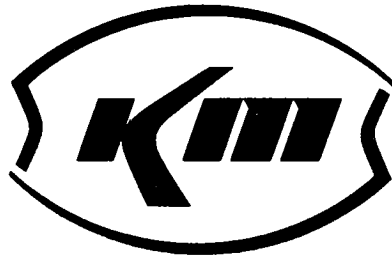


***KERR-McGEE CORPORATION***

FIRST QUARTER PERFORMANCE REPORT  
CHROMIUM MITIGATION PROGRAM  
KERR-McGEE CHEMICAL CORPORATION  
HENDERSON, NEVADA  
JANUARY - MARCH, 1989



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KERR-McGEE CHEMICAL CORPORATION  
HENDERSON, NEVADA

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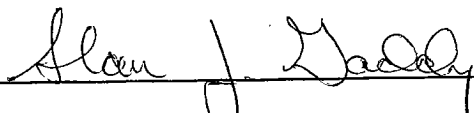
Submitted in Accordance with:

Chromium Mitigation Program  
Consent Order  
September 9, 1986

Prepared by:

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May 5, 1989

  
\_\_\_\_\_  
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FIRST QUARTER 1989 PERFORMANCE REPORT  
CHROMIUM MITIGATION PROGRAM  
KERR-McGEE CHEMICAL CORPORATION  
HENDERSON, NEVADA

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## INTRODUCTION

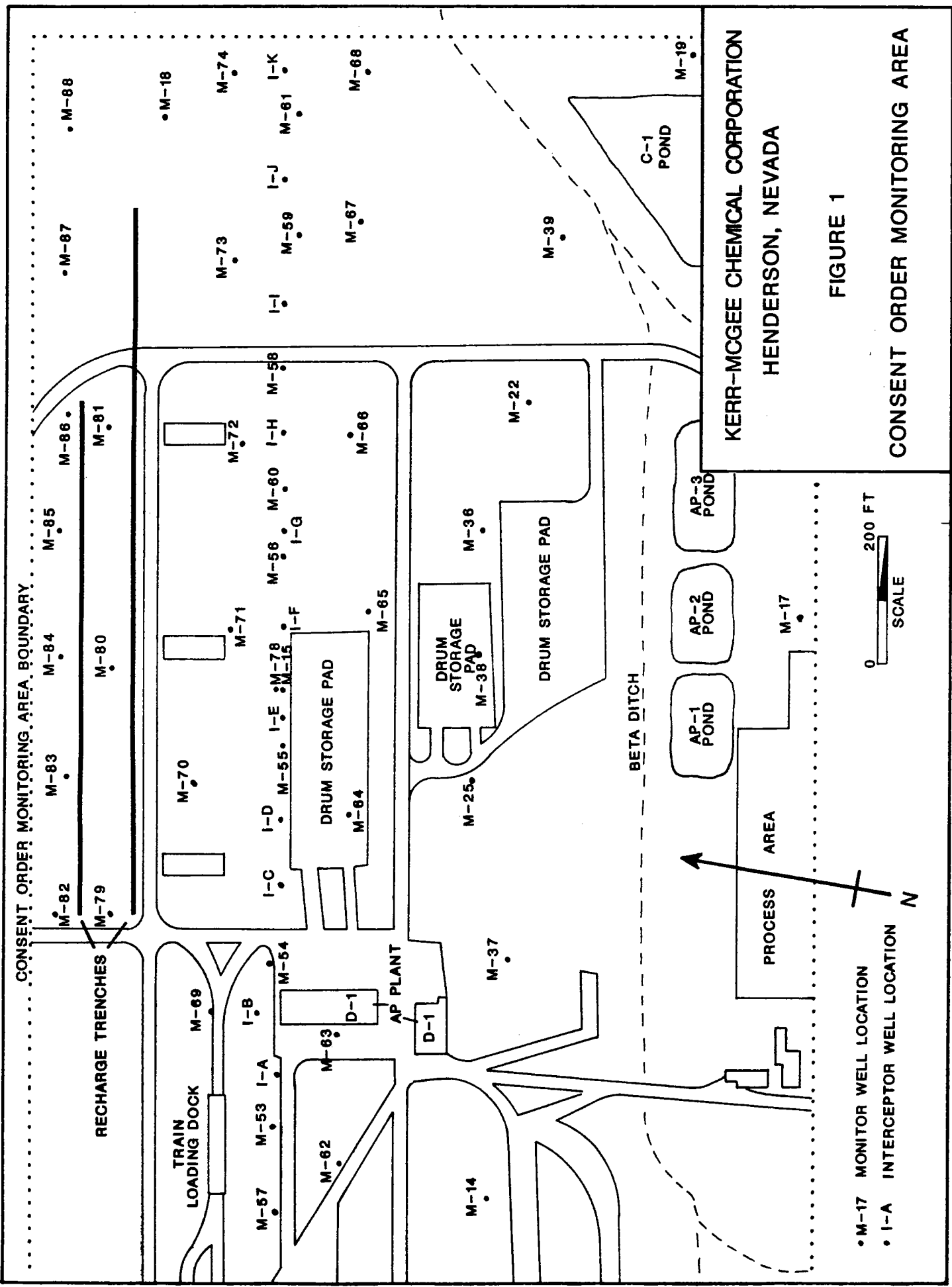
In accordance with the Consent Order for cleanup of chromium contaminated groundwater at the Henderson facility, finalized September 9, 1986, Kerr-McGee Chemical Corporation (KMCC) submits this quarterly performance report to the Nevada Department of Environmental Protection. This report for the first quarter of 1989 summarizes performance data for the groundwater treatment plant and evaluates the effectiveness of the groundwater interception and treatment system installed to carry out the chromium mitigation program.

## GROUNDWATER SURFACE CONFIGURATION

Figure 1 illustrates the chromium treatment system monitoring area as defined in Appendix D of the Consent Order, and shows the locations of all groundwater interceptor and monitor wells installed by KMCC within this area. Appendix A (monitor well inventory) has been excluded from this report. Appendix B lists all groundwater elevations recorded since January 1988 in wells within the Consent Order area. Appendix C presents the water table configuration during the first quarter of 1989, reflecting each month's water level measurements.

Figure C-1 illustrates the potentiometric surface within the consent order monitoring area on January 19, 1989. Figure C-2 presents a cross-section along the groundwater interceptor line, reflecting the pumping system drawdown on that date. The static water level shown on Figure C-2 represents the Consent Order reference groundwater elevation, established September 14, 1987, just prior to startup of the interception system. Figures C-3 and C-4 present a potentiometric surface map and cross-section for water level data recorded February 23, 1989. Figures C-5 and C-6 present water level data recorded March 23, 1989.

Groundwater elevations, listed in Appendix B, show that water levels throughout the Consent Order monitoring area have stabilized since the discharge of cooling water to the beta ditch was discontinued in November, 1987. Figures C-1 through C-6 show the reconfiguration of the potentiometric surface as groundwater



KERR-MCGEE CHEMICAL CORPORATION  
 HENDERSON, NEVADA

FIGURE 1

CONSENT ORDER MONITORING AREA

levels have dropped throughout the monitoring area. This groundwater level decline is a response to the lowering of the regional water table due to the cessation of cooling water discharge, which provided upgradient recharge from the beta ditch. The significant lowering of interceptor line water level elevations in December also reflects increased pumpage from several of the interceptor wells.

## CONTINUOUS WATER LEVEL RECORDERS

Wells M-78 and M-80 (Figure 1) are equipped with continuous water level recorders. Appendix D contains copies of the recorder charts generated during the first quarter of 1989. The charts illustrate the slowdown in the rate of water level decline that began following cessation of cooling water discharge to the beta ditch on November 13, 1987. During the first quarter of 1989, water levels declined approximately 0.8 feet in well M-78 (in the interceptor line). The rate of decline which had been dropping each quarter has essentially stabilized.



## INTERCEPTOR SYSTEM PERFORMANCE

Figures C-1 through C-6 show the potentiometric surface configuration in the interceptor area during the first quarter. Figures C-2, C-4, and C-6 show that drawdown consistently exceeded the one foot below reference water level criterion throughout the interceptor well line.

The potentiometric surface maps (Figures C-1, C-3, and C-5) do not show the overlap of pumping well drawdown cones along the interceptor well line that would indicate complete interception of the chromium plume.

Evaluation of the effectiveness of the groundwater interception and treatment system in reducing chromium levels in the groundwater includes the review of several factors. KMCC is monitoring chromium concentrations in five Consent Order Appendix J wells, located up and downgradient from the plume interceptor line (Figure 2). Hexavalent chromium concentrations in the five Appendix J wells sampled and analyzed for chromium are displayed in Table 1. Appendix E portrays this data in graphic form.

Well M-11 was selected for monitoring of chromium because it was nearest the source. Figure E-1 shows that the chromium concentration in M-11, (upgradient from the Consent Order monitoring area) has not declined significantly. Concentrations have not declined due to the slow rate of leaching of chromium from the low permeability Muddy Creek Clay. This is the horizon

**FIGURE 2**  
**KERR-MCGEE CHEMICAL CORPORATION**  
**HENDERSON, NEVADA**

**LOCATION OF APPENDIX J WELLS**

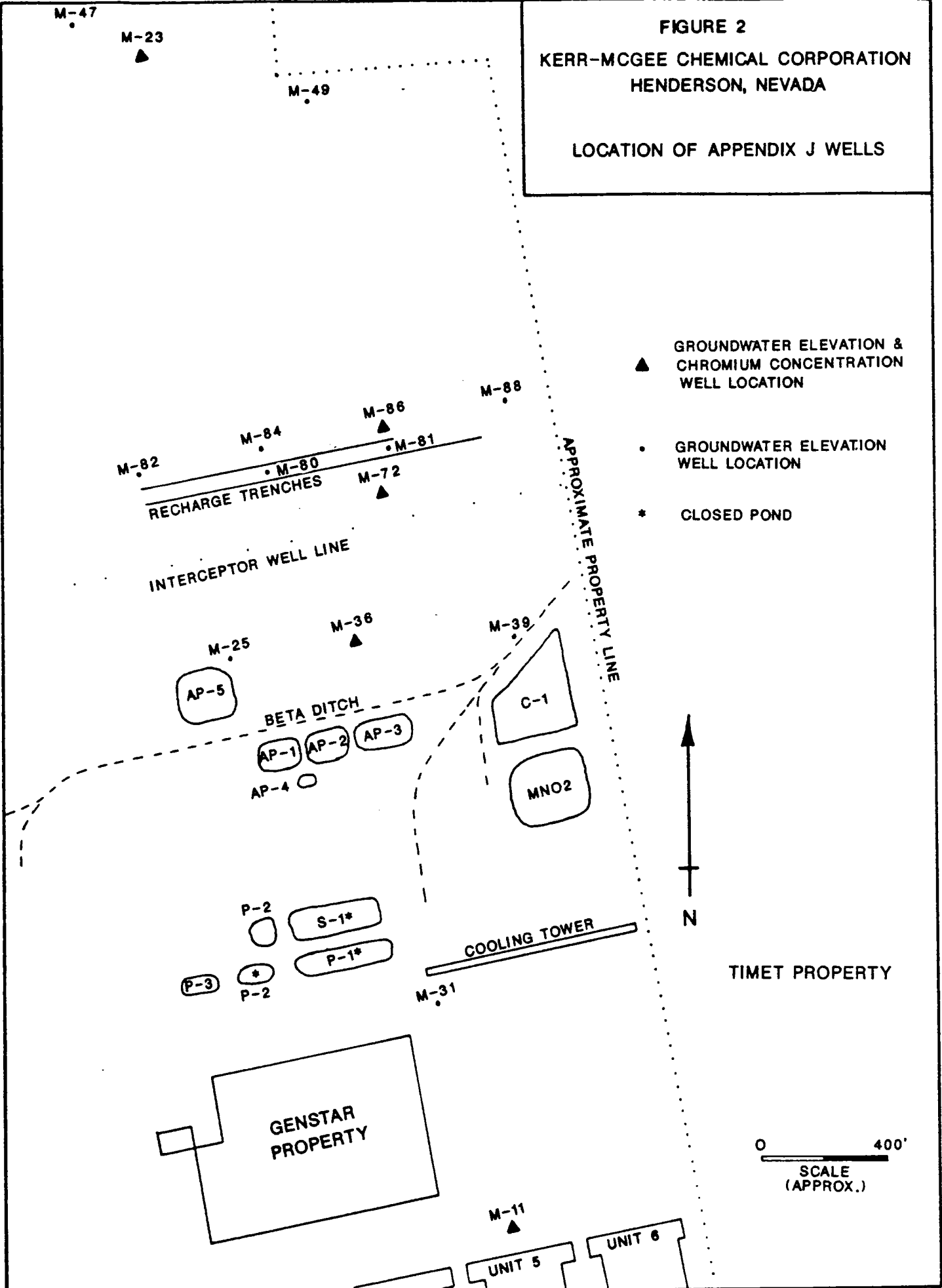


TABLE 1

TOTAL CHROMIUM CONCENTRATION (mg/l)  
IN APPENDIX J WELLS  
KERR-McGEE CHEMICAL CORPORATION  
HENDERSON, NEVADA

MONTH	WELL #				
	M-11	M-36	M-72	M-86	M-23
DEC 1987	46.00	0.47	1.20	0.83	5.40
JAN 1988	20.00	0.65	1.20	0.40	5.50
FEB 1988	17.00	0.75	1.10	0.35	5.40
MAR 1988	55.00	1.00	1.10	0.17	5.10
APR 1988	55.00	1.80	1.00	0.29	5.00
MAY 1988	44.00	2.20	1.00	0.21	5.40
JUN 1988	44.00	2.50	1.00	0.21	5.40
JUL 1988	43.00	2.80	0.89	0.18	5.00
AUG 1988	39.00	2.80	0.91	0.21	5.10
SEP 1988	46.00	2.60	0.82	0.30	5.00
OCT 1988	46.00	8.80	1.00	0.31	4.60
NOV 1988	40.00	12.40	1.20	0.20	4.80
DEC 1988	54.00	2.90	1.40	0.12	4.90
JAN 1989	6.70	2.90	1.40	0.31	4.60
FEB 1989	40.00	3.10	1.20	0.06	4.10
MAR 1989	42.00	3.80	1.40	0.19	3.80

M-11 2500 ft. upgradient of interceptor line.  
M-36 550 ft. upgradient of interceptor line.  
M-72 Between interceptor line and recharge trench.  
M-86 Immediately downgradient of recharge trench.  
M-23 1350 ft. downgradient of recharge trench.

that contains the basement of the building that formed the source of chromium. The rate of leaching from these relatively tight clays into the overlying alluvial deposits is expectedly low.

