KERR-McGEE CORPORATION

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY

CHROMIUM MITIGATION PROGRAM
PERFORMANCE REPORT

NOVEMBER 18, 1987

Engineering Services

KERR-MCGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY

CHROMIUM MITIGATION PROGRAM
PERFORMANCE REPORT

Prepared by:

Jeff Lux
Hydrologist
Engineering Services Division
Kerr-McGee Corporation

Approved by:

S. M. Logan, CPGS 7325
Manager, Hydrology Department
Engineering Services Division
Kerr-McGee Corporation

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INTRODUCTION

Kerr-McGee Chemical Corporation (KMCC) operates a chemical plant in the Henderson Industrial Complex near Henderson, Nevada. The location of the plant is shown in Figure 1. This facility occupies a portion of the former Basic Magnesium Incorporated plant, which was operated by the U. S. Government during World War II. The Henderson facility manufactures the following industrial chemicals: sodium chlorate, ammonium perchlorate, manganese dioxide, boron trichloride, boron tribromide, elemental boron, and sodium perchlorate.

In December of 1983, the Nevada Division of Environmental Protection (NDEP) directed KMCC to investigate and remove chromium contaminants from the groundwater underlying the Henderson, Nevada plant facilities. During June and July of 1985, KMCC installed four lines of groundwater monitor wells downgradient from the probable source of contamination. Plate 1 shows the major features of the Henderson plant, and locates the monitor wells installed for chromium plume delination. Appendix A is a monitor well inventory that lists significant criteria for all of the monitor wells on the facility. The four lines of groundwater monitor wells installed for evaluation of the chromium plume are as follows:

