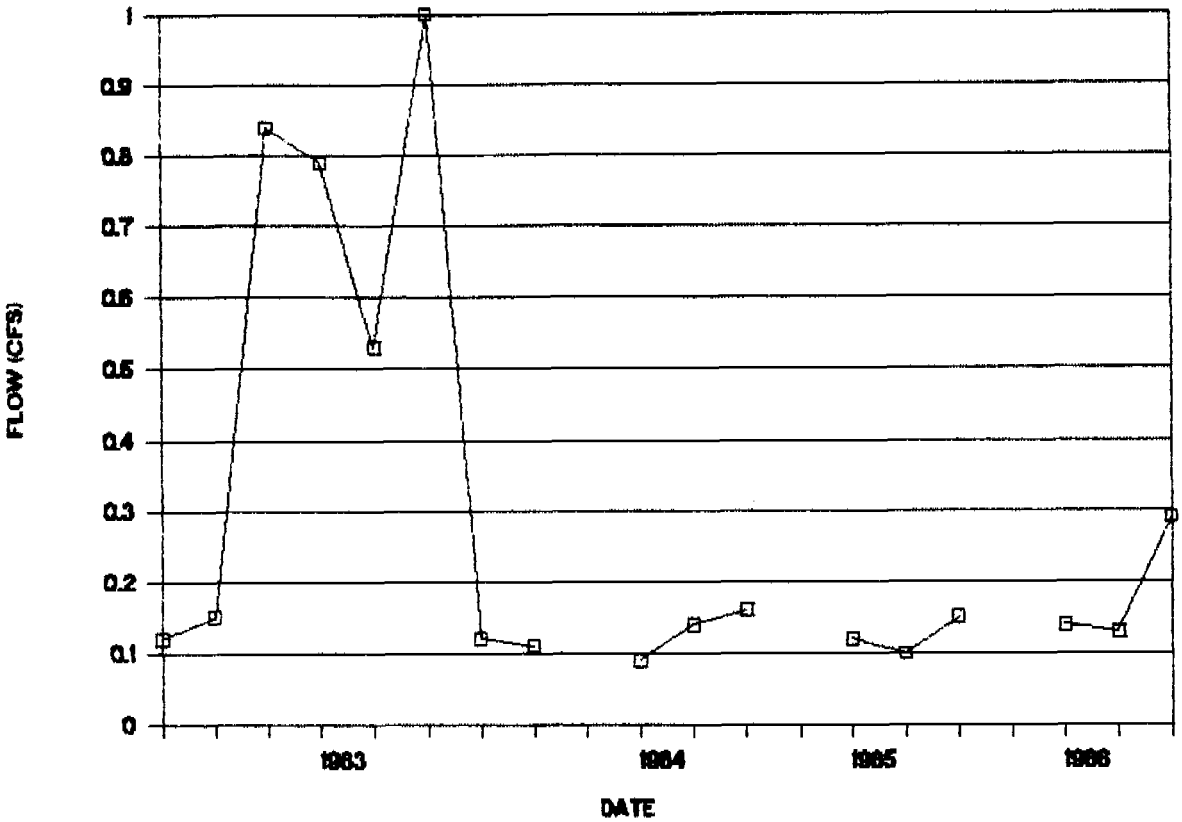

SOLIDS – SITE–047
600
550
500
450
400
350
300
250
200
CONCENTRATION (MG/L)
1983
1984
1985
1986
DATE
TOTAL DISS. SOLIDS


SOLIDS – SITE–047
620
610
600
590
580
570
560
550
540
530
520
510
500
490
480
470
460
450
440
430
420
410
400
CONCENTRATION (MG/L)
1987
1988
1989
1990
DATE
TOTAL DISS. SOLIDS

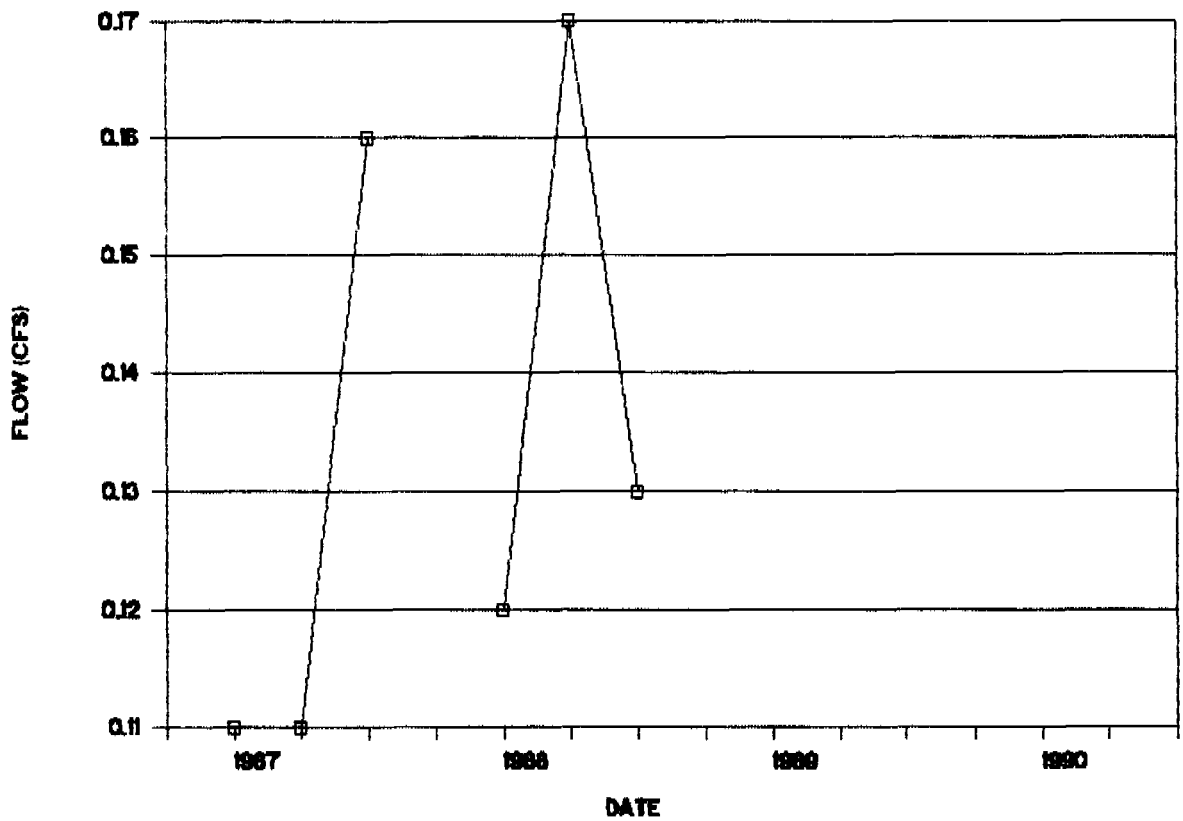

IRON/MANGANESE – SITE–047
CONCENTRATION (MG/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL


IRON/MANGANESE – SITE–047
CONCENTRATION (MG/L)
0.2
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