Well M-36, located approximately 350 feet upgradient from the interceptor line, shows an increase in chromium concentration in October and November 1988 (Figure E-2). This concentration "spike" appears to be due to a precipitation event, which resulted in leaching of previously deposited chromium from the unsaturated zone upgradient from M-36. Future precipitation events would be expected to continue to flush the upgradient unsaturated zone, so these concentration spikes would be expected to occur sporadically in relation to precipitation events. The gradual increase in concentration prior to October, 1988 may reflect a decrease in plume dilution, which would have resulted from infiltration of non-contact cooling water from the beta ditch.

Well M-72 (Figure E-3), which is located downgradient from the interceptor well line but upgradient from the recharge trench, had exhibited a steady decline in chromium concentration until October, 1988. The increase in concentration that began in October has apparently stabilized. KMCC believes this increase in and subsequent stabilization in concentration is due to some transient flowthrough of the plume due to incomplete plume interception.

The flow of groundwater into the interceptor well line is

approximately 95-105 gallons per minute, based on aquifer properties calculated from pump test data. The pumping system is discharging an average of 91.3 gallons per minute to the treatment plant, indicating an approximate 5-15 gpm shortfall in total interception capacity. However, as groundwater elevations decline to historic levels, the saturated thickness of the alluvial aquifer decreases, resulting in lower groundwater flow and more effective interception, as projected when the system was originally designed.

Well M-86 (Figure E-4), located just downgradient from the recharge trench, shows a decreasing trend in chromium concentration. This trend is expected to continue as treated water is recharged to the aquifer. The concentration recorded for February 1989 is the lowest yet recorded.

Well M-23 (Figure E-5), the farthest downgradient of the Appendix J wells, also shows a continued decreasing trend in chromium concentration. This trend, which indicates the effectiveness of the chromium mitigation program, is expected to continue. Historically low chromium concentrations are now being recorded in the groundwater extracted from this well.

Since chromium levels continue to decrease in well M-86 and are typically below 0.3 mg/l, KMCC believes the interception and treatment system is effectively reducing the chromium concentration of the groundwater and is meeting the Chromium

Mitigation Program objectives. Prior to the installation of the groundwater treatment system, the chromium concentration at well M-86 was near 5.0 mg/l. The fact that the chromium concentration at well M-23 continues to decrease provides definitive evidence that the groundwater is being restored.

KMCC instituted a program that provides for maximization of groundwater removal at those locations along the interception line that exhibit the highest chromium concentrations. Figure E-6 presents the chromium concentration in each of the interceptor well discharges. On the basis of the potentiometric surface configuration, individual well chromium concentrations, and well production capabilities, new pump rates for each recovery well were established. Table 2 lists the initial pumping rate of each interceptor well and the changes in pumping rate that have been made to maximize flow to the treatment plant and total chromium interception efficiency. The changes reflected in the first quarter 1989 potentiometric surface maps are due to changes in the pumping rates of individual wells.

Figure C-6 shows that most of the interceptor wells are drawn down nearly to the Muddy Creek Clay, so that flow through has been minimized. Continued monitoring of downgradient wells M-72 and M-86 is expected to continue to demonstrate the effectiveness of the interception system.

TABLE 2  
 KERR-McGEE CHEMICAL CORPORATION  
 HENDERSON, NEVADA  
 INTERCEPTOR WELL DISCHARGE RATES

WELL #	DISCHARGE RATE (GPM)			
	SEP. 14 1987	OCT. 1 1988	DEC. 19 1988	MARCH 1989
I-A	2.0	4.0	3.0	3.0
I-B	2.0	2.5	3.0	6.8
I-C*	2.5	5.0	8.8	7.3
I-D*	20.0	23.0	18.0	13.5
I-E*	5.0	2.2	2.4	2.5
I-F*	30.0	21.0	26.0	26.5
I-G	7.0	4.2	5.0	6.0
I-H	8.0	2.8	3.0	2.7
I-I	15.0	15.0	15.0	20.0
I-J	10.0	5.9	8.0	7.8
I-K	10.0	5.7	8.2	8.6
	-----	-----	-----	-----
	113.5	91.3	100.4	104.7

\*- Wells containing the highest chromium concentrations.

## IMPACT OF DISPOSAL SYSTEM ON DOWNGRADIENT WATER LEVELS

Appendix J of the Consent Order, the Disposal System Contingency Plan, identifies specific monitor wells that are to be utilized to evaluate the impact of the downgradient recharge of treated water into the groundwater. In addition, Kerr-McGee Chemical Corporation identified wells in Appendix J of the Consent Order that would be sampled and analyzed for chromium on a quarterly basis. Figure 2 illustrates the location of the Consent Order Appendix J wells.

Appendix B of this report shows that groundwater elevations are stabilizing in that portion of the facility that lies downgradient from the recharge system (evidences by wells M-47, M-23, and M-49), and are lower than when monitoring began in December, 1987. No surface wetting downgradient from the recharge trenches has been observed. KMCC is confident that there exists no undesirable impact to groundwater elevations downgradient from the recharge trench.



## CHROMIUM TREATMENT SYSTEM EFFECTIVENESS

The Consent Order specifies the following effluent concentration limits for the treatment plant discharge water: Total Chromium 1.7 mg/l and Hexavalent Chromium 0.05 mg/l as a monthly average; Total Chromium 3.4 mg/l and Hexavalent Chromium 0.1 mg/l as a maximum single value on a composite sample.

Table 3 lists treatment plant feed and discharge flow/concentration data for October 1, 1988 through December 30, 1988. Table 3 shows one exceedence of the discharge limits, occurring the week of March 4-10, 1989. The hexavalent chromium concentration of the treatment plant discharge for that week is 0.148 mg/l. Since the total chromium concentration for the same period is 0.187 mg/l, KMCC believes this disproportionately high ratio of hexavalent to total chromium may be due to an error in the laboratory analysis. However, this sample was taken immediately after changing the electrodes in one of the electrolytic cells in the treatment plant, so it is possible a "slug" of slightly higher chromium passed through the system at that time.

TABLE 3  
GROUNDWATER TREATMENT ANALYSIS  
CHROMIUM MITIGATION PROGRAM  
HENDERSON, NEVADA

WEEK OF	VOLUME TREATED (M gal.)	FEED CHROMIUM (mg/l)	TREATED TOTAL (mg/l)	EFFLUENT HEXAVALENT (mg/l)
Dec. 31 - Jan. 6	837	3.45	0.025	0.0025
Jan. 7 - Jan. 13	1008	3.625	0.026	0.0020
Jan. 14 - Jan. 20	988	3.24	0.050	0.0036
Jan. 21 - Jan. 27	873	5.00	0.028	0.0026
Jan. 28 - Feb. 3	991	5.90	0.036	0.007
January, 1989 Average		4.24	0.033	0.0035
Feb. 4 - Feb. 10	885	3.4	0.018	0.002
Feb. 11 - Feb. 17	912	3.15	0.088	0.0198
Feb. 18 - Feb. 24	929	3.60	0.038	0.0015
Feb. 25 - Mar. 3	978	3.20	0.040	0.008
February, 1989 Average		3.34	0.046	0.0078
Mar. 4 - Mar. 10	920	3.15	0.187	0.148
Mar. 11 - Mar. 17	989	3.05	0.0475	0.011
Mar. 18 - Mar. 24	899	3.10	0.052	0.003
Mar. 25 - Mar. 31	874	3.03	0.074	0.002
March, 1989 Average		3.08	0.090	0.041

#### ADDITIONAL WORK PERFORMED

During the first quarter of 1989, adjustments were made to several of the interceptor well discharge rates, based on the cross-sections and the changes in chromium concentrations. The discharge of interceptor well I-I, was increased from 15.0 gallons per minute to approximately 20.0 gallons per minute. Because of excessive drawdown at well I-D, the discharge was decreased from 18.0 gpm to 13.5 gpm. Other well discharges have varied slightly, and the impact of these changes on the interception effort will be monitored.

## CONCLUSIONS

Kerr-McGee Chemical Corporation continues to observe declining regional water levels in the interceptor system area. Monthly water elevations will be recorded, and groundwater control development will be monitored. KMCC is confident that effective groundwater interception and treatment are being attained. The effect of changing the pumping rates of the interceptor wells will continue to be monitored, and appropriate response measures (i.e. pump rate adjustments) will be taken to achieve optimal drawdown and plume interception.

Treatment facility discharge chromium concentrations are consistently below established requirements. No adverse impacts to downgradient groundwater elevations have been observed as a result of returning treated groundwater to the near-surface aquifer via the recharge trenches. No other design modifications to the treatment plant facility are contemplated at this time.

**APPENDIX A**  
**MONITOR WELL INVENTORY**  
**(NOT INCLUDED IN THIS REPORT)**

**APPENDIX B**  
**GROUNDWATER ELEVATIONS**

APPENDIX B  
 KERR-MCGEE CHEMICAL CORPORATION  
 HENDERSON, NEVADA FACILITY  
 GROUNDWATER ELEVATIONS

TOC-->	N-55 1749.35 DTW	N-56 1749.60 DTW	N-57 1752.29 DTW	N-58 1749.25 DTW	N-59 1743.01 DTW	N-60 1750.13 DTW	N-61 1745.55 DTW	N-62 1752.92 DTW	N-63 1750.59 DTW	N-64 1749.76 DTW
20-Jan-88	23.27	22.48	26.44	20.58	14.22	22.06	16.60	25.51	22.54	22.91
05-Feb-88	23.74	22.87	26.67	20.80	14.48	22.38	17.12	25.74	22.78	23.15
01-Mar-88	24.15	23.35	27.10	21.09	14.86	22.80	17.34	26.18	23.43	23.87
19-Apr-88	24.75	24.04	27.58	21.67	15.54	23.54	17.81	26.77	24.08	24.52
18-May-88	25.05	24.57	27.88	22.12	15.83	23.82	18.16	27.05	24.40	24.74
07-Jun-88	25.27	24.68	27.97	22.35	16.08	24.01	18.35	27.25	24.55	25.00
14-Jul-88	25.78	25.14	28.32	22.90	16.57	24.48	18.78	27.63	24.88	25.50
06-Aug-88	25.91	25.33	28.61	23.24	16.78	24.69	19.05	27.99	25.20	25.66
03-Sep-88	26.20	25.30	28.62	23.15	16.57	20.80	16.50	28.10	25.30	25.80
10-Oct-88	26.40	25.65	28.75	23.30	16.60	25.00	19.20	28.10	25.15	25.90
26-Nov-88	26.80	25.80	28.85	23.30	16.90	25.00	19.60	28.20	25.20	26.20
15-Dec-88	28.75	31.00	29.10	26.90	17.30	26.40	19.25	28.60	31.50	29.45
19-Jan-89	24.20	26.50	29.10	24.10	17.70	25.00	19.70	28.75	25.85	26.65
23-Feb-89	27.80	26.95	29.40	24.75	18.40	26.15	22.50	28.80	26.15	27.35

TOC-->	N-65 1752.88 DTW	N-66 1752.33 DTW	N-67 1744.98 DTW	N-68 1747.44 DTW	N-69 1748.77 DTW	N-70 1746.96 DTW	N-71 1745.88 DTW	N-72 1745.49 DTW	N-73 1740.05 DTW	N-74 1743.42 DTW
20-Jan-88	24.97	22.69	14.59	16.12	23.61	21.61	19.37	17.22	12.02	15.40
05-Feb-88	25.24	22.97	14.90	16.53	23.84	21.97	19.77	17.46	12.27	15.63
01-Mar-88	25.89	23.54	15.33	16.96	24.31	22.53	20.11	17.77	12.50	16.00
19-Apr-88	26.58	23.92	15.81	17.50	24.82	23.10	20.75	18.31	13.12	16.56
18-May-88	27.00	24.33	16.18	17.84	25.07	23.34	21.30	18.73	13.55	16.80
07-Jun-88	27.24	24.52	16.44	18.08	25.34	23.55	21.55	18.97	13.82	17.05
14-Jul-88	27.85	25.05	16.93	18.46	24.54	23.95	22.04	19.49	14.30	17.47
06-Aug-88	27.97	25.20	17.20	18.76	26.02	24.26	22.25	19.40	14.51	17.71
03-Sep-88	28.25	25.35	17.00	17.95	25.90	24.40	22.15	19.70	14.30	17.00
10-Oct-88	28.65	25.40	17.10	16.80	26.00	24.80	22.80	20.25	14.85	18.00
26-Nov-88	28.90	25.70	17.80	19.00	26.25	25.35	23.20	20.10	15.00	18.30
15-Dec-88	26.75	25.95	17.60	18.75	29.55	26.65	24.10	21.55	14.60	17.90
19-Jan-89	30.00	26.10	18.00	19.00	26.00	25.55	24.10	20.00	14.70	18.00
23-Feb-89	30.40	26.70	18.45	19.40	26.50	25.90	24.75	21.40	16.30	18.90