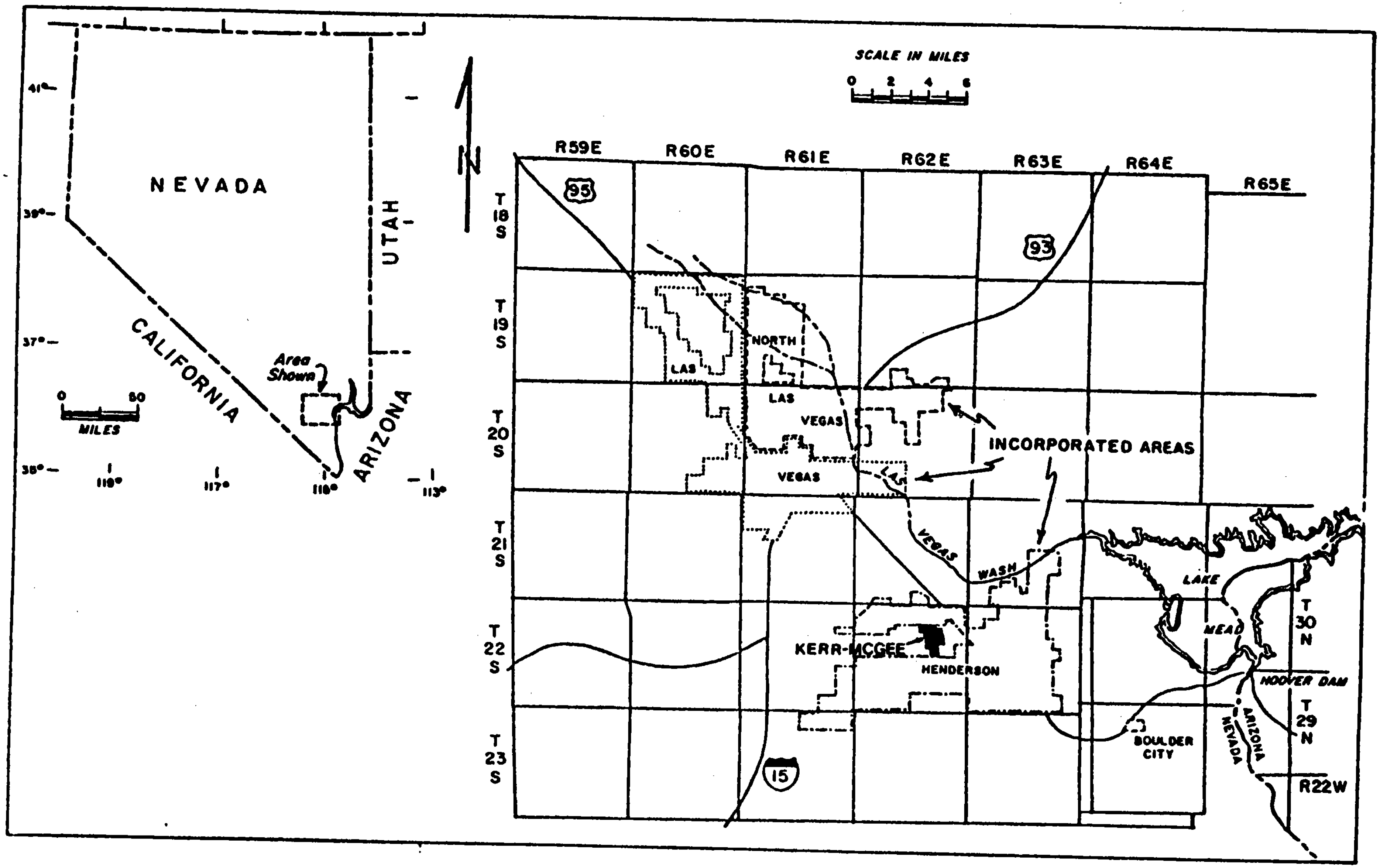

FIGURE 1. INDEX MAP OF THE REPORT AREA.

1. M-45, M-44, M-43, M-42, M-41, and M-51, near the northeastern border of the facility.

2. M-47, M-23, M-46, M-49, and M-48, along the drainage ditch that bisects the northern half of the property. Well M-23 was already installed.

3. M-14, M-37, M-25, M-38, M-36, M-22, M-39, and M-19, just north of the AP ponds and the C-1 lagoon. Wells M-14, M-25, M-22, and M-19 were already installed.

4. M-24, M-50, M-31, M-32, and M-33, to the north of the processing units.

The collection and interpretation of data from these wells enabled KMCC to delineate and evaluate the extent and degree of chromium contamination in the groundwater beneath the facility. Plate 2 shows the configuration of the plume, including concentration isopleths, upon which the interception and recovery plans were based. The location of the groundwater interceptor wells was chosen to be near the downgradient point of the 5 ppm isopleth.

On September 9, 1986, a Consent Order was entered into by the Nevada Division of Environmental Protection and Kerr-McGee Chemical Corporation. Provisions of this Consent Order included a hydrogeologic investigation to determine the location and design of a groundwater intercept system.

Figure 2 illustrates the Consent Order monitoring area, and shows the approximate