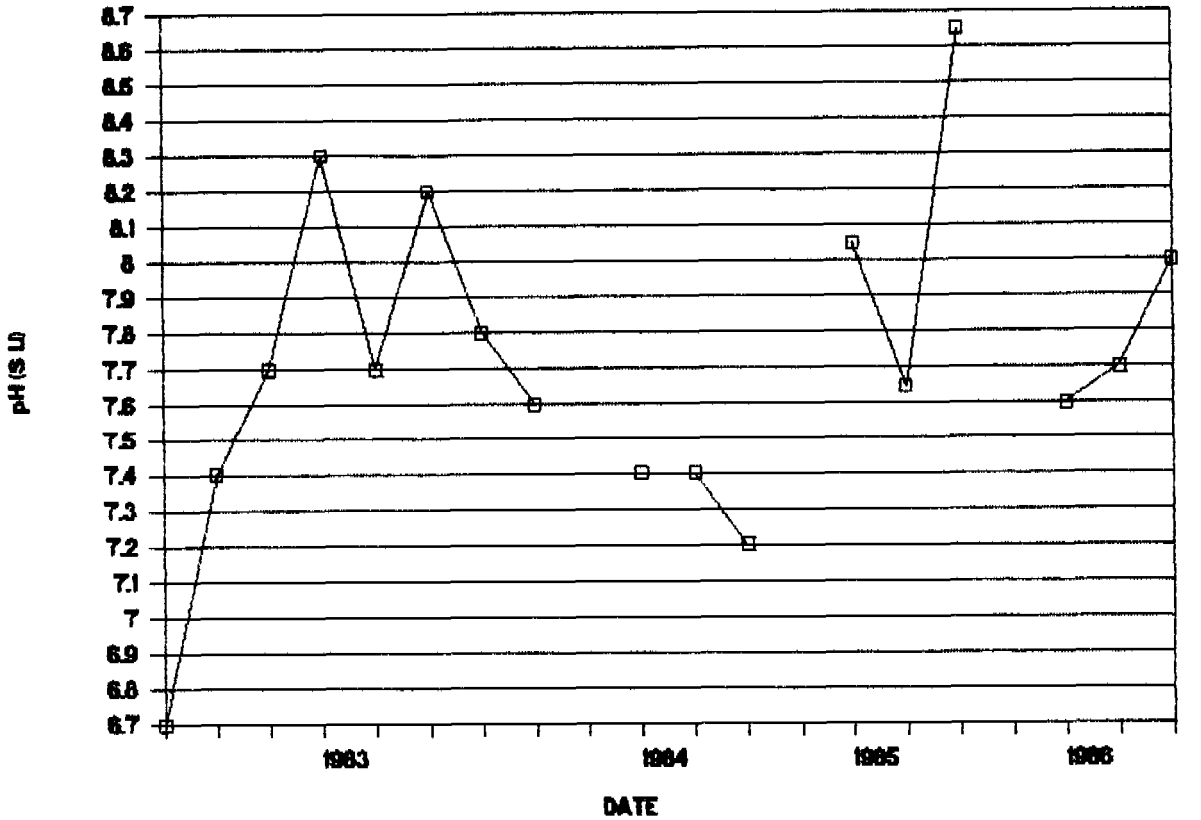
FLOW – SITE–047A



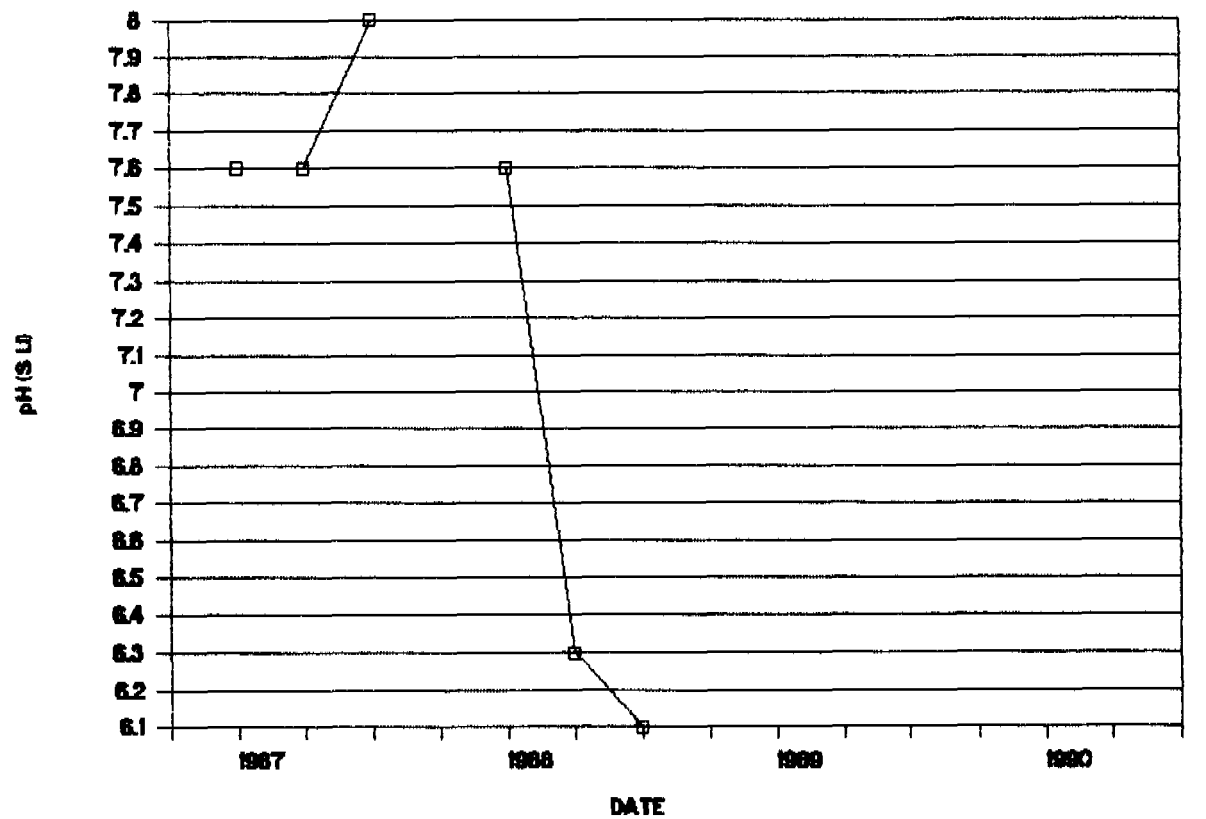
FLOW – SITE–047A

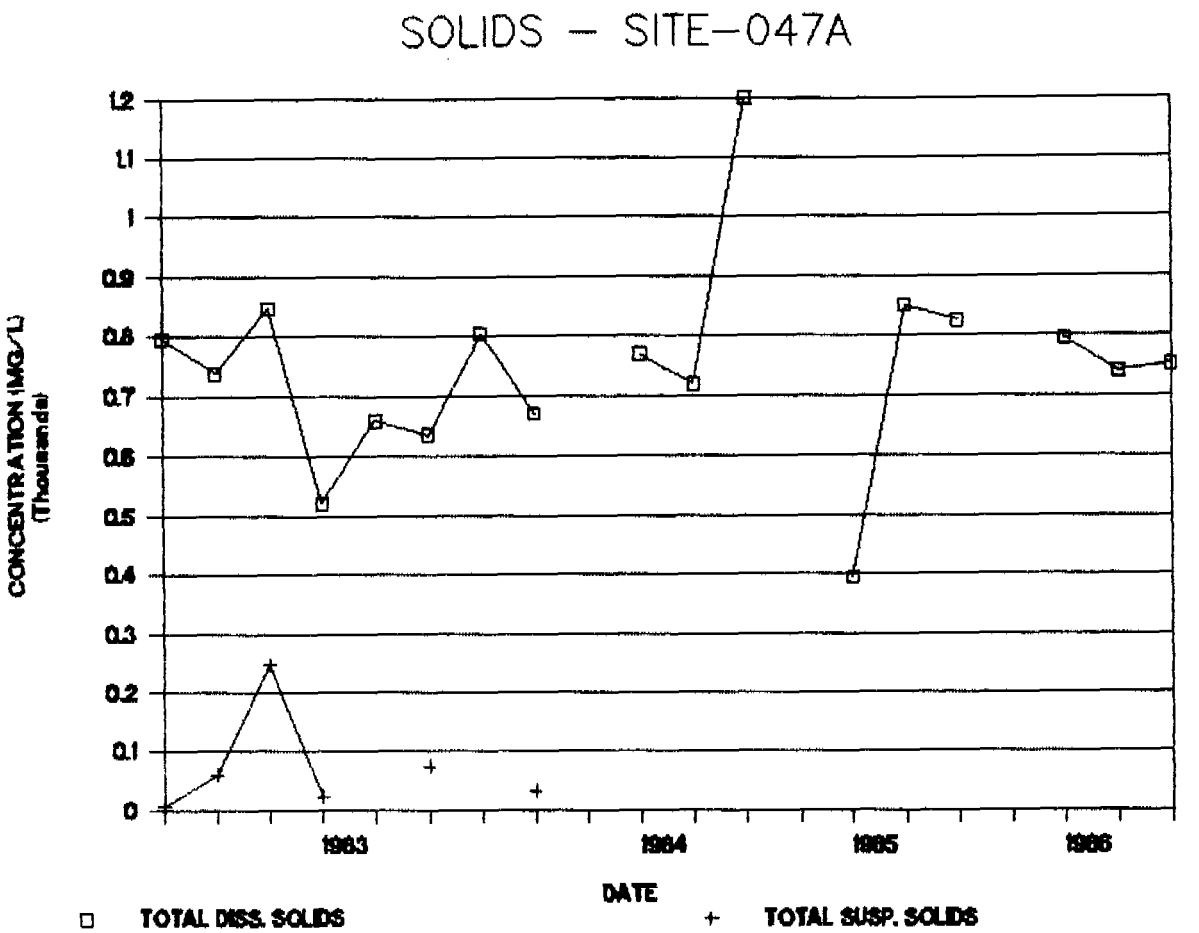


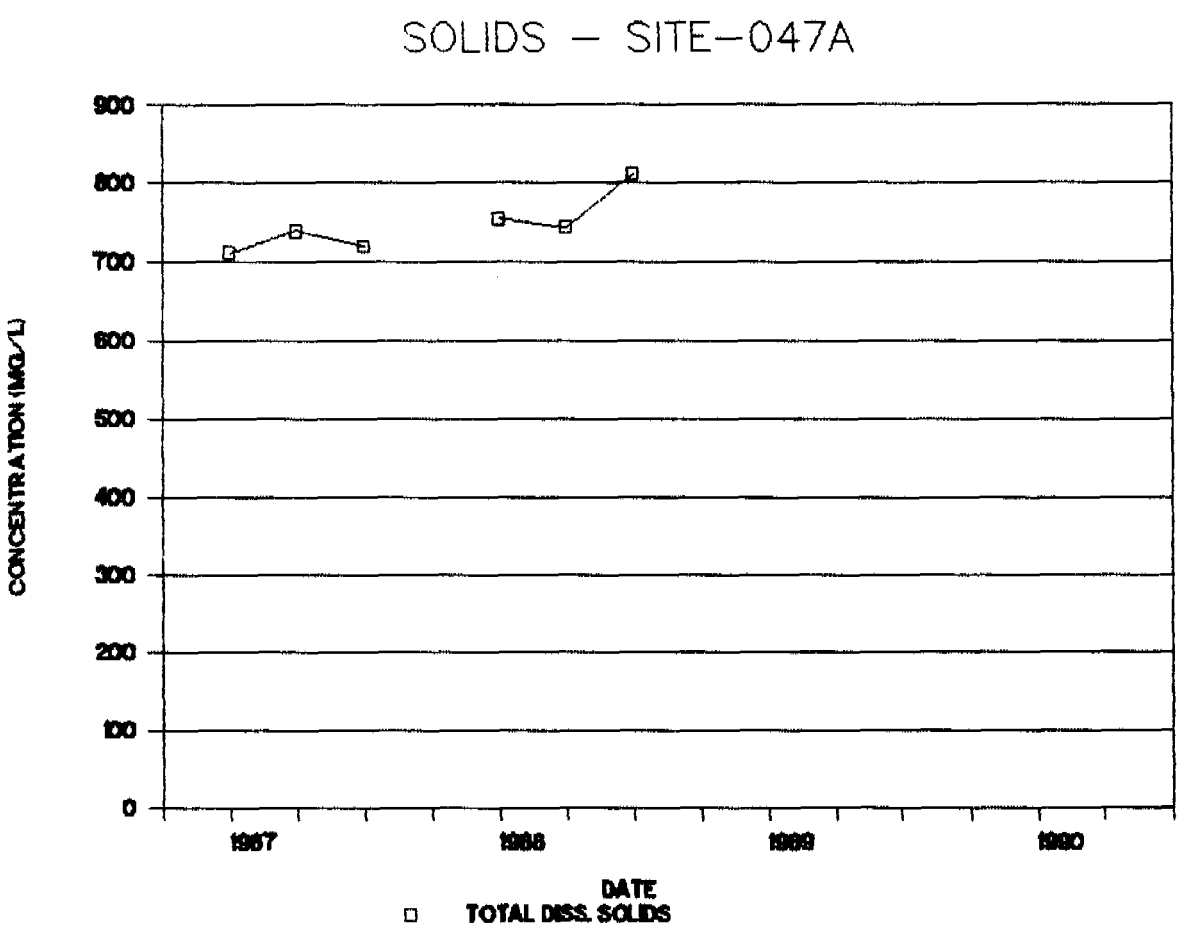
pH – SITE–047A

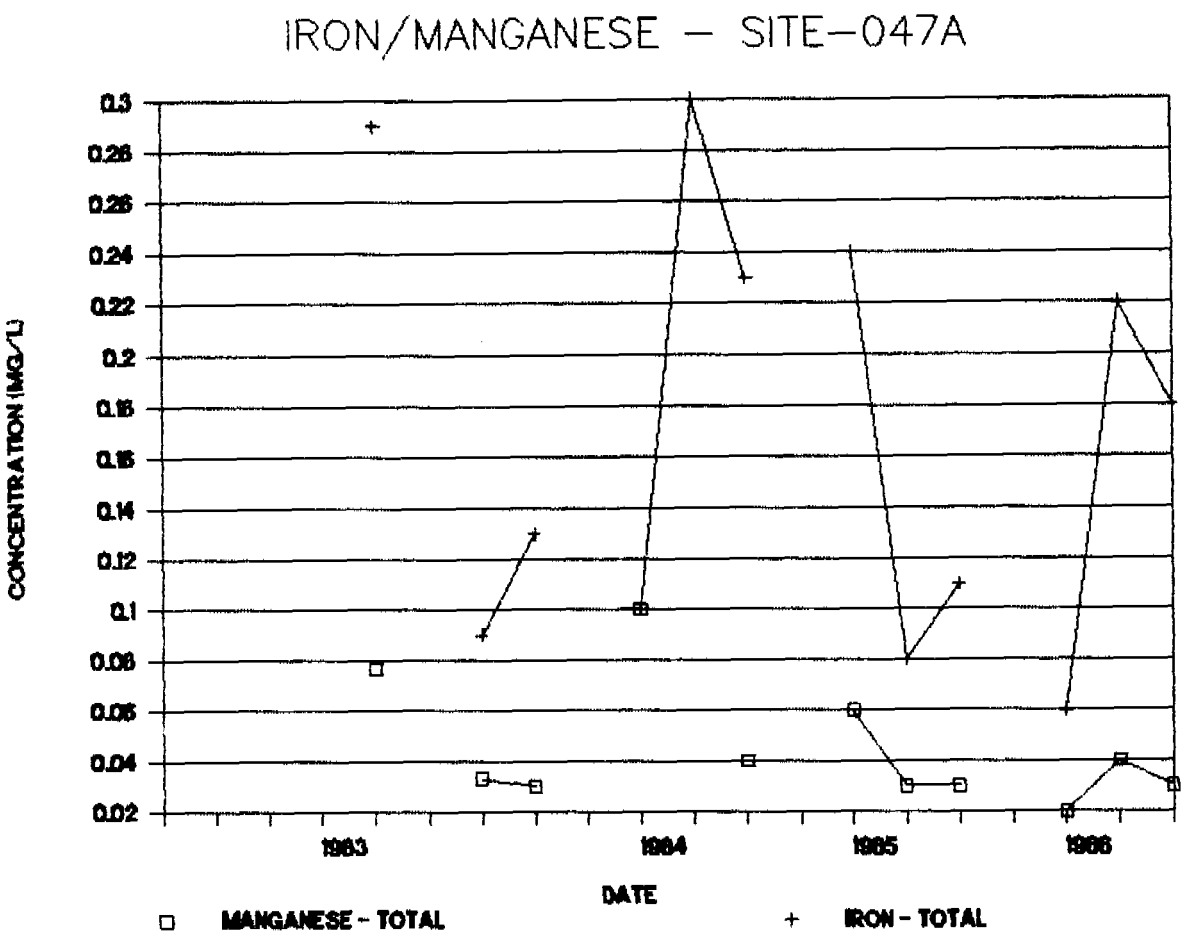


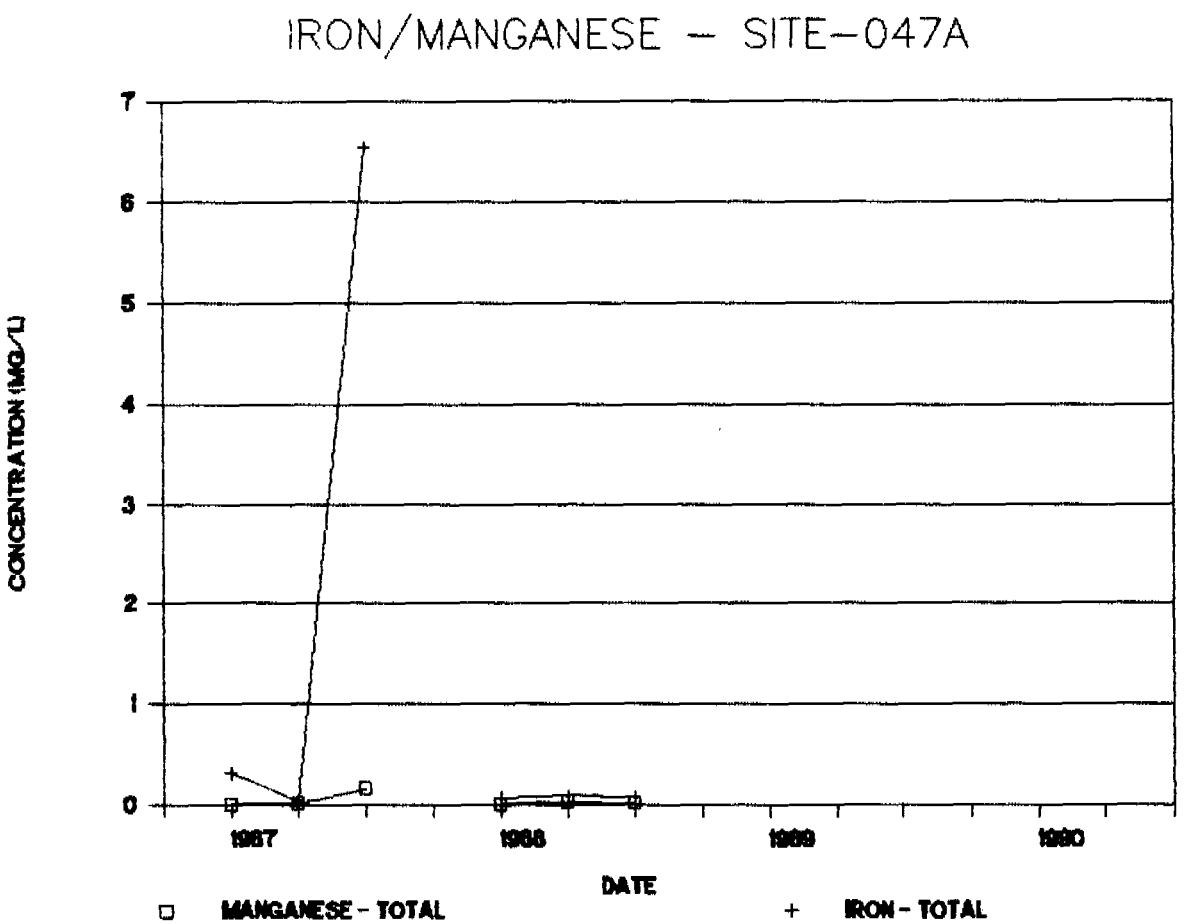