APPENDIX B  
 KRRR-MCGEE CHEMICAL CORPORATION  
 HENDERSON, NEVADA FACILITY  
 GROUNDWATER ELEVATIONS

TOC----	M-11 DTW	ELEV.	M-14 DTW	ELEV.	M-15 DTW	ELEV.	M-17 DTW	ELEV.	M-18 DTW	ELEV.	M-19 DTW	ELEV.	M-22 DTW	ELEV.	M-22R DTW	ELEV.	M-23 DTW	ELEV.	M-25 DTW	ELEV.
20-Jan-88	44.78	1768.68	28.56	1730.27	23.29	1726.40	30.64	1738.90	11.73	1726.55	27.60	1738.35	23.78	1734.35			14.58	1698.20	26.63	1731.52
05-Feb-88	44.78	1768.68	28.70	1730.13	23.59	1726.10	31.12	1738.42	11.87	1726.41	27.88	1738.67	24.20	1733.93			14.52	1698.26	27.07	1731.08
01-Mar-88	44.76	1768.70	29.36	1729.47	24.03	1725.66	31.72	1737.82	12.13	1726.15	28.36	1738.19	24.65	1733.48			14.67	1698.11	27.66	1730.49
19-Apr-88	45.17	1768.29	30.14	1728.69	24.62	1725.07	32.42	1737.12	12.73	1725.55	28.92	1737.63	25.25	1732.88			14.94	1697.84	28.33	1729.82
18-May-88	45.13	1768.33	30.48	1728.35	25.05	1724.64	32.90	1736.64	13.08	1725.20	29.34	1737.21	25.61	1732.52			15.05	1697.73	28.75	1729.40
07-Jun-88	45.39	1768.07	30.67	1728.16	25.24	1724.45	33.03	1736.51	13.30	1724.98	29.64	1736.91	26.19	1731.94			15.29	1697.49	29.00	1729.15
14-Jul-88	46.16	1767.30	31.06	1727.77	25.83	1723.86	33.96	1735.58	13.73	1724.55	29.98	1736.57					15.73	1697.05	29.60	1728.55
06-Aug-88	46.20	1767.26	31.36	1727.47	25.94	1723.75	34.18	1735.36	13.91	1724.37	29.24	1737.31					15.45	1697.33	29.65	1728.50
03-Sep-88	46.12	1767.34	31.32	1727.51	25.95	1723.74	34.30	1735.24	13.40	1724.88	29.75	1736.80			26.50	1732.18	15.55	1697.28	30.10	1728.05
10-Oct-88	45.40	1768.06	31.50	1727.33	26.00	1723.69	34.40	1735.14	14.30	1723.98	29.70	1736.85			36.20	1722.48	15.55	1697.23	30.70	1727.45
26-Nov-88	41.65	1771.81	31.65	1727.18	27.10	1722.59	34.30	1735.24	14.40	1723.88	29.90	1736.85			26.90	1731.78	16.85	1695.93	30.70	1727.45
15-Dec-88	46.10	1767.36	37.70	1721.13	30.18	1719.51	33.75	1735.79	14.00	1724.28	30.40	1736.15			26.90	1731.78	15.10	1697.68	30.95	1727.20
19-Jan-89	46.15	1767.31	31.80	1727.03	25.05	1724.64	34.75	1734.79	14.80	1723.48	30.60	1735.95			27.13	1731.55	16.45	1696.33		
23-Feb-89	45.27	1768.19	32.15	1726.88	28.35	1721.34	35.00	1734.54	15.35	1722.93	30.80	1735.75							32.10	1726.05

TOC----	M-27 DTW	ELEV.	M-31 DTW	ELEV.	M-35 DTW	ELEV.	M-37 DTW	ELEV.	M-38 DTW	ELEV.	M-39 DTW	ELEV.	M-47 DTW	ELEV.	M-49 DTW	ELEV.	M-53 DTW	ELEV.	M-54 DTW	ELEV.
20-Jan-88	15.36	1729.11	39.34	1749.05	25.62	1732.32	26.98	1732.30	26.04	1731.84	23.80	1735.51	13.08	1703.43	12.53	1706.25	25.60	1725.96	22.14	1726.79
05-Feb-88	15.70	1728.77	39.53	1748.86	25.95	1731.99	27.28	1732.00	26.37	1731.51	24.32	1734.99	13.04	1703.47	12.49	1706.29	25.73	1725.83	22.31	1726.62
01-Mar-88	15.88	1728.59	39.68	1748.71	26.50	1731.44	27.87	1731.41	26.99	1730.89	24.81	1734.50	13.00	1703.51	12.47	1706.31	26.21	1725.35	22.88	1726.05
19-Apr-88	16.45	1728.02	40.08	1748.31	27.14	1730.80	28.62	1730.66	27.60	1730.28	25.42	1733.89	13.10	1703.41	12.60	1706.18	26.75	1724.81	23.50	1725.43
18-May-88	16.95	1727.52	40.36	1748.03	27.50	1730.44	28.90	1730.38	28.00	1729.88	25.83	1733.48	13.29	1703.22	12.94	1705.84	27.09	1724.47	23.60	1725.33
07-Jun-88	17.21	1727.26	40.50	1747.89	27.73	1730.21	29.16	1730.12	28.27	1729.61	26.07	1733.24	13.47	1703.04	13.09	1705.69	27.25	1724.31	23.83	1725.10
14-Jul-88	17.52	1726.95	40.70	1747.69	28.60	1729.34	29.60	1729.68	28.75	1729.13	26.50	1732.81	13.72	1702.79	13.35	1705.43	27.60	1723.96	24.50	1724.43
06-Aug-88	17.67	1726.80	40.53	1747.86	28.45	1729.49	29.86	1729.42	28.94	1728.94	26.77	1732.54	14.07	1702.44	13.81	1704.97	27.94	1723.62	24.52	1724.41
03-Sep-88	16.66	1727.81	40.52	1747.87	29.50	1728.44	29.80	1729.48	29.20	1728.68	26.71	1732.60	13.72	1702.79	13.35	1705.43	28.12	1723.44	24.48	1724.45
10-Oct-88	18.30	1726.17	40.15	1748.24	28.80	1729.14	30.10	1729.18	29.50	1728.38	26.80	1732.51	13.65	1702.86	13.60	1705.18	28.30	1723.26	24.90	1724.03
26-Nov-88	18.60	1725.87	40.30	1748.09	29.00	1728.94	29.90	1729.38	29.30	1728.58	26.90	1732.41	13.80	1702.71	13.10	1705.68	28.10	1723.46	25.10	1723.83
15-Dec-88	19.30	1725.17	39.83	1748.56	29.40	1728.54	31.90	1727.38	29.70	1728.18	26.75	1732.56	13.75	1702.76	13.75	1705.03	28.60	1722.96	28.60	1720.33
19-Jan-89	18.75	1725.72	40.15	1748.24	26.60	1731.34	30.40	1728.88	29.90	1727.98	26.85	1732.46	14.10	1702.41	14.10	1704.68	28.85	1722.71	24.45	1724.48
23-Feb-89	19.75	1724.72	40.47	1747.92	29.80	1728.14	30.65	1728.63	32.70	1725.18	27.65	1731.66	14.45	1702.06	14.23	1704.55	28.90	1722.66	25.90	1723.03



APPENDIX B  
 KERR-MCCKE CHEMICAL CORPORATION  
 HENDERSON, NEVADA FACILITY  
 GROUNDWATER ELEVATIONS

TOC-->	M-78		M-79		M-80		M-81		M-82		M-83	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
20-Jan-88	24.94	1726.07	17.54	1725.39	20.80	1724.93	15.13	1728.60	15.74	1723.64	16.52	1724.31
05-Feb-88	25.24	1725.77	17.88	1725.05	21.23	1724.50	15.18	1728.55	15.98	1723.40	16.64	1724.19
01-Mar-88	25.68	1725.33	18.37	1724.56	19.72	1726.01	15.46	1728.27	16.37	1723.01	17.05	1723.78
19-Apr-88	24.75	1726.26	18.87	1724.06	20.41	1725.32	16.08	1727.65	16.85	1722.53	17.54	1723.29
18-May-88	26.23	1724.78	19.47	1723.46	21.05	1724.68	16.80	1726.93	17.28	1722.10	18.00	1722.83
07-Jun-88	26.23	1724.78	19.70	1723.23	21.20	1724.53	17.11	1726.62	17.47	1721.91	18.24	1722.59
14-Jul-88	26.80	1724.21	20.00	1722.93	21.50	1724.23	17.55	1726.18	17.67	1721.71	18.45	1722.38
06-Aug-88	26.97	1724.04	20.42	1722.51	21.53	1724.20	17.79	1725.94	18.07	1721.31	19.00	1721.83
03-Sep-88	27.10	1723.91	20.10	1722.83	21.02	1724.71	17.40	1726.33	17.50	1721.88	17.87	1722.96
10-Oct-88	27.62	1723.39	20.50	1722.43	22.50	1723.23	18.15	1725.58	18.30	1721.08	19.20	1721.63
26-Nov-88	23.20	1727.81	20.75	1722.18	28.10	1717.63	17.75	1725.98	18.50	1720.88	19.30	1721.53
15-Dec-88	28.65	1722.36	22.45	1720.48	23.60	1722.13	18.25	1725.48	23.40	1715.98	24.10	1716.73
19-Jan-89	29.05	1721.96	20.15	1722.78	23.50	1722.23	18.80	1724.93	17.90	1721.48	19.85	1720.98
23-Feb-89	29.40	1721.61	20.20	1722.73	23.83	1721.90	19.90	1723.83	18.70	1720.68	20.25	1720.58

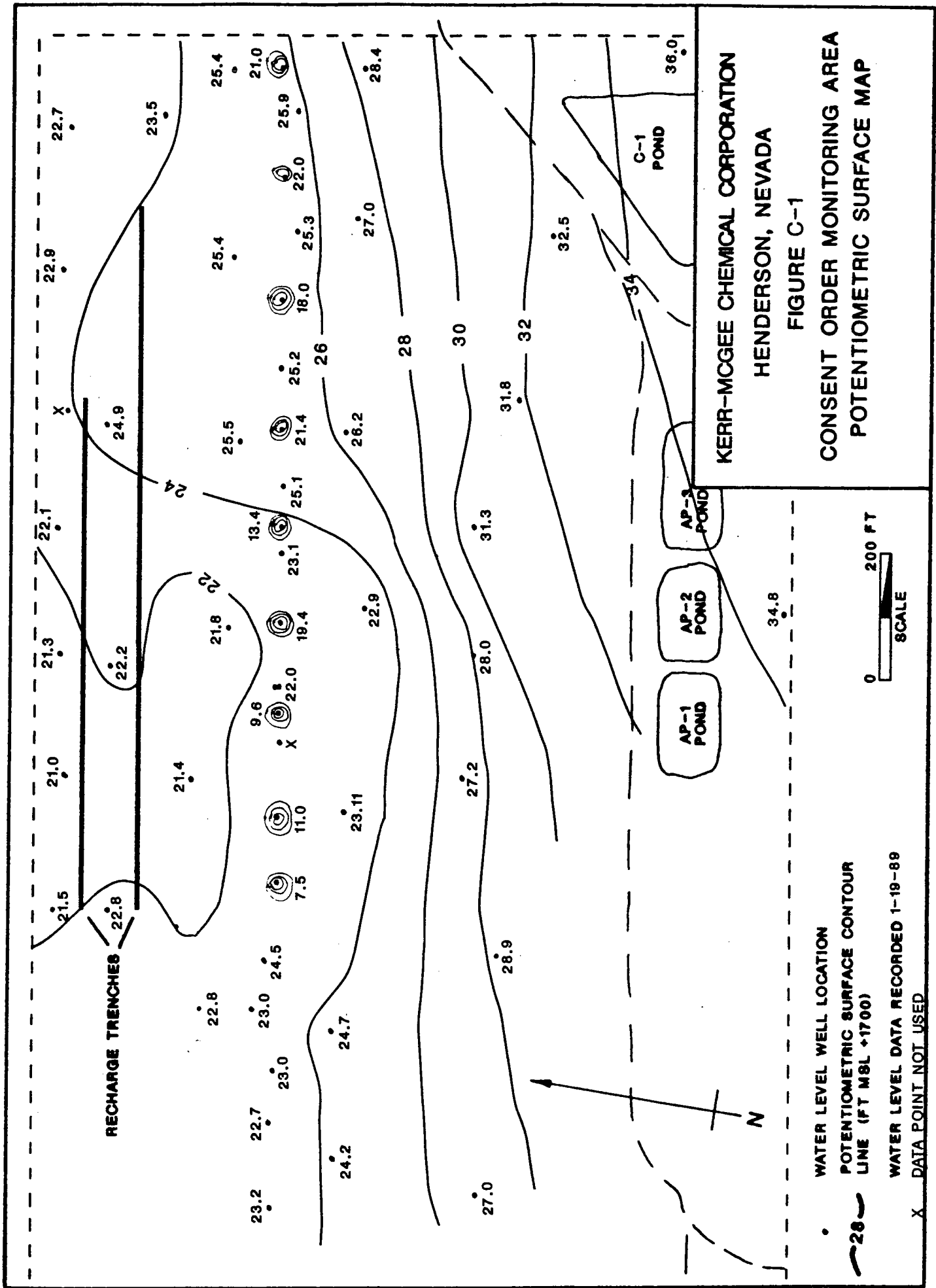
TOC-->	M-84		M-85		M-86		M-87		M-88	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
20-Jan-88	14.42	1725.21	15.14	1726.05	15.71	1727.02	16.10	1726.17	13.02	1724.97
05-Feb-88	14.82	1724.81	15.36	1725.83	15.96	1726.77	16.15	1726.12	13.19	1724.80
01-Mar-88	15.00	1724.63	15.63	1725.56	16.00	1726.73	16.32	1725.95	13.41	1724.58
19-Apr-88	15.56	1724.07	16.23	1724.96	16.62	1726.11	16.87	1725.40	13.93	1724.06
18-May-88	16.00	1723.63	16.80	1724.39	16.23	1726.50	17.31	1724.96	14.41	1723.58
07-Jun-88	16.32	1723.31	17.11	1724.08	17.50	1725.23	17.63	1724.64	14.57	1723.42
14-Jul-88	16.62	1723.01	17.42	1723.77	17.93	1724.80	18.15	1724.12	14.97	1723.02
06-Aug-88	17.03	1722.60	17.80	1723.39	18.21	1724.52	18.20	1724.07	15.08	1722.91
03-Sep-88	15.80	1723.83	16.90	1724.29	17.74	1724.99	17.80	1724.47	14.56	1723.43
10-Oct-88	17.30	1722.33	18.30	1722.89	18.90	1723.83	18.60	1723.67	15.60	1722.39
26-Nov-88	17.95	1721.68	18.35	1722.84	18.10	1724.63	18.25	1724.02	15.75	1722.24
15-Dec-88	23.80	1715.83	19.05	1722.14	18.55	1724.18	18.85	1723.42	15.60	1722.39
19-Jan-89	18.30	1721.33	19.10	1722.09	16.30	1726.43	19.35	1722.92	15.30	1722.69
23-Feb-89	18.77	1720.86	19.60	1721.59	20.15	1722.58	24.35	1717.92	16.70	1721.29