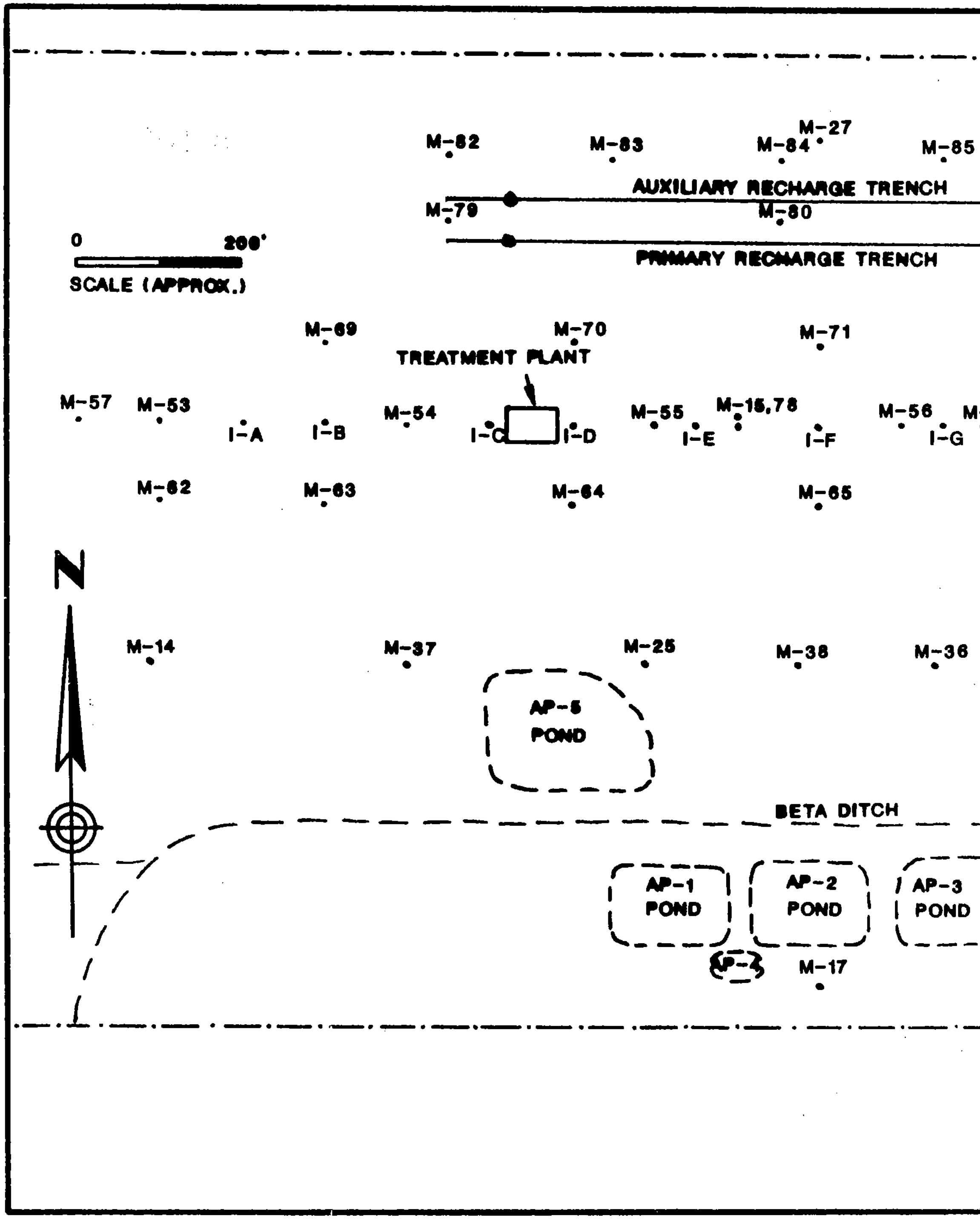

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FIGURE 2
CONSENT ORDER MONITORING AREA

I-A GROUNDWATER INTERCEPTOR WELL
M-15 GROUNDWATER MONITOR WELL

locations of the groundwater intercept and monitor wells that have been installed.

In September, 1986, four groundwater recovery wells (HR-1 through HR-4) were installed, along with seven groundwater monitor wells (M-53 through M-59). Groundwater recovery wells (pumping wells) are hereafter referred to as interceptor wells. Pump tests were conducted in the four interceptor wells, using the monitor wells as observation points, during October, 1986.

The results of the interceptor well pump tests determined that to effectively control groundwater flow along the selected interceptor line, an additional seven interceptor wells would be required. Wells HR-5 through HR-11 were installed during December 1986, along with an additional fifteen groundwater monitor wells, numbered M-60 through M-74.

Pump tests were conducted on all eleven interceptor wells during March, 1987, using the monitor wells as observation points. These pump test results were utilized to determine the discharge required from each interceptor well to effectively intercept groundwater flow through this plane.

A treated groundwater recharge trench was constructed downgradient from the interceptor system line during May, 1987. Then groundwater monitor wells (M-79 through M-88) were installed during August, 1987 for the purpose of monitoring water levels near the recharge trenches.

The groundwater treatment plant, manufactured by Andco Environmental Processes, Incorporated, of Amherst, New York, was installed in August, 1987. On September

9, the groundwater recovery, treatment, and recharge system was temporarily started up for system evaluation and troubleshooting purposes.

On September 14, 1987, in accordance with the Consent Order, the operation of the groundwater interceptor wells, the treatment plant, and the recharge system was initiated. This report evaluates the success of this system to date in intercepting and treating the groundwater.