pH – SITE–047A



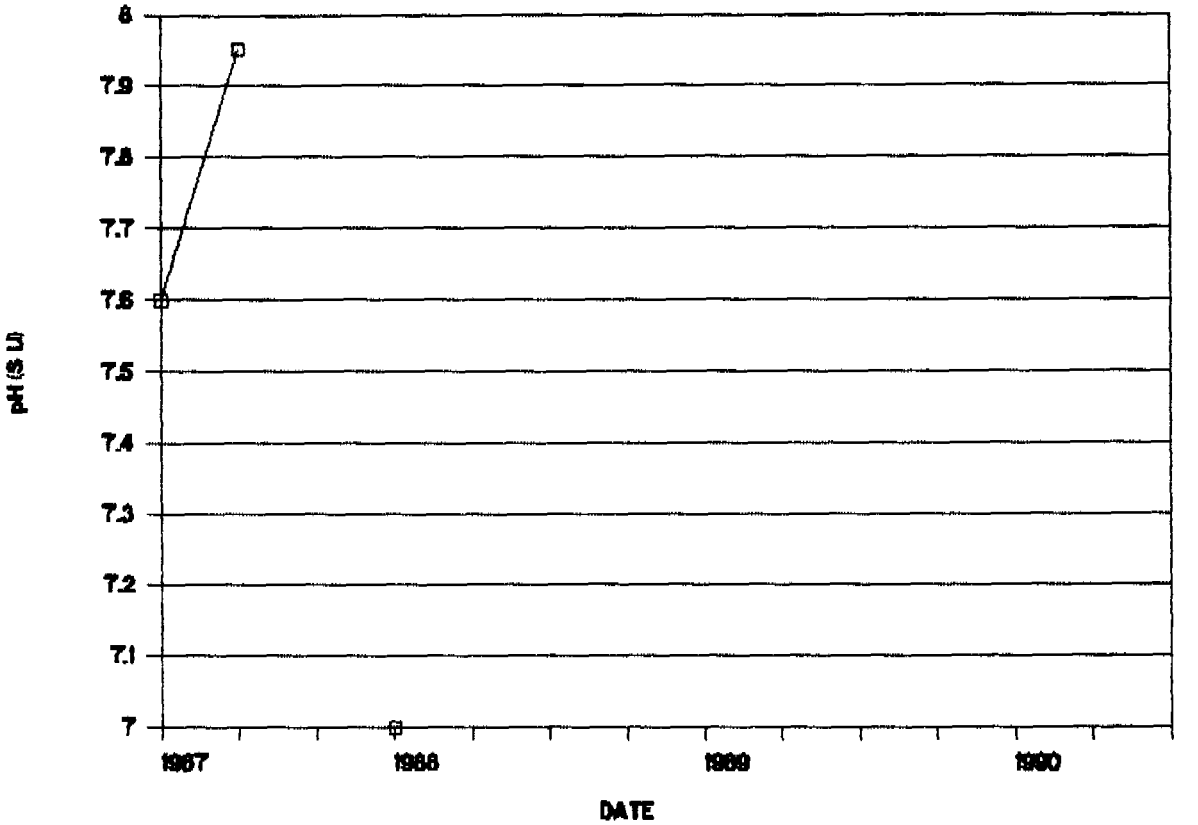

SOLIDS – SITE–047A
CONCENTRATION (MG/L)
(Thousands)
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
1984
1985
1986
DATE
TOTAL DISS. SOLIDS
TOTAL SUSP. SOLIDS


SOLIDS – SITE–047A
CONCENTRATION (MG/L)
900
800
700
600
500
400
300
200
100
0
1987