APPENDIX B  
 KERR-MCGEE CHEMICAL CORPORATION  
 HENDERSON, NEVADA FACILITY  
 GROUNDWATER ELEVATIONS

TOC-->	I-A		I-B		I-C		I-D		I-E		I-F	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
20-Jan-88	26.63	1724.43	26.66	1724.03	26.06	1724.38	28.29	1722.25	45.76	1704.46	23.81	1723.77
05-Feb-88	25.42	1725.64	25.40	1725.29	26.46	1723.98	28.72	1721.82	46.20	1704.02	23.99	1723.59
01-Mar-88	27.70	1723.36	27.38	1723.31	26.99	1723.45	29.16	1721.38	45.68	1704.54	24.55	1723.03
19-Apr-88	28.42	1722.64	27.89	1722.80	27.75	1722.69	29.79	1720.75	29.69	1720.53	25.21	1722.37
18-May-88	28.83	1722.23	28.07	1722.62	26.03	1724.41	30.06	1720.48	32.22	1718.00	25.74	1721.84
07-Jun-88	29.12	1721.94	28.30	1722.39	26.25	1724.19	30.43	1720.11	32.76	1717.46	25.87	1721.71
14-Jul-88	29.69	1721.37	27.02	1723.67	26.37	1724.07	33.12	1717.42	34.60	1715.62	26.50	1721.08
06-Aug-88	29.80	1721.26	28.94	1721.75	26.49	1723.95	32.06	1718.48	33.10	1717.12	26.60	1720.98
03-Sep-88	31.10	1719.96	28.90	1721.79	26.60	1723.84	35.10	1715.44	32.70	1717.52	26.75	1720.83
10-Oct-88	26.75	1724.31	27.60	1723.09	26.80	1723.64	27.35	1723.19	29.00	1721.22	26.80	1720.78
26-Nov-88	25.60	1725.46	29.40	1721.29	36.20	1714.24	32.20	1718.34	38.10	1712.12	27.80	1719.78
15-Dec-88	30.00	1721.06	29.65	1721.04	37.75	1712.69	45.40	1705.14	41.50	1708.72	33.65	1713.93
19-Jan-89	28.10	1722.96	27.70	1722.99	42.90	1707.54	39.55	1710.99	40.65	1709.57	28.20	1719.38
23-Feb-89	28.20	1722.86	28.00	1722.69	44.10	1706.34	44.55	1705.99	45.70	1704.52	31.00	1716.58

TOC-->	I-G		I-H		I-I		I-J		I-K	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
20-Jan-88	25.62	1724.80	30.07	1721.00	18.65	1724.71	22.62	1725.33	21.48	1722.49
05-Feb-88	26.06	1724.36	33.08	1717.99	18.87	1724.49	22.90	1725.05	22.75	1721.22
01-Mar-88	26.59	1723.83	33.20	1717.87	19.30	1724.06	23.39	1724.56	24.02	1719.95
19-Apr-88	27.83	1722.59	28.54	1722.53	20.02	1723.34	23.50	1724.45	22.17	1721.80
18-May-88	29.13	1721.29	30.12	1720.95	20.30	1723.06	23.62	1724.33	22.79	1721.18
07-Jun-88	37.40	1713.02	30.85	1720.22	19.80	1723.56	23.87	1724.08	25.20	1718.77
14-Jul-88	37.50	1712.92	32.97	1718.10	21.40	1721.96			25.00	1718.97
06-Aug-88	38.01	1712.41	31.45	1719.62	21.48	1721.88	24.65	1723.30	27.40	1716.57
03-Sep-88	40.50	1709.92	38.80	1712.27	21.12	1722.24	23.54	1724.41	23.75	1720.22
10-Oct-88	30.30	1720.12	27.90	1723.17	20.25	1723.11	24.00	1723.95	24.25	1719.72
26-Nov-88	27.50	1722.92	26.70	1724.37	21.60	1721.76	25.60	1722.35	28.00	1715.97
15-Dec-88	40.65	1709.77	34.90	1716.17	21.60	1721.76	26.70	1721.25	22.35	1721.62
19-Jan-89	37.00	1713.42	29.65	1721.42	25.40	1717.96	26.00	1721.95	22.95	1721.02
23-Feb-89	28.00	1722.42	31.00	1720.07	28.00	1715.36	26.57	1721.38	25.35	1718.62

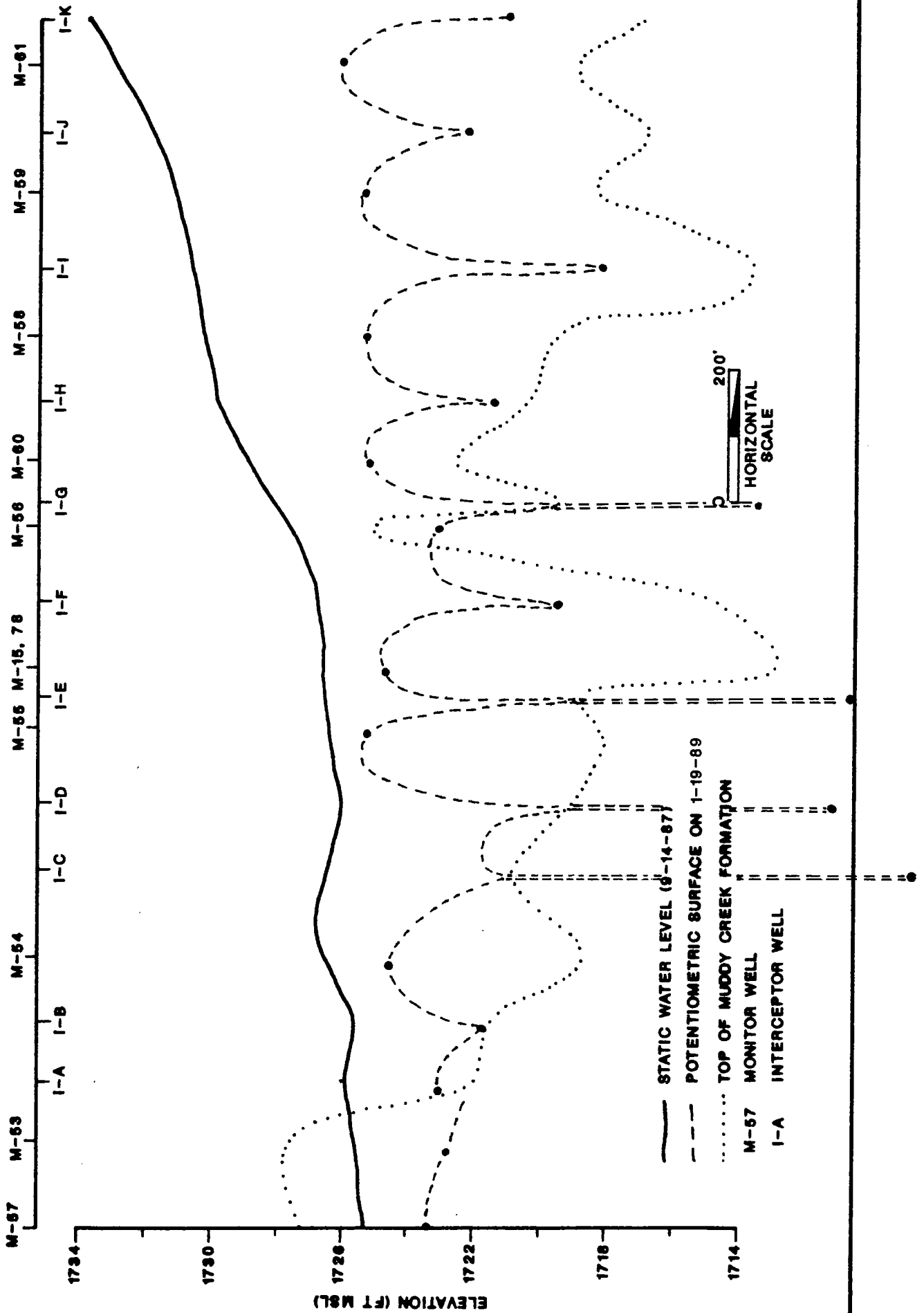
**APPENDIX C**  
**POTENTIOMETRIC SURFACE MAPS**  
**INTERCEPTOR AREA CROSS-SECTIONS**

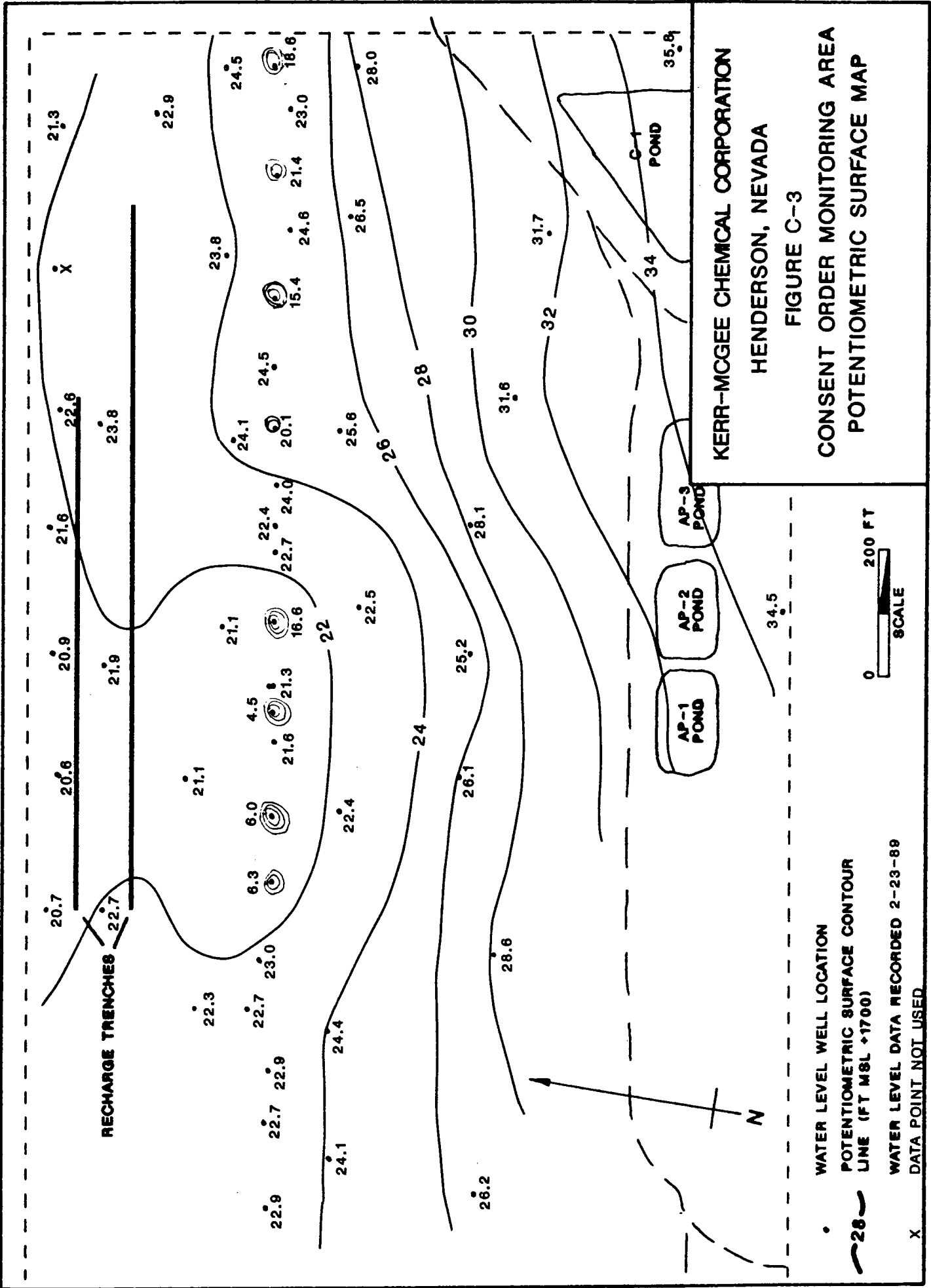


KERR-MCGEE CHEMICAL CORPORATION  
 HENDERSON, NEVADA  
 FIGURE C-1

CONSENT ORDER MONITORING AREA  
 POTENTIOMETRIC SURFACE MAP

**KERR-MCGEE CHEMICAL CORPORATION  
HENDERSON, NEVADA  
GROUNDWATER INTERCEPTOR LINE CROSS-SECTION  
FIGURE C-2**





RECHARGE TRENCHES

KERR-MCGEE CHEMICAL CORPORATION

HENDERSON, NEVADA

FIGURE C-3

CONSENT ORDER MONITORING AREA  
POTENTIOMETRIC SURFACE MAP

• WATER LEVEL WELL LOCATION

— POTENTIOMETRIC SURFACE CONTOUR  
LINE (FT MSL +1700)