GROUNDWATER INTERCEPTOR AND RECHARGE SYSTEM EVALUATION

Hydrogeologic Setting

The Muddy Creek formation, of Pleistocene age, underlies the Henderson Facility. This formation consists of light brown to reddish-brown silty clay and clayey silt. This formation functions as an aquitard to groundwater flow at the Henderson plant. The top of the Muddy Creek is an old erosional surface, which is now covered with alluvial fan deposits in the area of the Henderson Facility. As would be expected, the configuration of the erosional surface of the Muddy Creek displays some control over groundwater flow beneath the facility.

The alluvial fan deposits that overlie the Muddy Creek formation at the plant site vary in thickness from less than twenty feet to over sixty feet. The greatest thicknesses occur where the Muddy Creek exhibits a low erosional surface. These fan deposits consist of poorly sorted, heterogeneous, unconsolidated deposits of silty sands and gravels. This material is primarily volcanics and meta-volcanics. Coarse grained materials may be locally cemented with calcium carbonate. Small lenses of white clayey silt are common near the base of the alluvium. Transmissivity determined for these deposits vary from several hundred gallons per day per foot to over 70,000 gpd/ft. This is due both to great variation in the hydraulic conductivity and differences in saturated thickness. Generally, the greatest transmissivities are in areas where coarser materials have filled in low areas in the Muddy Creek's eroded surface.

Description of Interceptor and Recharge Systems

The location of the interceptor and recharge systems is shown on the map of the Consent Order Monitoring Area, which appears as Figure 2. The groundwater interceptor system consists of eleven pumping wells, identified as I-A through I-K. These wells were previously identified as HR-1 through HR-11, but were renamed with labels assigned sequentially from west to east for easier identification as to function. The three wells to the west of the treatment plant deliver groundwater to the treatment plant's feed tank through a two-inch pipe. The eight wells to the east deliver groundwater to the same tank via a graduated line, varying from two-inch diameter pipe at the east boundary to six-inch diameter pipe near the treatment plant. Table 1 lists significant features of the interceptor wells as well as the discharge rates at which they are being pumped.

The treatment system takes water from the feed tank, removes the chromium from it, and delivers it to a discharge tank, from which the water is gravity-fed to the recharge trenches via one of five headers. Figure 2 identified the single header which is currently being utilized to feed the water to the trench. The groundwater recharge trenches are five-foot deep trenches, filled with gravel

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TABLE 1
INTERCEPTOR WELL INVENTORY

WELL #	ELEV. (TOC)	DEPTH	SCREENED INTERVAL	ELEVATION MUDDY CREEK	DISCHARGE 9-14-87 (GPM)
I-A	1752.59'	42.7'	21-41'	1721.9'	2.0
I-B	1752.24'	47.1'	18-45'	1723.1'	2.0
I-C	1752.02'	44.4'	13.6'-43.6'	1720.6'	2.5
I-D	1752.05'	47.5'	16-45'	1716.3'	20.0
I-E	1751.65'	49.0'	14-43.5'	1723.6'	5.0
I-F	1749.03'	50.5'	12-44'	1722.4'	30.0
I-G	1751.86'	44.3'	10-40'	1720.1'	7.0
I-H	1752.50'	47.5'	14-44'	1720.8'	8.0
I-I	1745.03'	45.5'	12-41'	1715.3'	15.0
I-J	1749.57'	46.0'	12-41.6'	1718.5'	10.0
I-K	1745.49'	44.1'	8-37'	1718.7'	10.0
				TOTAL DISCHARGE	113.5