1988
1989
1990
DATE
TOTAL DISS. SOLIDS

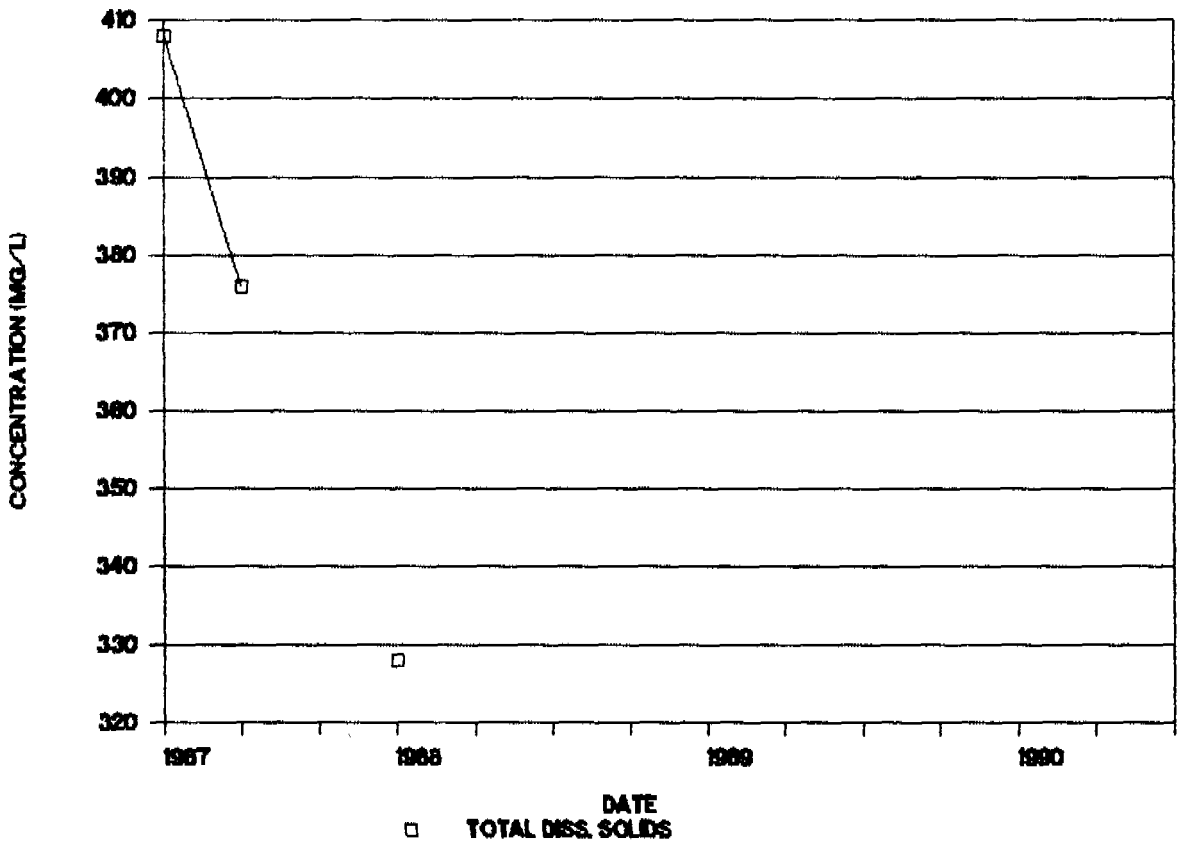

IRON/MANGANESE – SITE–047A
CONCENTRATION (MG/L)
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL


IRON/MANGANESE – SITE–047A
CONCENTRATION (MG/L)
7
6
5
4
3
2
1
0
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