X WATER LEVEL DATA RECORDED 2-23-89

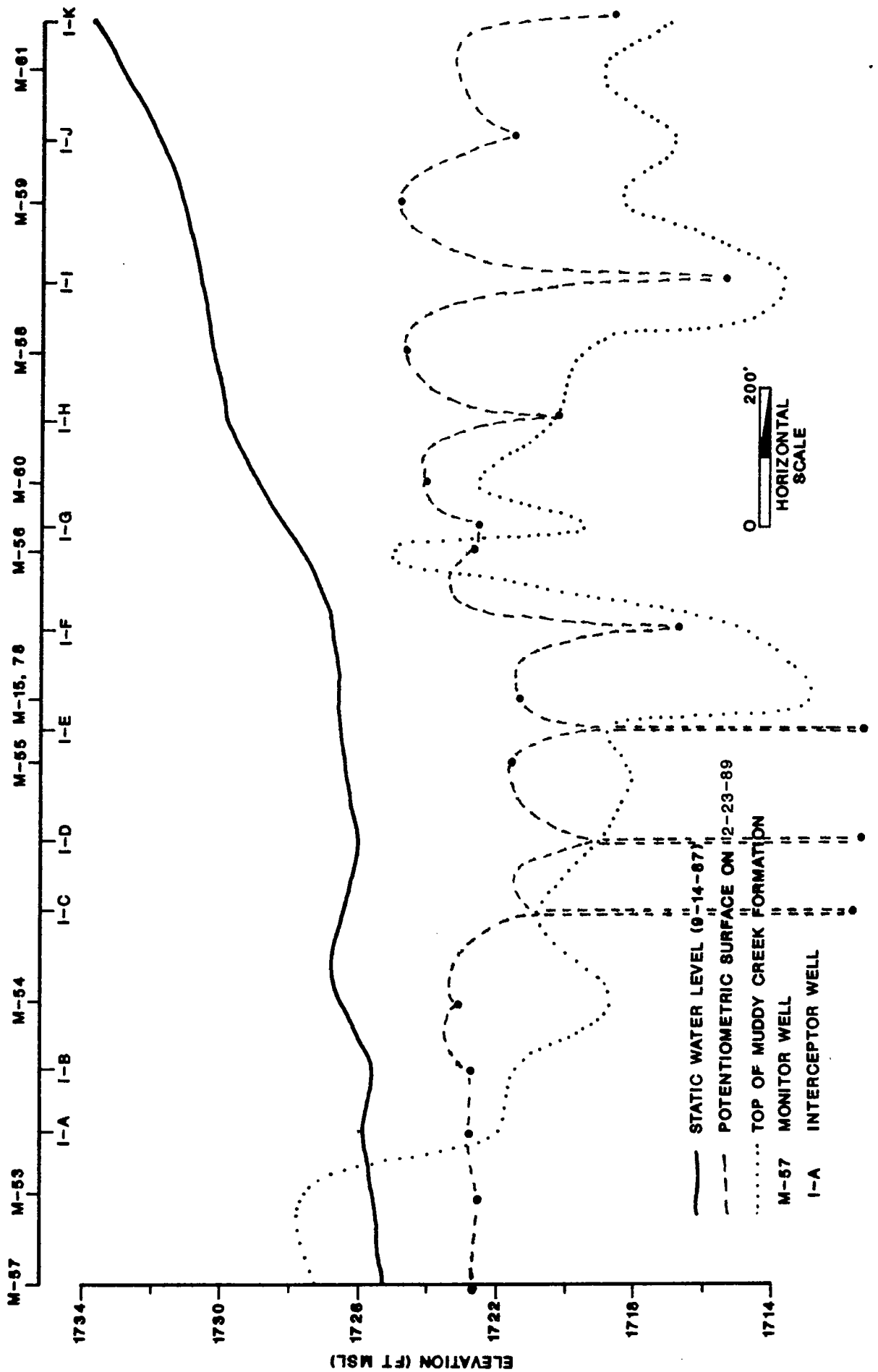
DATA POINT NOT USED

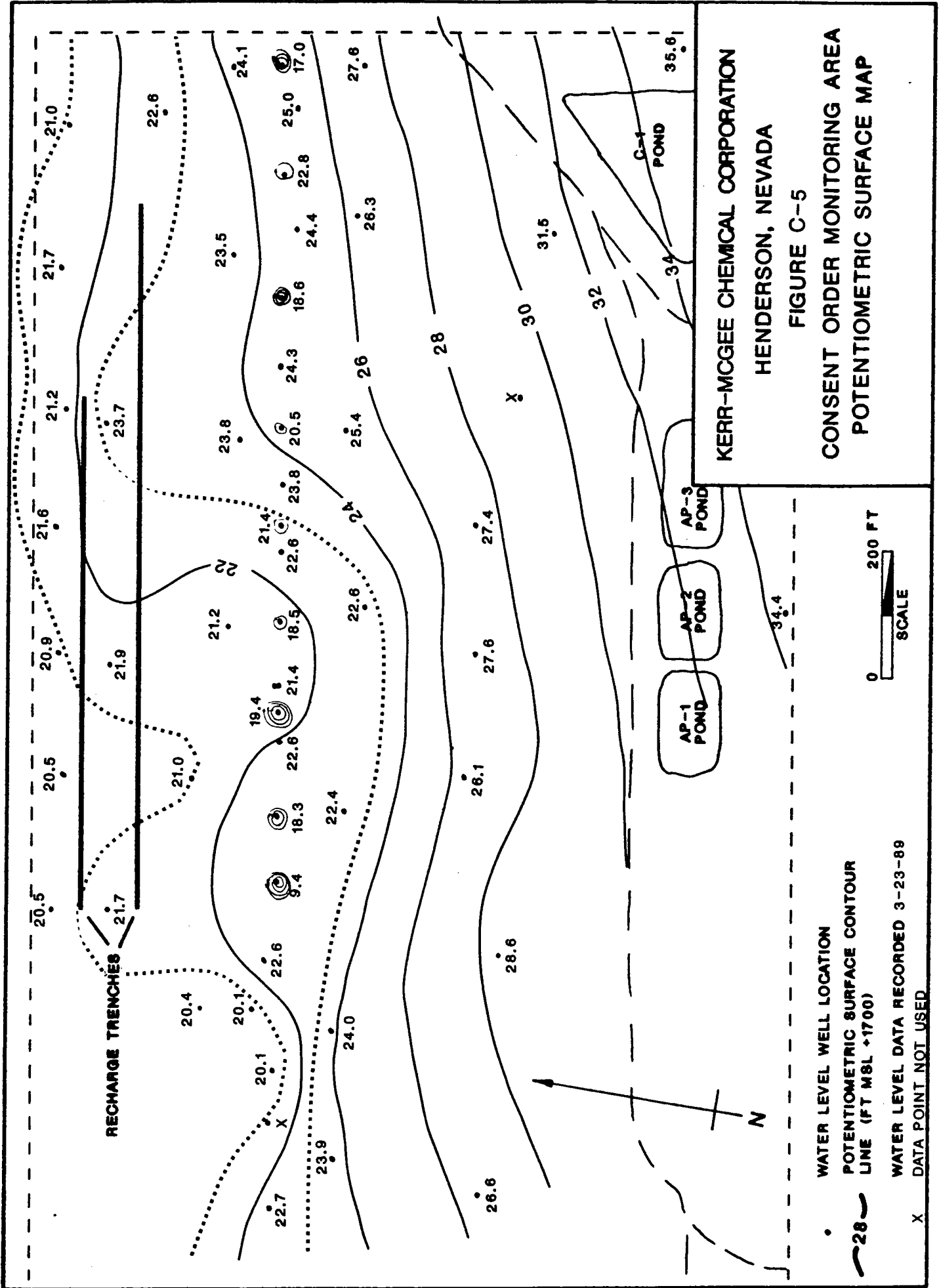


N

28

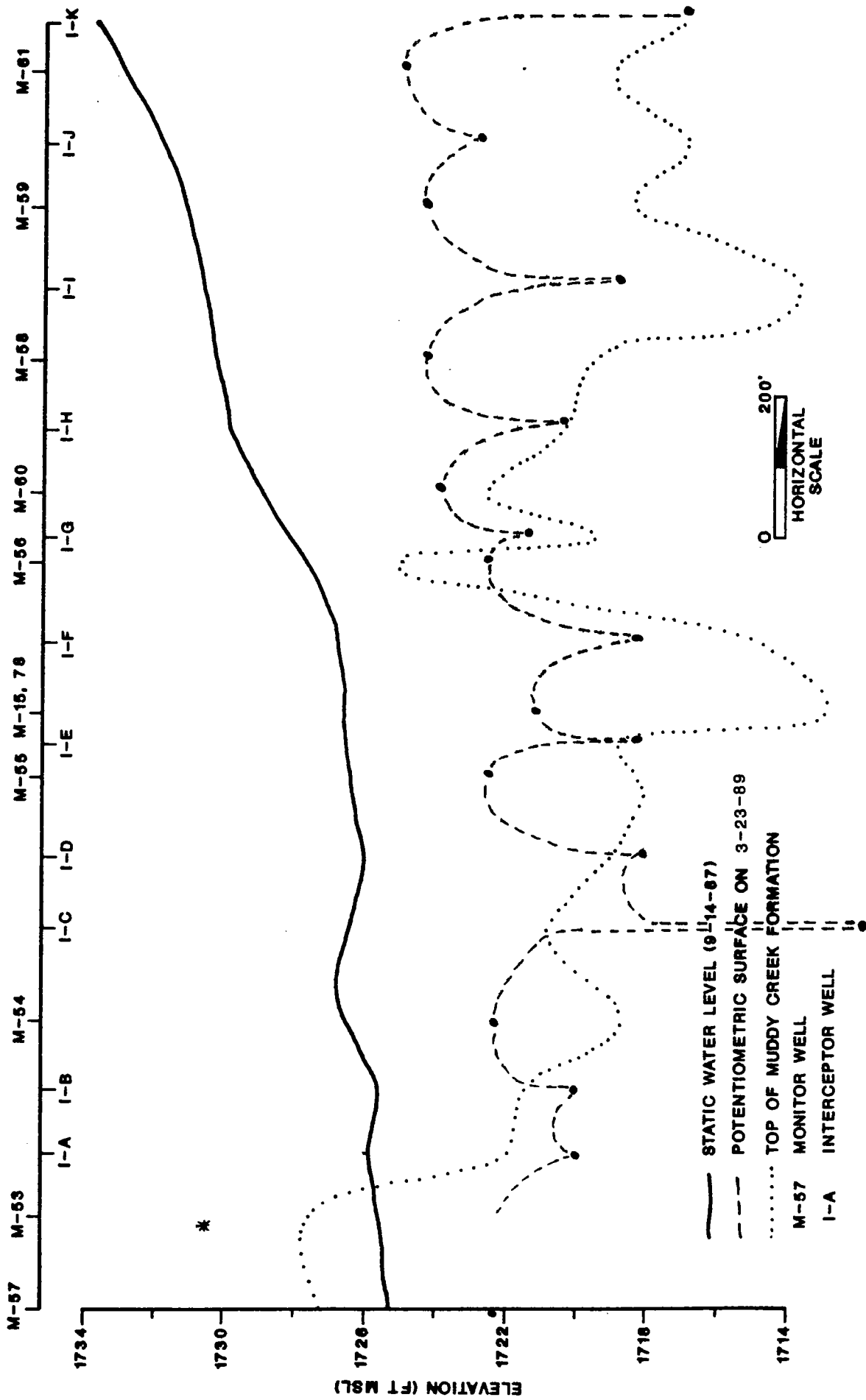
**KERR-MCGEE CHEMICAL CORPORATION  
HENDERSON, NEVADA  
GROUNDWATER INTERCEPTOR LINE CROSS-SECTION  
FIGURE C-4**