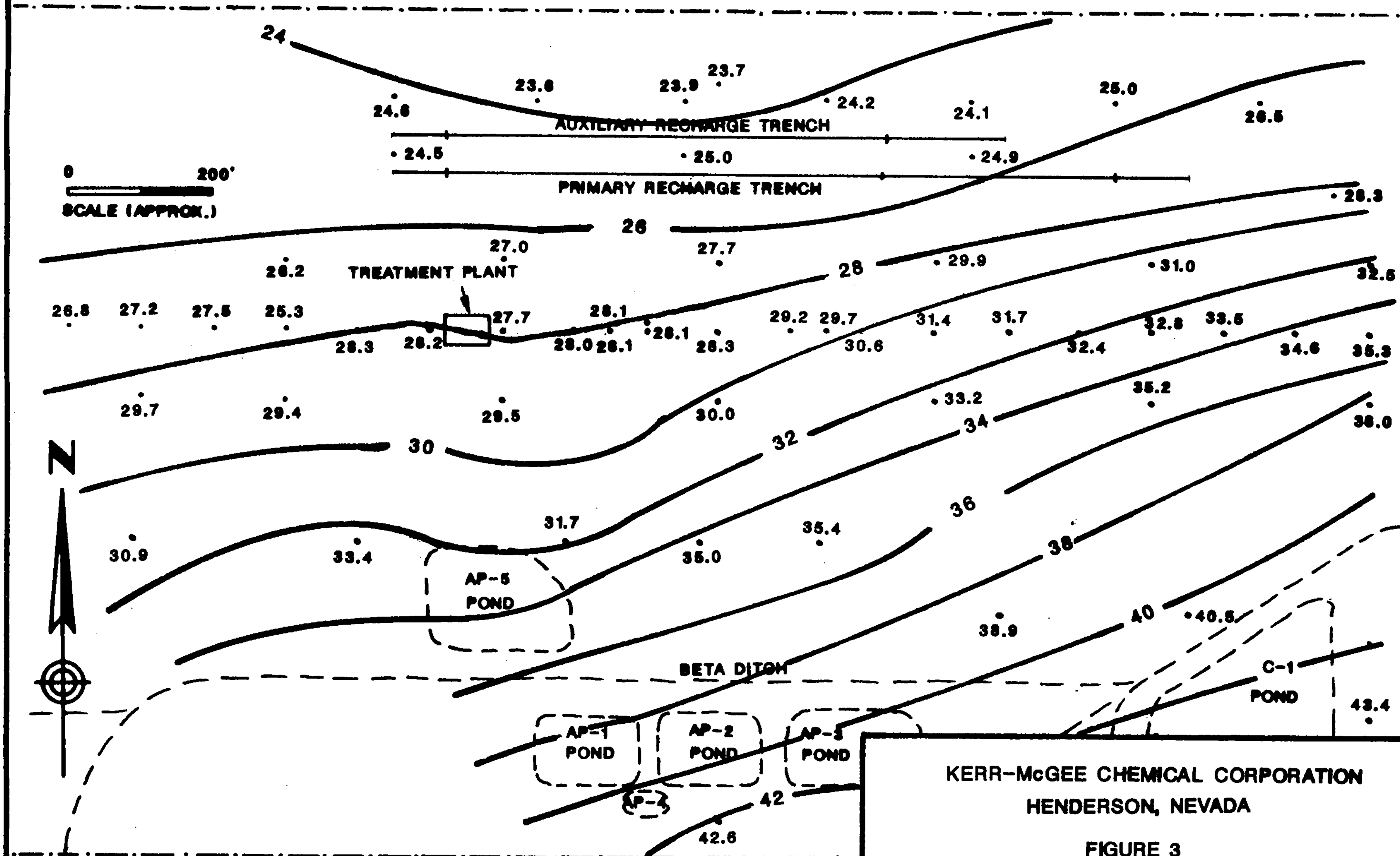
and lined with geofabric, with a perforated four-inch diameter pipe running the length of the trench. Treated water percolates through the trench to the water table.

Interceptor System Effectiveness

Water levels were recorded on September 14, 1987, just prior to initiation of groundwater recovery. Figure 3 is a potentiometric surface map based on static water levels, showing a regional trend of groundwater flow to the north. Table 2 lists groundwater elevations taken prior to and since start-up of groundwater recovery. Figure 4 shows a cross-section of the interceptor trench line, and details both the location of the top of the Muddy Creek Formation and static water level, based on September 14, 1987 data.

On September 15, 1987, one day after pumping commenced, water levels were again recorded. The resulting drawdown is illustrated in Figure 4. As can be seen, drawdown is occurring throughout the interception system. It is important to note that water levels in upgradient wells had risen, as can be seen in Table 2, in response to discharge of cooling water into the beta ditch since water treatment initiation.