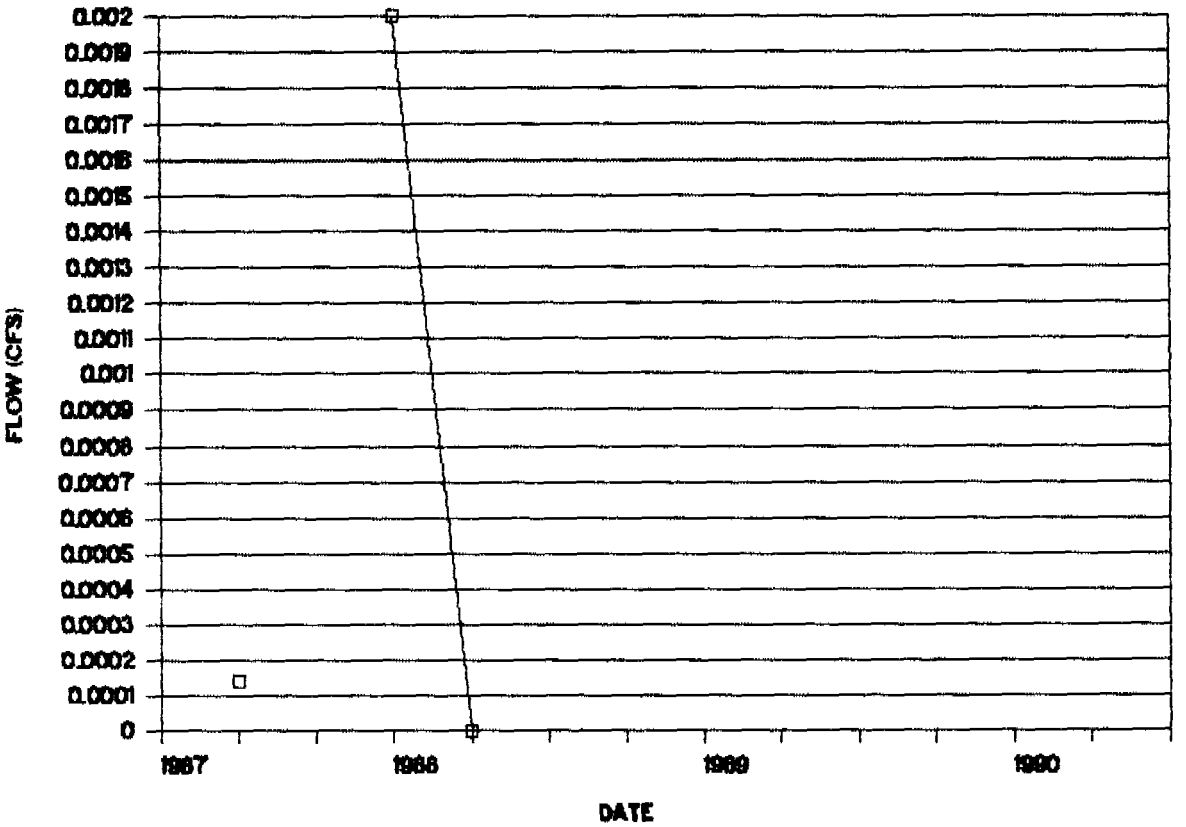
pH – SITE–057A



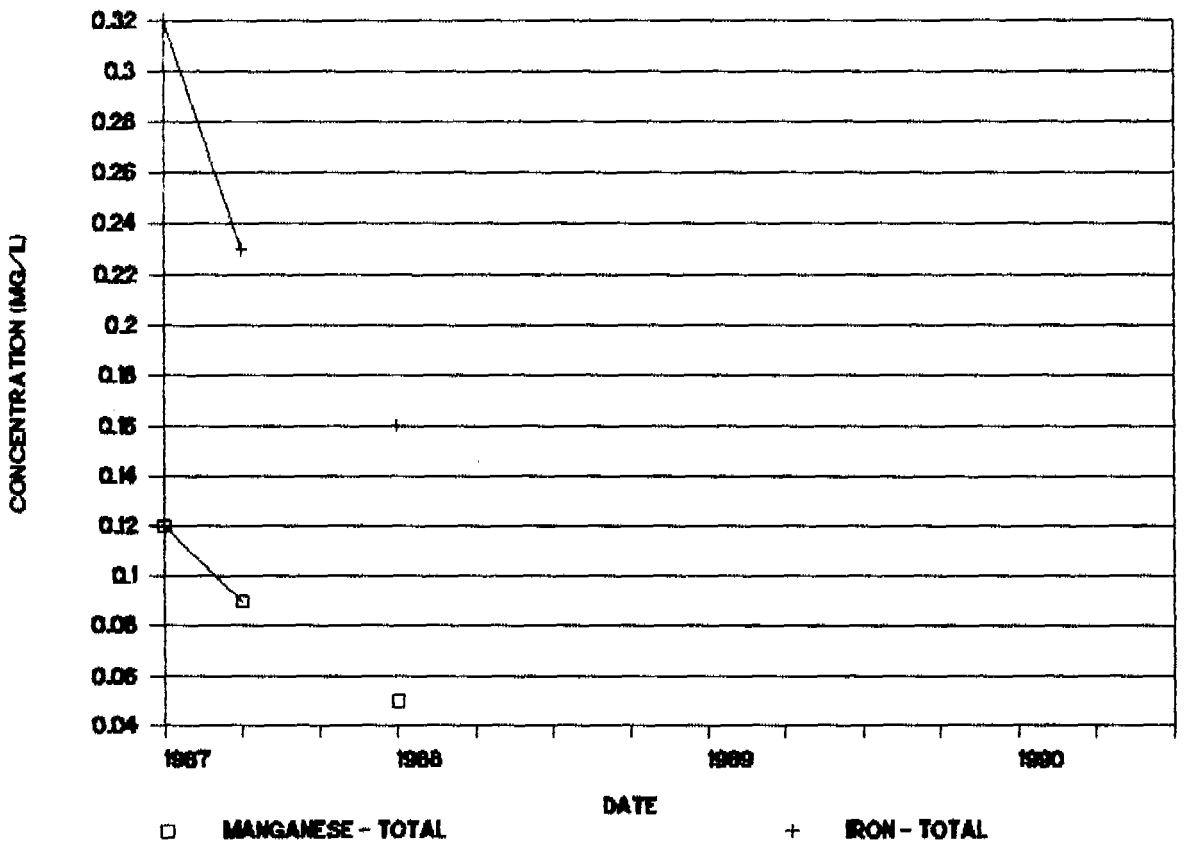
SOLIDS – SITE–057A

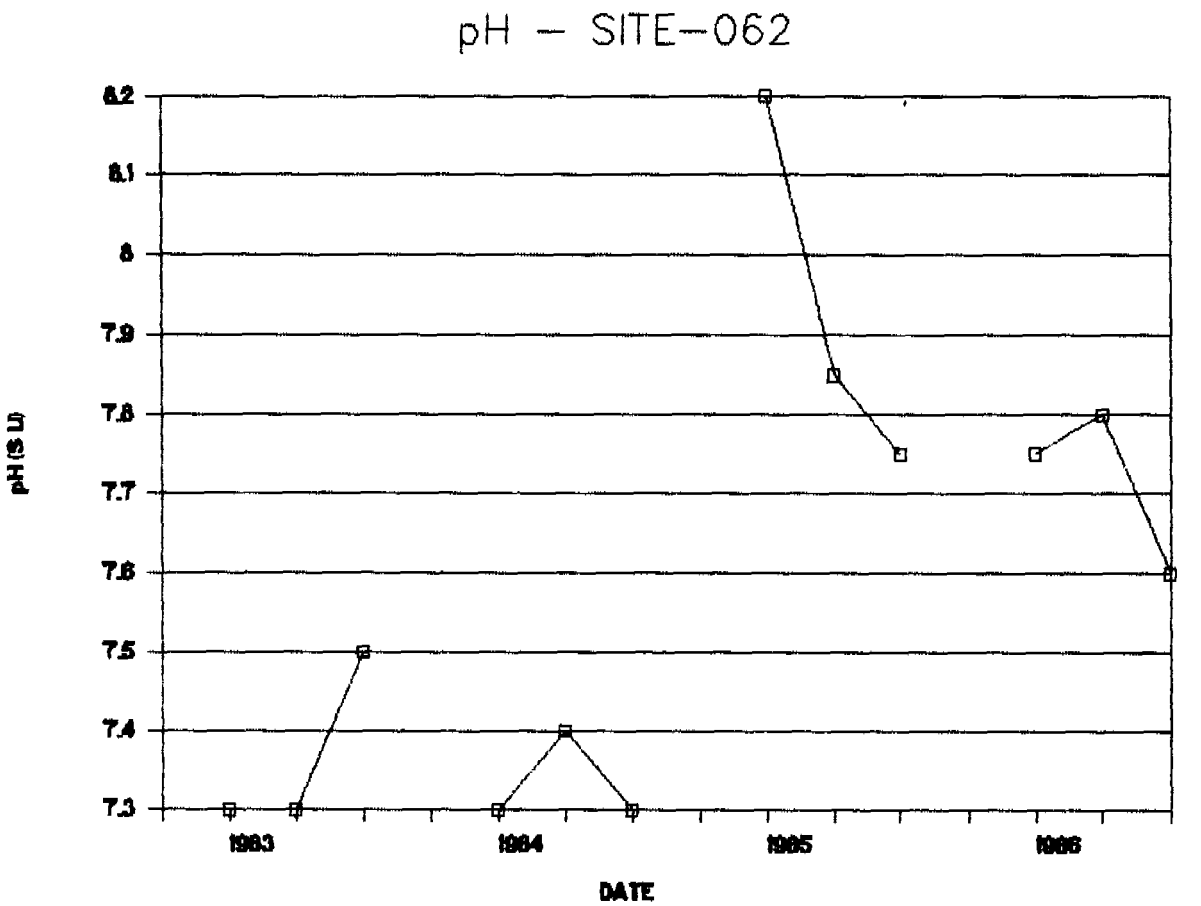


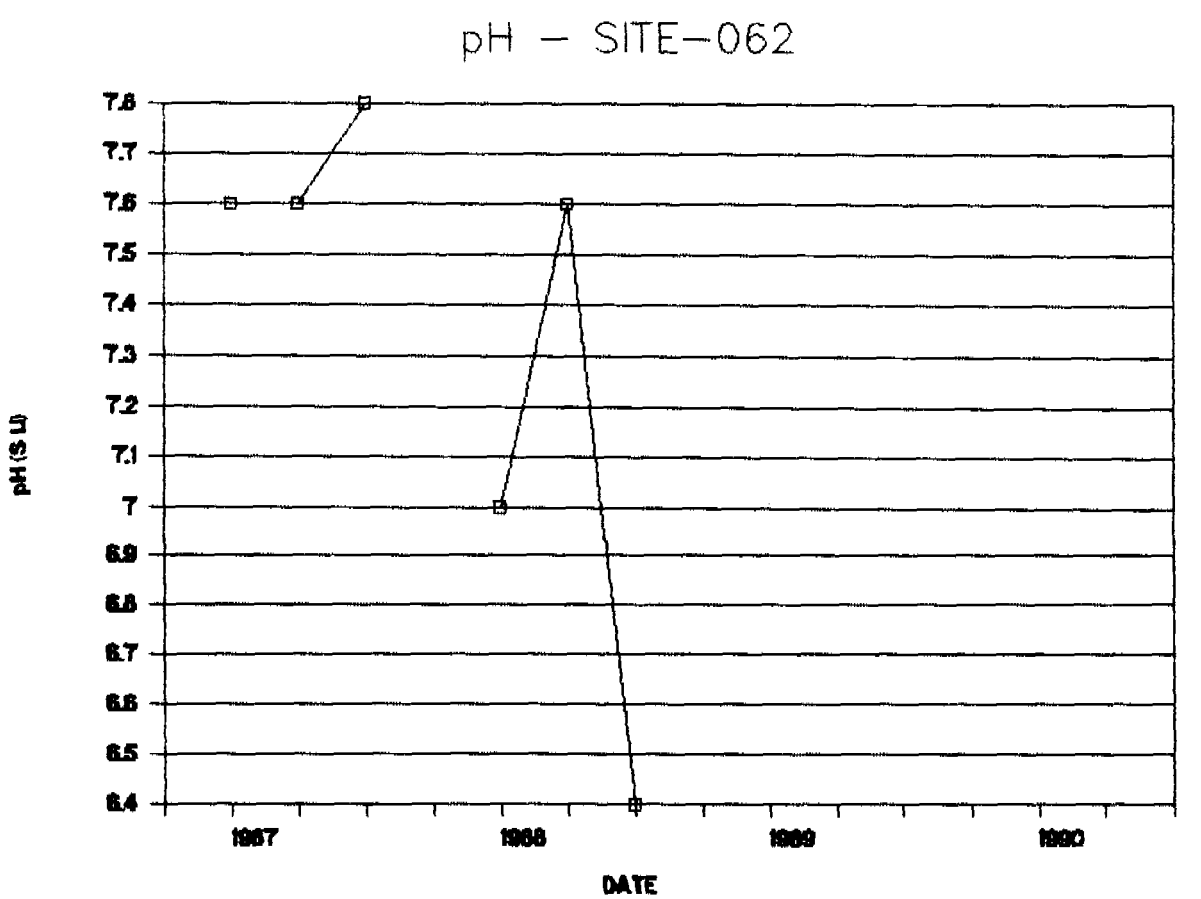
FLOW – SITE–057A

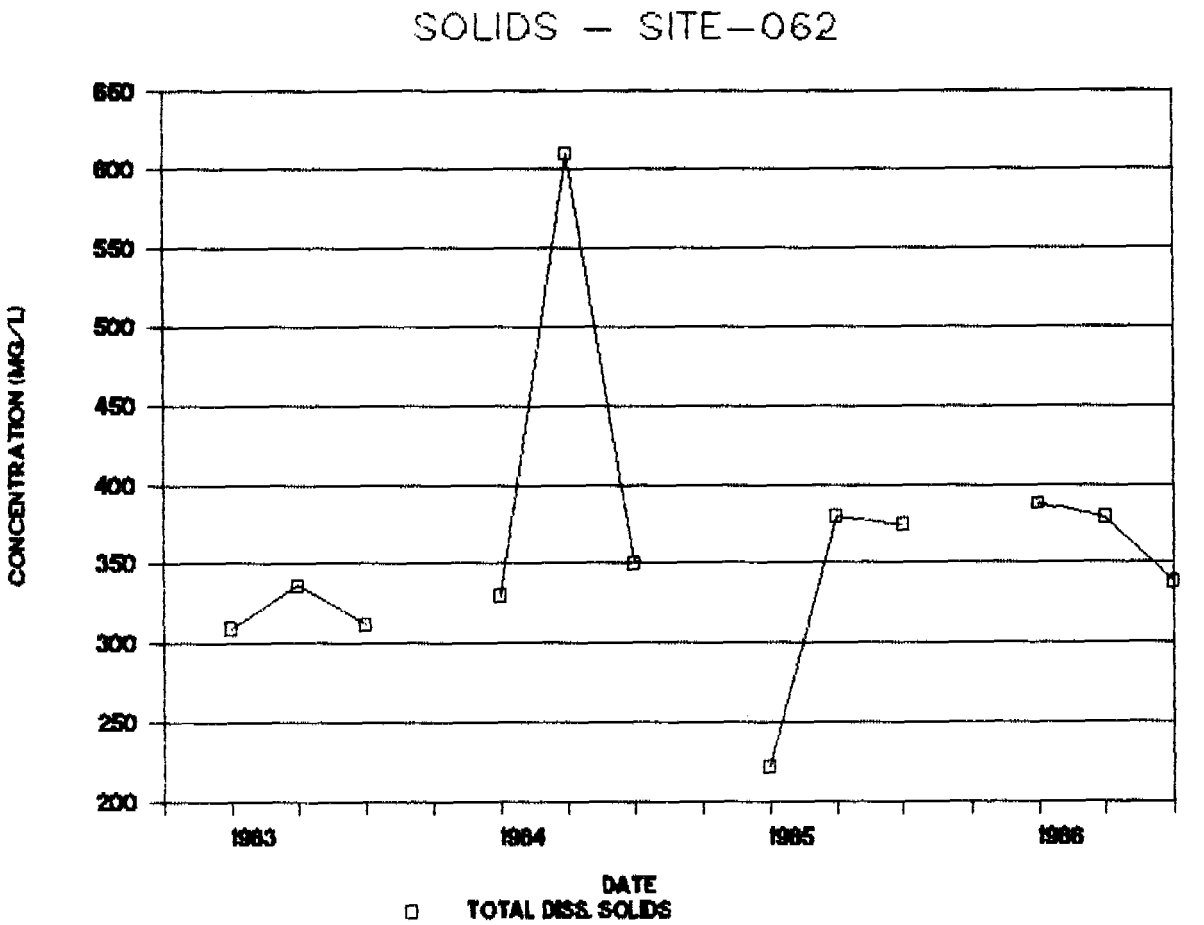


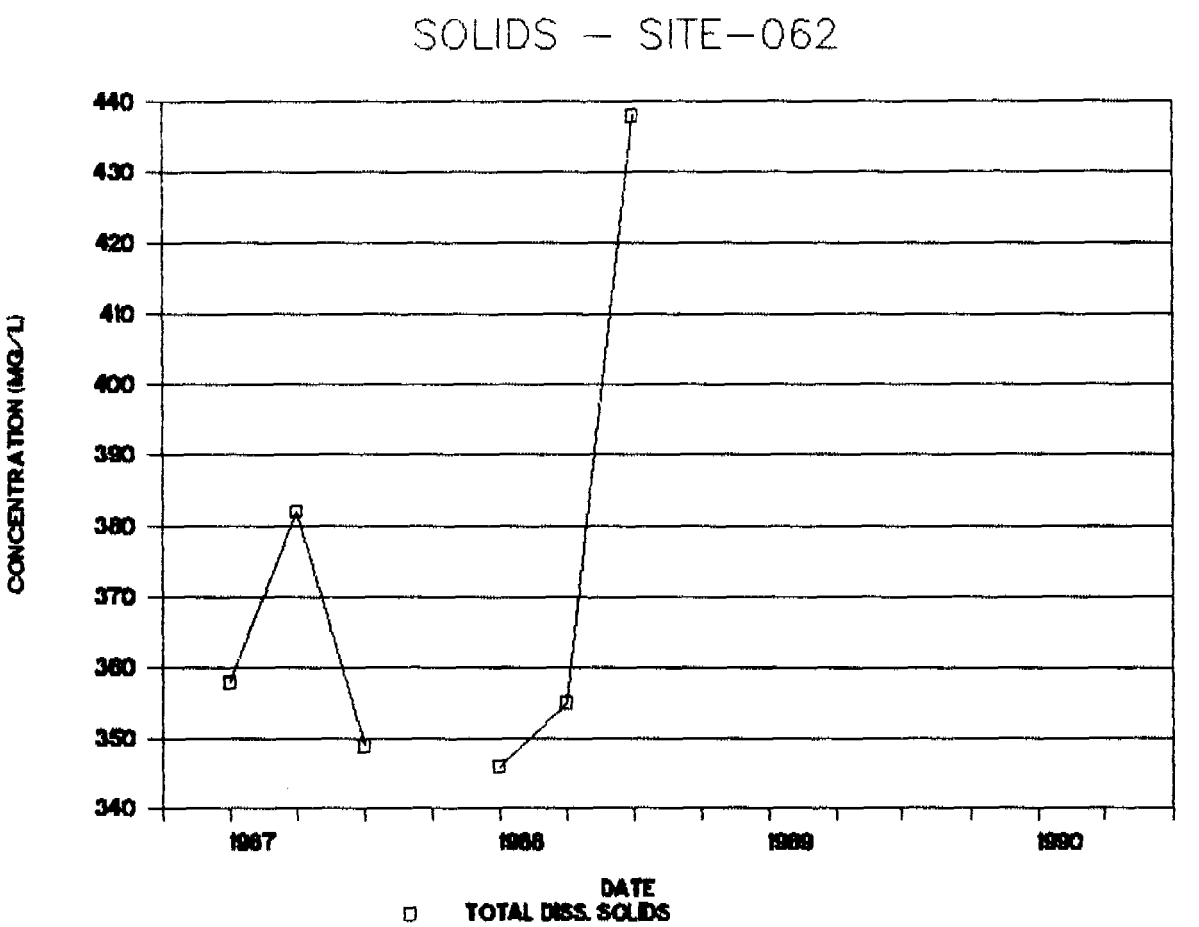
IRON/MANGANESE – SITE–057A

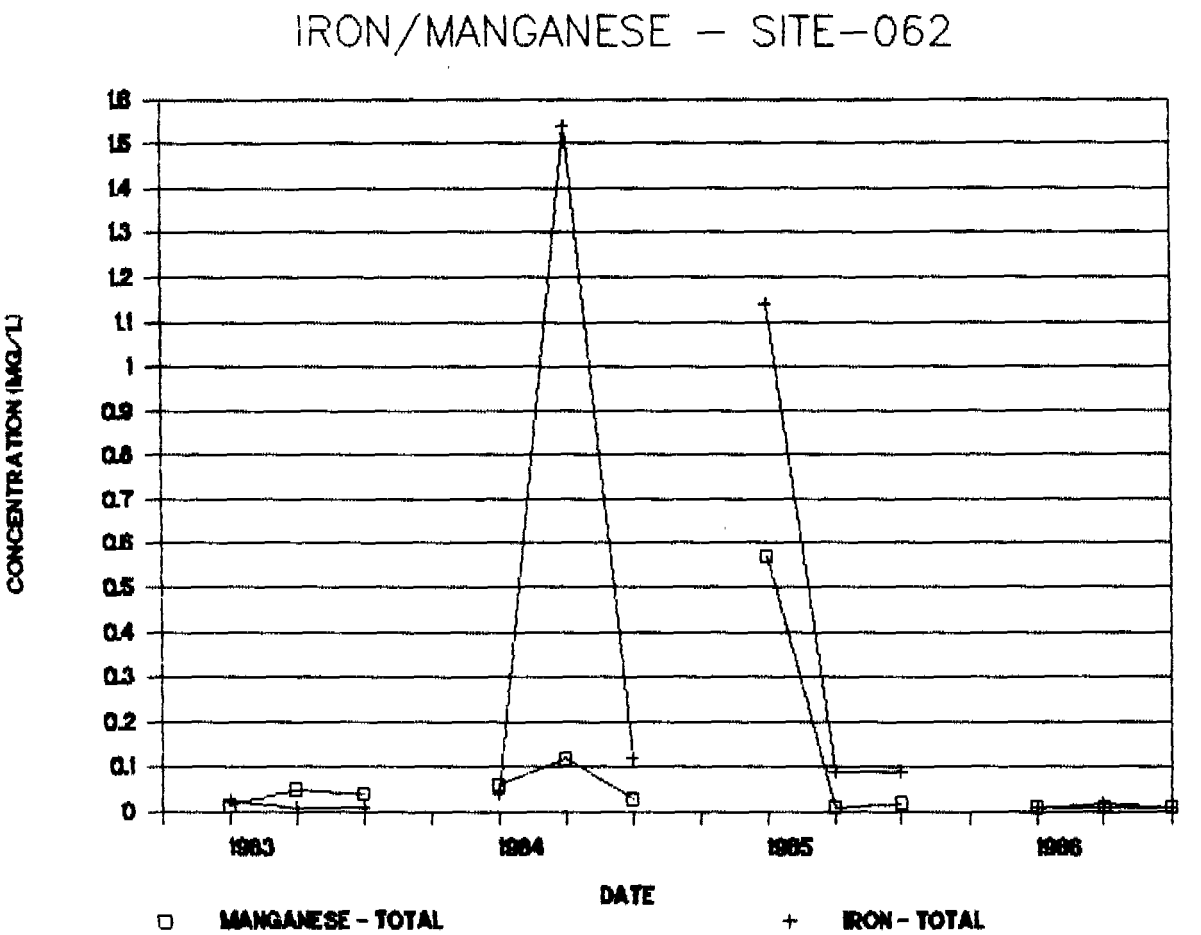


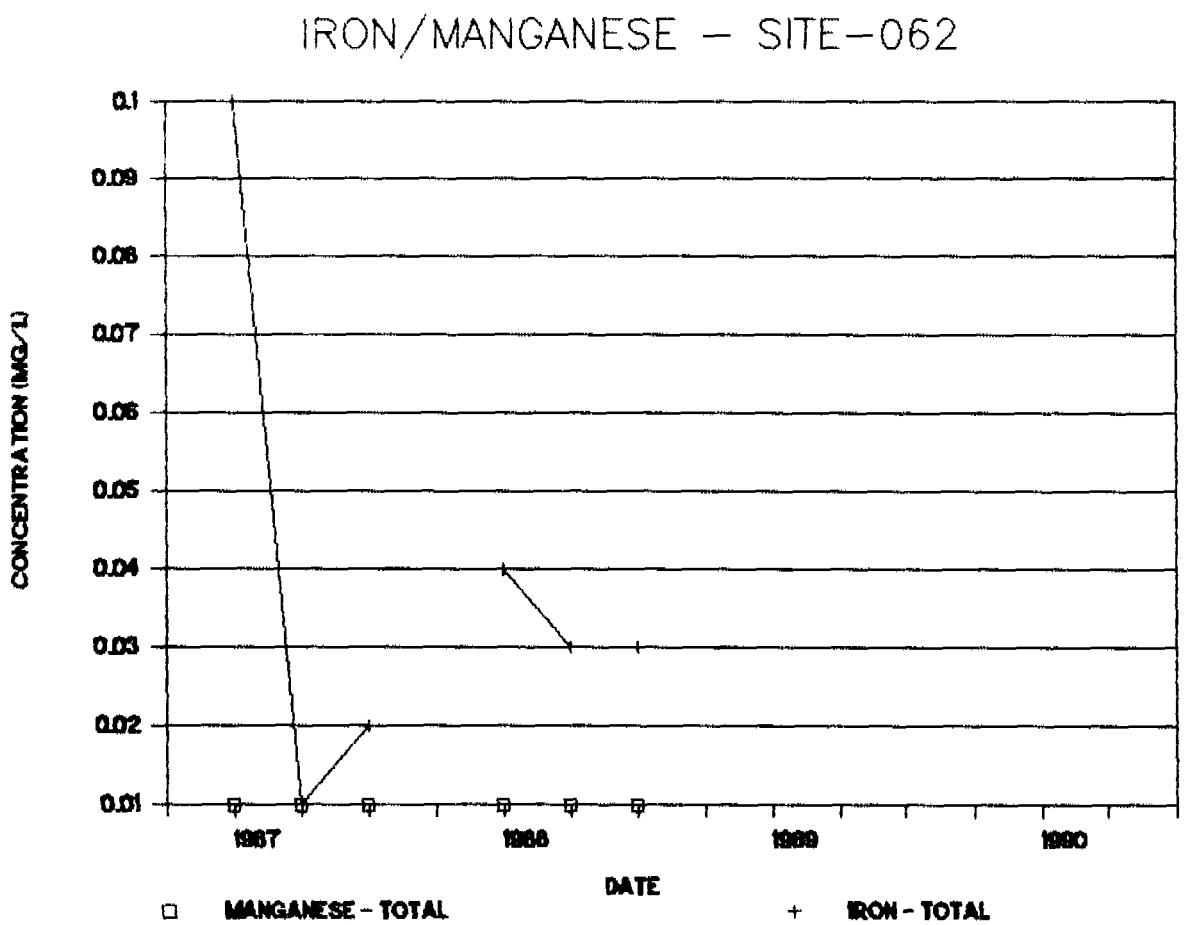

pH – SITE–062
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
pH (S U)
1983
1984
1985
1986
DATE


pH – SITE–062
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
6.7
6.6
6.5
6.4
pH (S U)
1987
1988
1989
1990
DATE


SOLIDS – SITE–062
CONCENTRATION (MG/L)
650
600
550
500
450
400
350
300
250
200
1983
1984
1985
1986