**KERR-MCGEE CHEMICAL CORPORATION  
HENDERSON, NEVADA  
GROUNDWATER INTERCEPTOR LINE CROSS-SECTION  
FIGURE C-6**



**APPENDIX D**  
**CONTINUOUS WATER LEVEL RECORDER CHARTS**

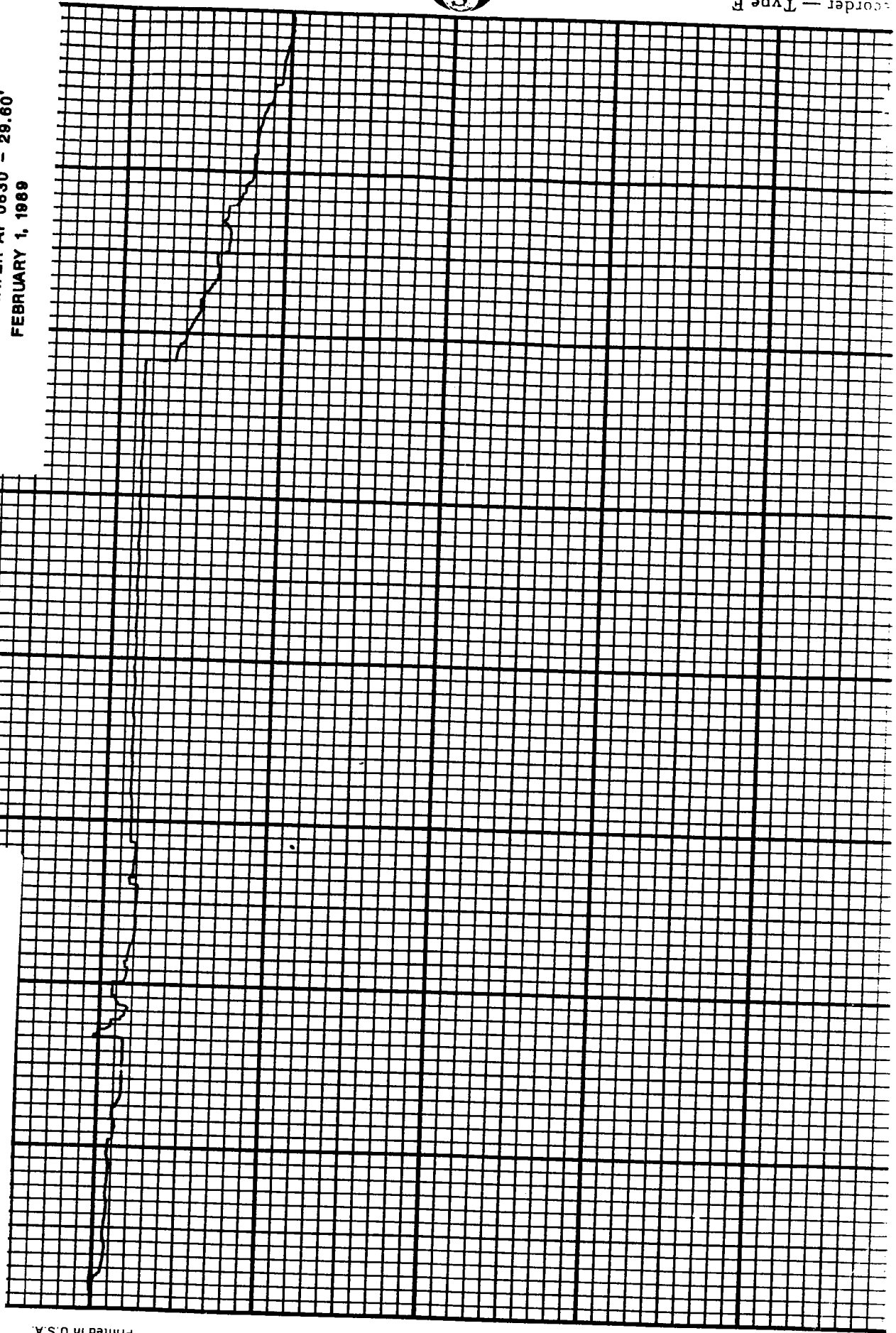
CONTINUOUS WATER LEVEL RECORDER CHART

WELL M-78

12-30-88 TO 2-1-89

DEPTH TO WATER AT 0930 - 28.73'  
DECEMBER 30, 1988

DEPTH TO WATER AT 0830 - 29.60'  
FEBRUARY 1, 1989



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Chart F-1

Recorder - Type R

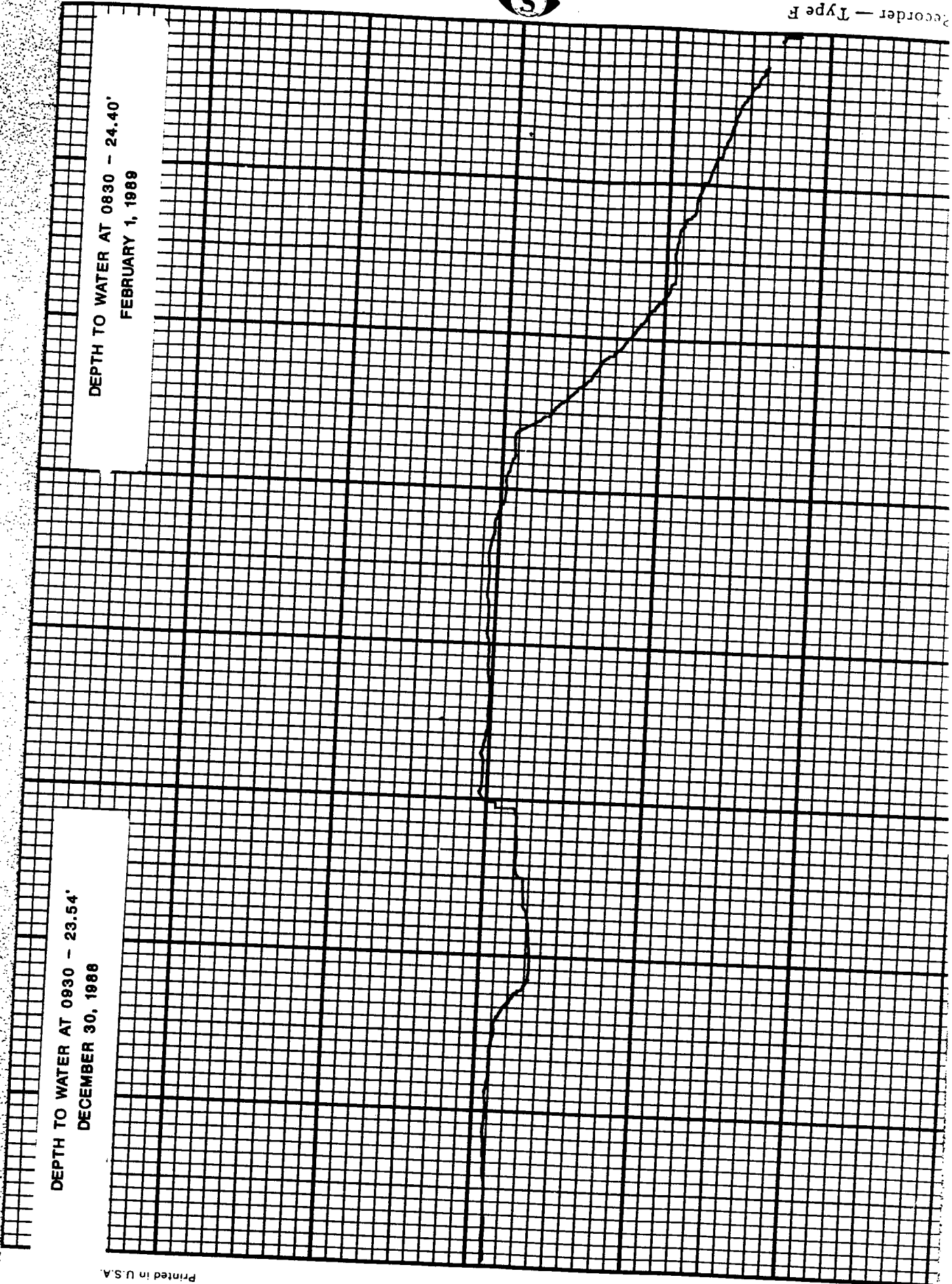
CONTINUOUS WATER LEVEL RECORDER CHART

WELL M-80

12-30-88 TO 2-1-89

DEPTH TO WATER AT 0930 - 23.54'  
DECEMBER 30, 1988

DEPTH TO WATER AT 0830 - 24.40'  
FEBRUARY 1, 1989

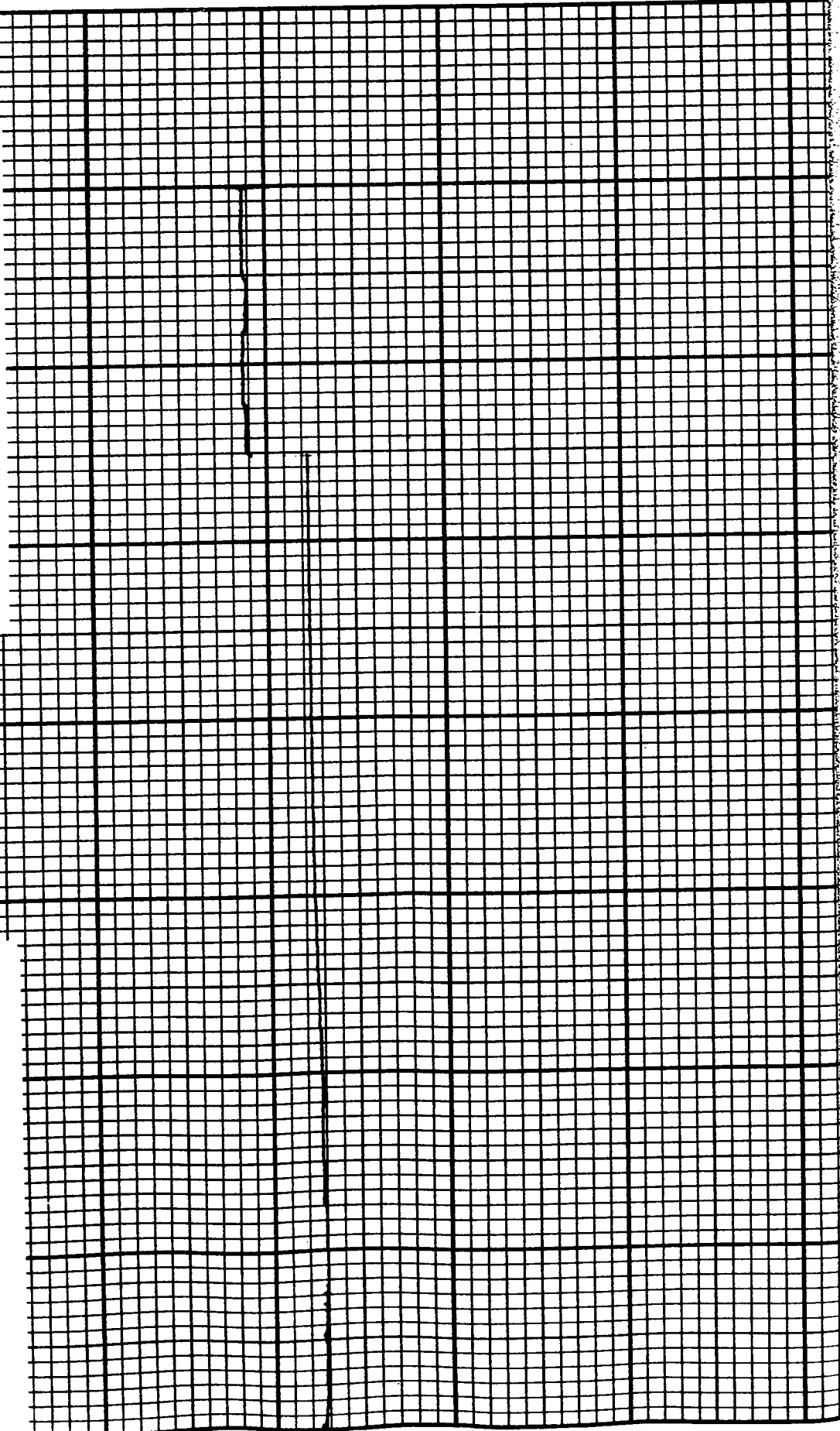


Printed in U.S.A.

Apold & Stevens, Inc., Beaverton, Ore.

DEPTH TO WATER AT 0630 - 29.60'  
FEBRUARY 1, 1989

DEPTH TO WATER AT 0000 - 3.40  
MARCH 1, 1989



Type F

CONTINUOUS WATER LEVEL RECORDER CHART

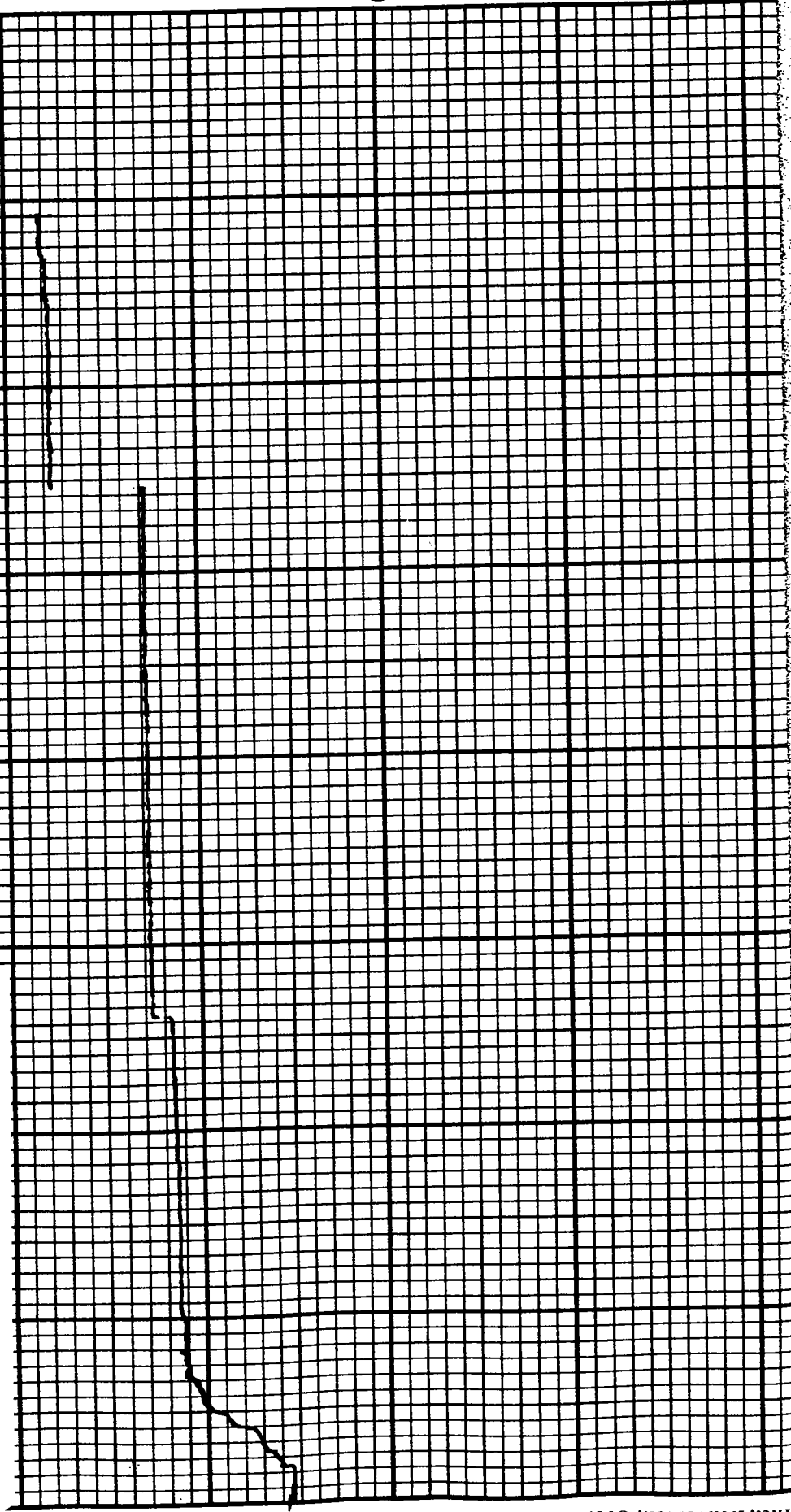
WELL M-78

2-1-89 TO 3-1-89



DEPTH TO WATER AT 1000 - 23.78'  
MARCH 1, 1989

DEPTH TO WATER AT 0830 - 24.40'  
FEBRUARY 1, 1989



CONTINUOUS WATER LEVEL RECORDER CHART

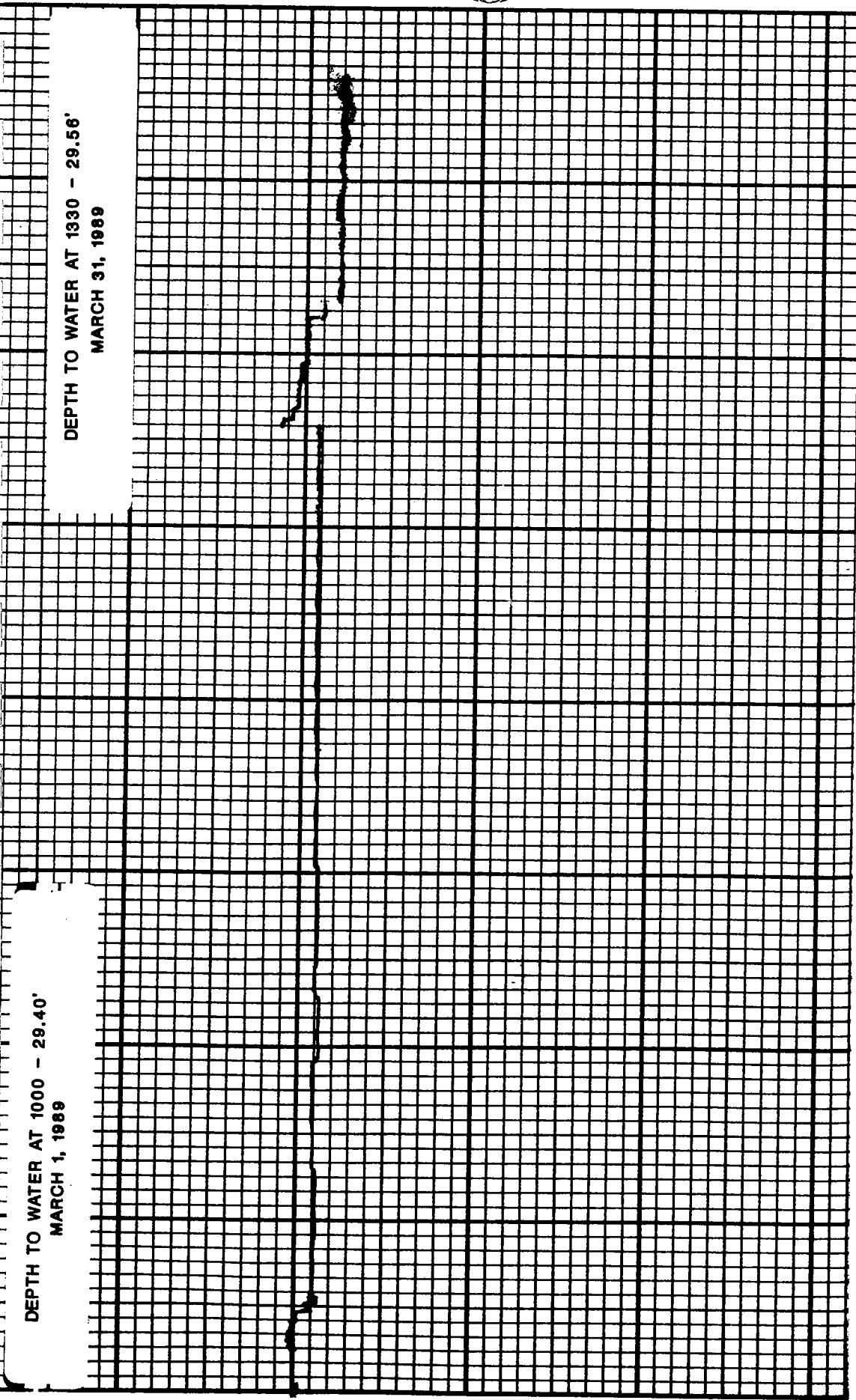
WELL M-80

2-1-89 TO 3-1-89



DEPTH TO WATER AT 1000 - 29.40'  
MARCH 1, 1989

DEPTH TO WATER AT 1330 - 29.56'  
MARCH 31, 1989



CONTINUOUS WATER LEVEL RECORDER CHART

WELL M-78

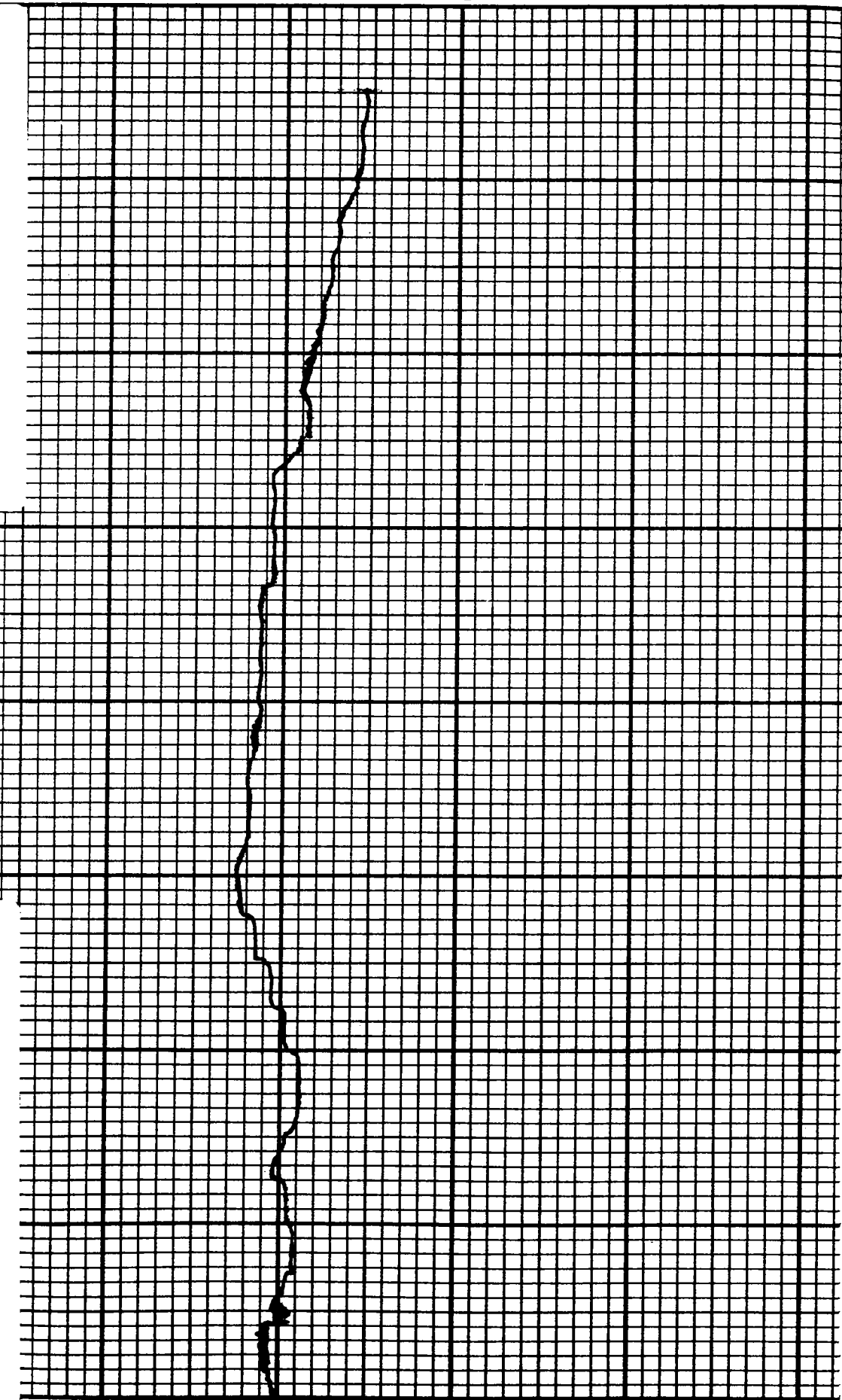
3-1-89 TO 3-31-89

DEPTH TO WATER AT 1000 - 23.78'

MARCH 1, 1969

MARCH 31, 1969

DEPTH TO WATER AT 1330 - 24.00'



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S. Inc., Beaverton, Ore.