DATE
TOTAL DISS. SOLIDS


SOLIDS – SITE–062
CONCENTRATION (MG/L)
440
430
420
410
400
390
380
370
360
350
340
1987
1988
1989
1990
DATE
TOTAL DISS. SOLIDS


IRON/MANGANESE – SITE–062
CONCENTRATION (MG/L)
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
1984
1985
1986
DATE
MANGANESE - TOTAL
IRON - TOTAL


IRON/MANGANESE – SITE–062
CONCENTRATION (MG/L)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1987
1988
1989
1990
DATE
MANGANESE - TOTAL
IRON - TOTAL

SOUTHERN UTAH FUEL COMPANY

CLIMATOLOGICAL DATA

FOR

1988 ANNUAL REPORT

KWW 27-Jan-89

SUFCO CLIMATOLOGICAL SUMMARY - 1986

YEAR 1986	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL SUMMARY
TEMPERATURE -F													
-MAX							84	87	80	62	52	43	87
-MIN							40	47	29	23	8	-1	-1
-AVE HIGH							76.1	80.4	61.7	51.9	40.5	33.8	57.4
-AVE LOW							48.6	52.5	38.4	32.1	24.3	16.7	35.4
PRECIPITATION													
-TOTAL							1.86	1.80	1.47	1.05	1.34	0.18	7.7
-NO DAYS .01 IN +							10	12	9	5	7	5	48.0
SNOW COVER													
-MAX DEPTH							0	0	1	5.5	2.5	1	5.5

PERIOD OF RECORD SUMMARY													
TEMPERATURE -F													
-MAX							84	87	80	62	52	43	87
-MIN							40	47	29	23	8	-1	-1
-AVE HIGH							76.1	80.4	61.7	51.9	40.5	33.8	
-AVE LOW							48.6	52.5	38.4	32.1	24.3	16.7	
PRECIPITATION (AVE BY MONTH & YEAR)													
-TOTAL							1.86	1.80	1.47	1.05	1.34	0.18	15.4
-NO DAYS .01 IN +							10	12	9	5	7	5	96.0
SNOW COVER (MAX BY MONTH & YEAR)													
-MAX DEPTH							0	0	1	5.5	2.5	1	5.5