- Type F

Chart F 1

CONTINUOUS WATER LEVEL RECORDER CHART

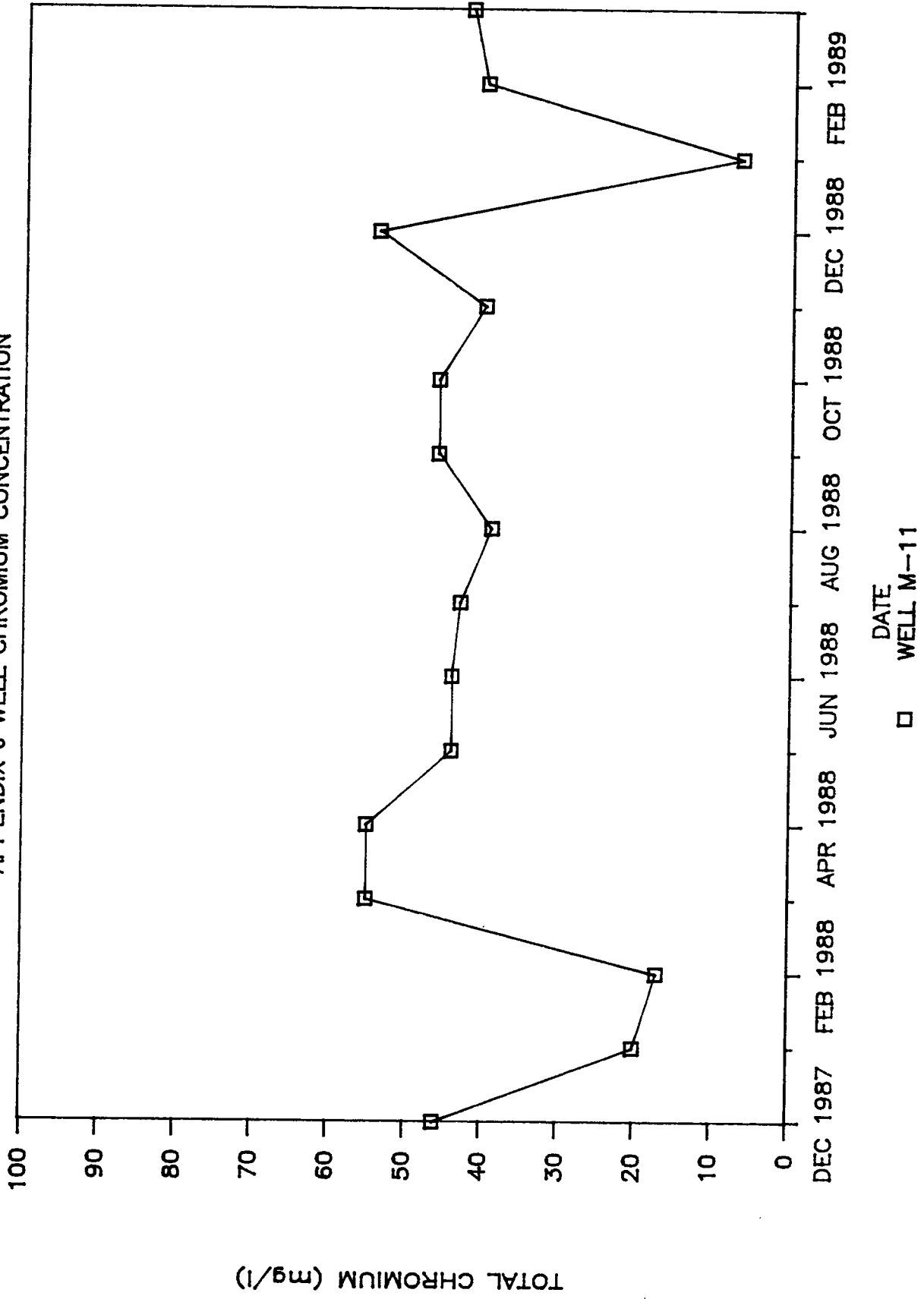
WELL M-80

3-1-69 TO 3-31-69



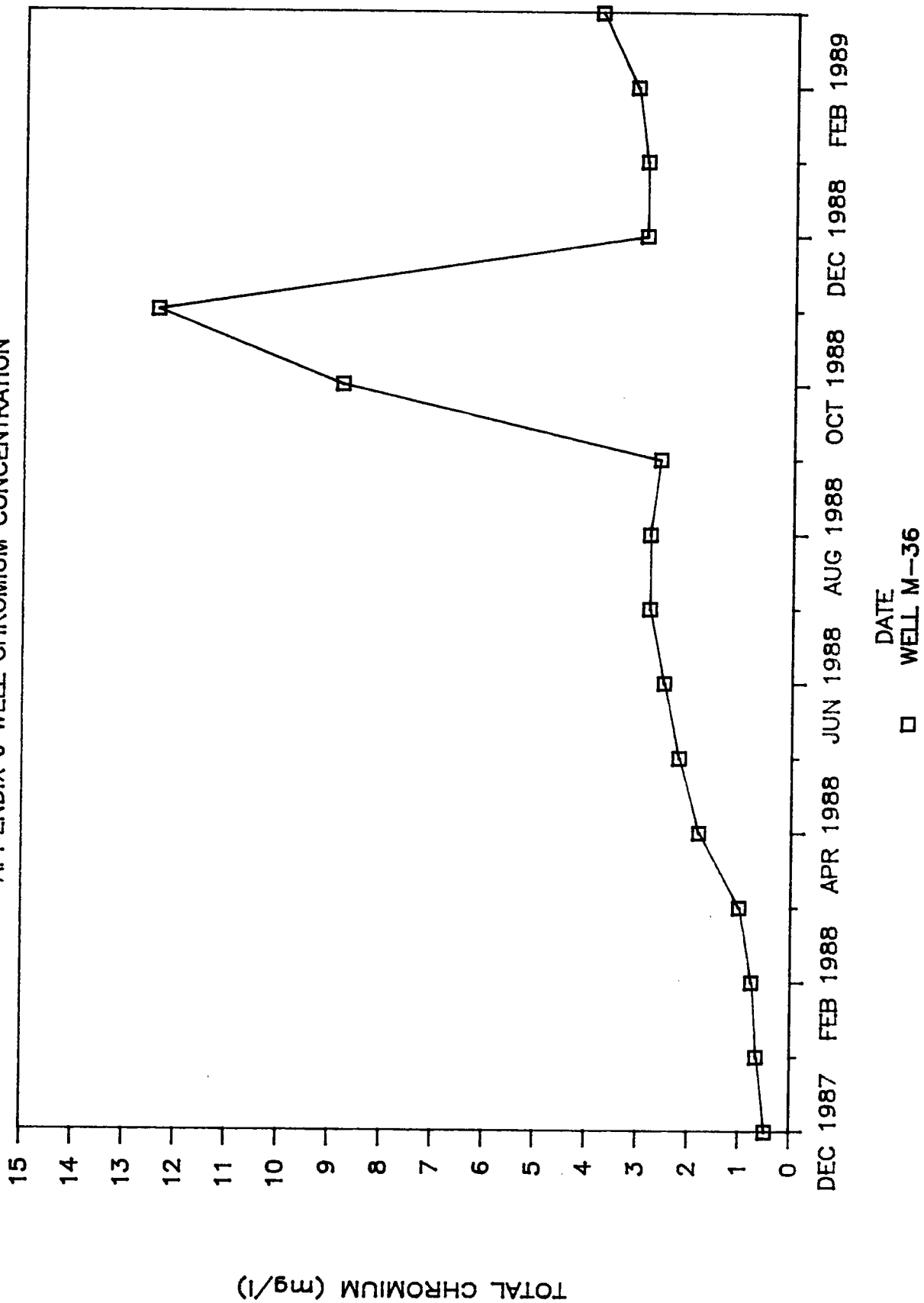
APPENDIX E  
CHROMIUM CONCENTRATIONS IN  
APPENDIX J AND INTERCEPTOR WELLS

FIGURE E-1  
APPENDIX J WELL CHROMIUM CONCENTRATION



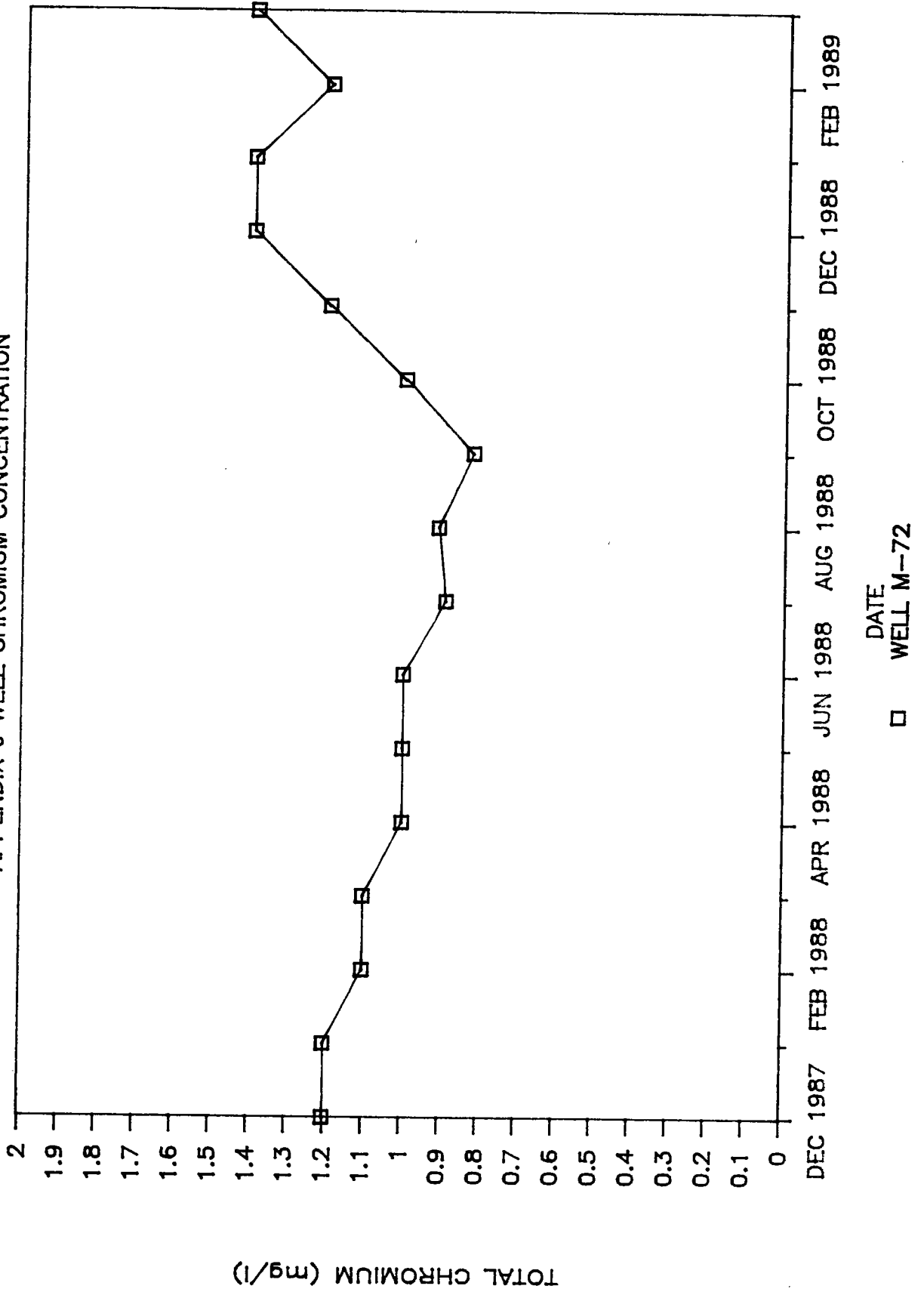
# FIGURE E-2

APPENDIX J WELL CHROMIUM CONCENTRATION



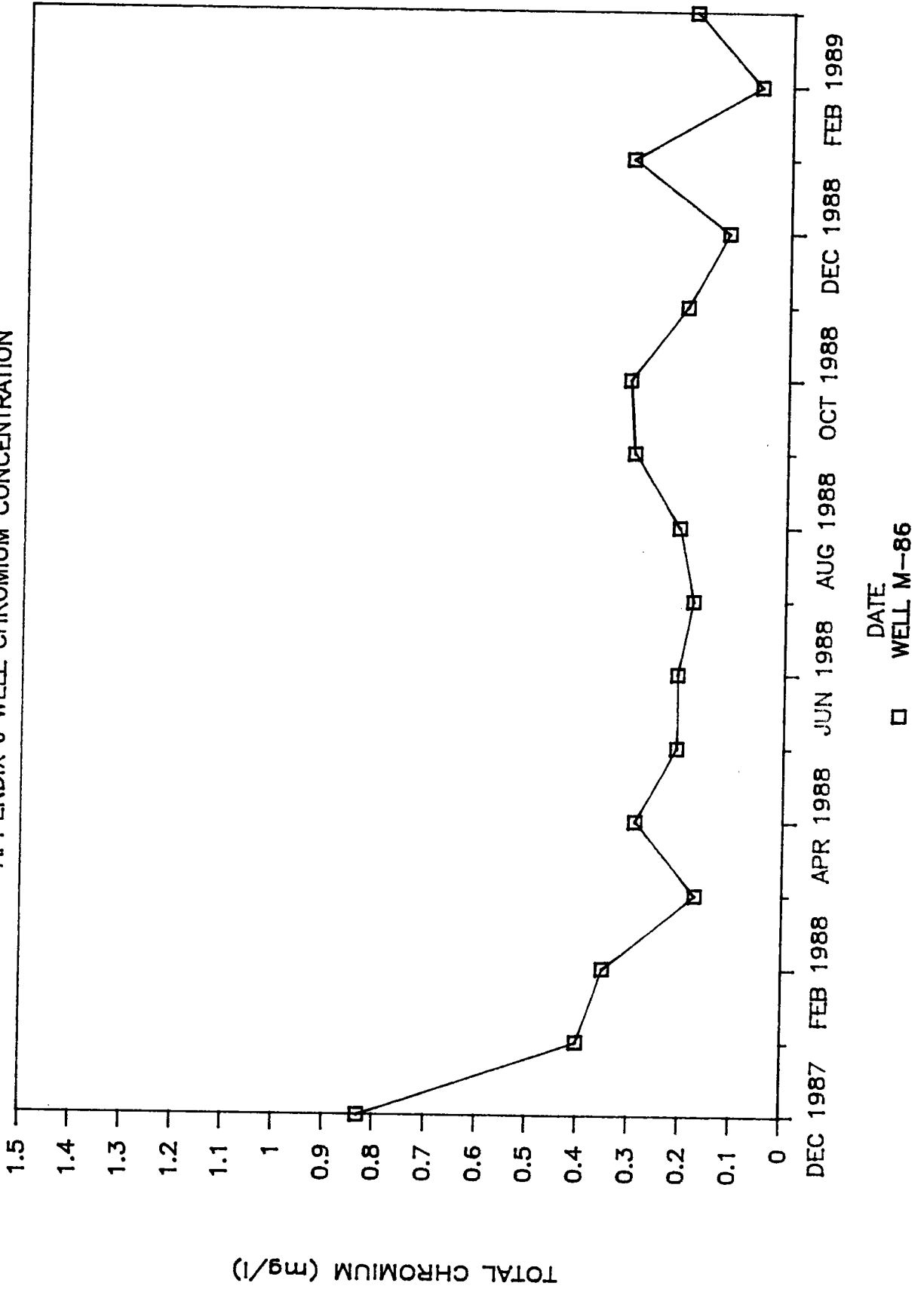
# FIGURE E-3

APPENDIX J WELL CHROMIUM CONCENTRATION



# FIGURE E-4

APPENDIX J WELL CHROMIUM CONCENTRATION



# FIGURE E-5

## APPENDIX J WELL CHROMIUM CONCENTRATION

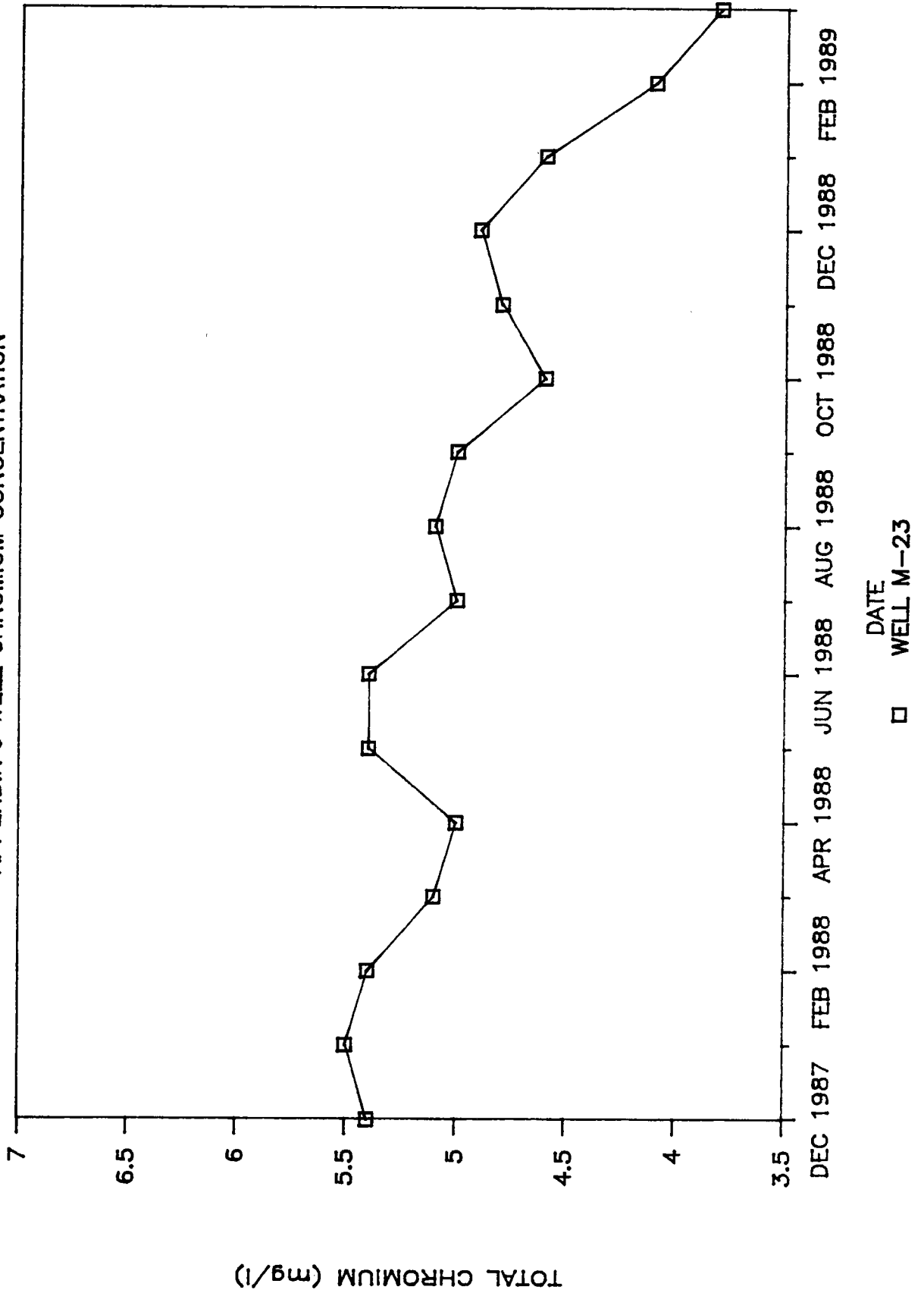


FIGURE E-6