KWW 27-Jan-89

SUFCO CLIMATOLOGICAL SUMMARY - 1987

YEAR 1987	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL SUMMARY
TEMPERATURE -F													
-MAX	50	50	50	70	73	83	85	83	80	73	51	52	85
-MIN	-6	1	7	21	30	39	40	38	35	30	8	-11	-11
-AVE HIGH	30.1	34.3	37.1	55.4	59.6	73.8	74.3	72.4	70.2	60.0	38.6	29.3	52.9
-AVE LOW	11.9	15.8	19.7	31.5	38.5	47.0	49.8	48.1	41.4	36.7	23.2	11.6	31.3
PRECIPITATION													
-TOTAL	0.99	0.82	1.49	0.45	2.45	0.59	2.21	1.38	0.65	1.78	1.56	1.41	23.48
-NO DAYS .01 IN +	11	12	8	6	20	7	11	9	5	7	12	11	119
SNOW COVER													
-MAX DEPTH	5	6.25	13	4	0	0	0	0	0	0	1	9	13

PERIOD OF RECORD SUMMARY

TEMPERATURE -F													
-MAX	50	50	50	70	73	83	85	87	80	73	52	52	87
-MIN	-6	1	7	21	30	39	40	38	29	23	8	-11	-11
-AVE HIGH	30.1	34.3	37.1	55.4	59.6	73.8	75.2	76.4	66.0	56.0	39.6	31.6	
-AVE LOW	11.9	15.8	19.7	31.5	38.5	47.0	49.2	50.3	39.9	34.4	23.8	14.2	
PRECIPITATION (AVE BY MONTH & YEAR)													
-TOTAL	0.99	0.82	1.49	0.45	2.45	0.59	2.04	1.59	1.06	1.42	1.45	0.79	19.44
-NO DAYS .01 IN +	11	12	8	6	20	7	10.5	10.5	7	6	9.5	8	107.5
SNOW COVER (MAX BY MONTH & YEAR)													
-MAX DEPTH	5	6.25	13	4	0	0	0	0	1	5.5	2.5	9	13

KWW 27-Jan-89

SUFCO CLIMATOLOGICAL SUMMARY - 1988

YEAR 1988	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL SUMMARY
TEMPERATURE -F													
-MAX	44	50	59	68	76	88	86	83	79	74	59	52	88
-MIN	-4	4	5	19	20	31	49	42	27	26	4	-4	-4
-AVE HIGH	28.9	37.6	45.7	50.9	60.1	75.3	80.5	77.4	66.2	62.9	40.4	31.9	54.8
-AVE LOW	10.9	18.3	19.5	30.9	34.5	47.7	53.5	50.6	40.1	37.6	22.2	13.8	31.6
PRECIPITATION													
-TOTAL	1.58	0.10	1.12	1.98	0.73	0.50	1.78	2.31	1.24	1.05	0.91	1.35	14.65
-NO DAYS .01 IN +	13	5	13	10	10	6	6	7	5	6	11	13	105
SNOW COVER													
-MAX DEPTH	7	1	3	2	0.5	0	0	0	0	0	2	11	11

PERIOD OF RECORD SUMMARY

TEMPERATURE -F													
-MAX	50	50	59	70	76	88	86	87	80	74	59	52	88
-MIN	-4	4	5	19	20	31	49	42	27	26	4	-4	-4
-AVE HIGH	29.5	36.0	41.4	53.2	59.9	74.6	77.0	76.7	66.0	58.3	39.8	31.7	
-AVE LOW	11.4	17.1	19.6	31.2	36.5	47.4	50.6	50.4	40.0	35.5	23.2	14.0	
PRECIPITATION (AVE BY MONTH & YEAR)													
-TOTAL	1.29	0.46	1.31	1.22	1.59	0.55	1.95	1.83	1.12	1.29	1.27	0.98	17.84
-NO DAYS .01 IN +	12.0	8.5	10.5	8.0	15.0	6.5	9.0	9.3	6.3	6.0	10.0	9.7	106.7
SNOW COVER (MAX BY MONTH & YEAR)													
-MAX DEPTH	7	6.25	13	4	0.5	0	0	0	1	5.5	2.5	11	13

SOUTHERN UTAH FUEL COMPANY

SUBSIDENCE MONITORING REPORT

FOR

1988 ANNUAL REPORT

1988 SUBSIDENCE REPORT

SOUTHERN UTAH FUEL COMPANY

MINE NO. 1

by

Dall Dimick

Project Engineer

INTRODUCTION

The 1988 subsidence report is an update of previous subsidence information obtained since 1976. A photogrammetric survey was initiated in 1985 for subsidence monitoring. Surface elevations were determined by photogrammetric methods during 1988 and compared to the 1985 base elevations. Differences in elevation, indicating subsidence, were contoured and used to modify the subsidence maps.

Two maps accompany this report. Map 1 is a current mine map with the subsidence map superimposed and Map 2 is the main subsidence map. It shows the surface control monuments, overburden contours, subsidence contours, and surface tension cracks.

1988 SUBSIDENCE

The 1988 subsidence map [Map 2] was updated using the results from photogrammetric monitoring. There are eight separate subsidence areas shown on the map. A brief description of each follows.

Area 1

No movement has been detected in this area since 1985 indicting that this block has probably stabilized. Maximum subsidence varies from eight feet on the eastern end to four feet on the western end. Mining ceased in this area in 1979.

Area 2

No movement has been detected in this block since 1985. Seam recovery was moderate with maximum subsidence to date of two feet. Mining ceased in this area in 1984.

Area 3

This area has been slowly subsiding the past few years but may be stabilized now. No movement was detected in the 1987-1988 time period. Seam recovery was moderate with subcritical areas which caused some slower residual subsidence. Maximum subsidence is still two feet. Mining ceased in this area in 1983.

Area 4

The southwest portion of this block has continued to subside. Seam recovery was good with maximum subsidence to date of five feet. Mining ceased in this area in 1985.

Area 5

No movement has been detected in this block since 1984. Seam recovery was good with maximum subsidence of five feet. Mining ceased in this area in 1981.

Area 6

Subsidence in this area has expanded since 1987. The coal seam is being recovered with a longwall system. Maximum subsidence to date is six feet. This occurred outside the escarpment in the 300 feet to 700 feet thick overburden. This escarpment area is being subsided as part of an experimental mining study approved by the Division and the USFS. Active mining will continue through 1989.

Area 7

No further subsidence was detected here this year. The coal seam was only first-mined [partial extraction] but the support pillars have apparently failed from the north towards the south. The subsidence contours are only approximate in the northern end because of a lack of baseline data; i.e. some subsidence had occurred before the 1985 photogrammetric monitoring began. The southern end now shows seven feet of subsidence. Mining ceased here in 1984.

Area 8

This is an active subsidence area with changes since 1987. The area has enlarged and now has up to five feet of subsidence. Seam recovery was good. Mining temporarily ceased in 1988 with additional mining planned for 1990.

DRAW ANGLE SURVEYS

No new draw angle data is available for 1988. The areas where draw angle monitoring monuments are installed [Areas 6 and 8] are still actively subsiding. These monuments will be used once the areas begin to stabilize to calculate local draw angles.

TENSION CRACKS

Tension cracks have developed in Area 6, mostly around the canyon escarpment. Little or no horizontal or vertical displacement was noticed on these new cracks. They were located by survey and added to Map 2.

SUMMARY

Southern Utah Fuel Company's 1988 subsidence report is a continuation of a subsidence monitoring program established in 1978. The program was modified to use photogrammetric monitoring methods beginning in 1985. Areas 1, 2, 3, 4, 5, and 8 had been monitored using conventional surveying techniques prior to initiation of the photogrammetric program. Subsidence has expanded in Areas 4, 6, and 8. Areas 1 and 2 have appeared to be stable since 1985 and Area 5 since 1984. Areas 3 and 7 may have stabilized last year. New tension cracks were located in Area 6 and added to the subsidence map.

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SOUTHERN UTAH FUEL COMPANY

PERMIT STIPULATION STATUS

FOR

1988 ANNUAL REPORT

SOUTHERN UTAH FUEL COMPANY

PERMIT STIPULATION STATUS - 1988

1. Five Year Permit Stipulations - All five year permit stipulations have been satisfactorily addressed.

2. Waste Rock Disposal Site Stipulations - All thirteen of the stipulations for the waste rock disposal site have been satisfactorily addressed.

   Stipulation UMC 817.48-(1)-JSL requires ongoing monitoring of waste for acid- or toxic-forming potential other than high boron levels. During 1988, quarterly waste analyses showed no such potential.

OTHER

SOUTHERN UTAH FUEL COMPANY

WASTE ROCK DISPOSAL SITE
Annual Certification Report

Southern Utah Fuel Company's Waste Rock Disposal Site was approved by the Division of Oil, Gas, and Mining on August 26, 1988. The sedimentation pond and diversion structures were built in accordance with Division approval. Certified as-builts were submitted to the Division on November 23, 1988. These as-builts were deemed acceptable by Mike DeWeese on December 27, 1988.

A small amount of waste rock (630 tons) has been temporarily stored during the winter months on the prepared base. This material needs to be redistributed to cover the entire first lift area and compacted.

Waste from the minesite sediment pond is temporarily stored in two small impoundments until it dries out sufficiently to be placed in compacted lifts.

REGISTERED PROFESSIONAL
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WESLEY
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