Water levels were again recorded on October 19, 1987, and Figure 5 illustrates the configuration of the potentiometric surface in a cross-section of the interceptor trench. As can be seen, even though over 165,000 gallons per day were removed for a period of five weeks, groundwater levels between interceptor wells had risen above "static" groundwater levels. A potentiometric surface map based



EXPLANATION

40 — WATER ELEVATION CONTOUR WATER LEVELS RECORDED 9/14/87

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FIGURE 3

POTENTIOMETRIC SURFACE MAP

STATIC WATER LEVELS

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GROUNDWATER INTERCEPTOR TRENCH CROSS-SECTION

FIGURE 4

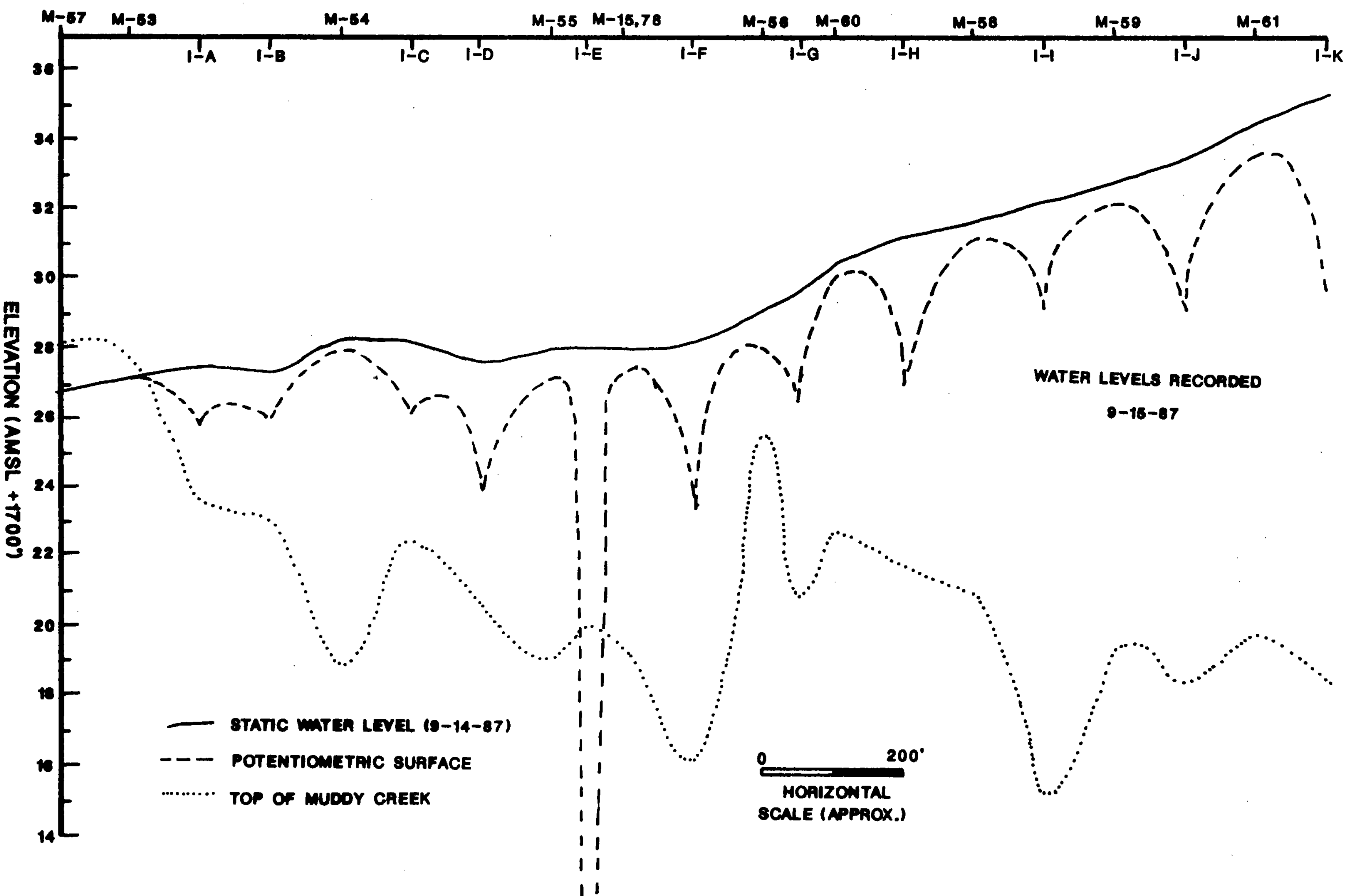


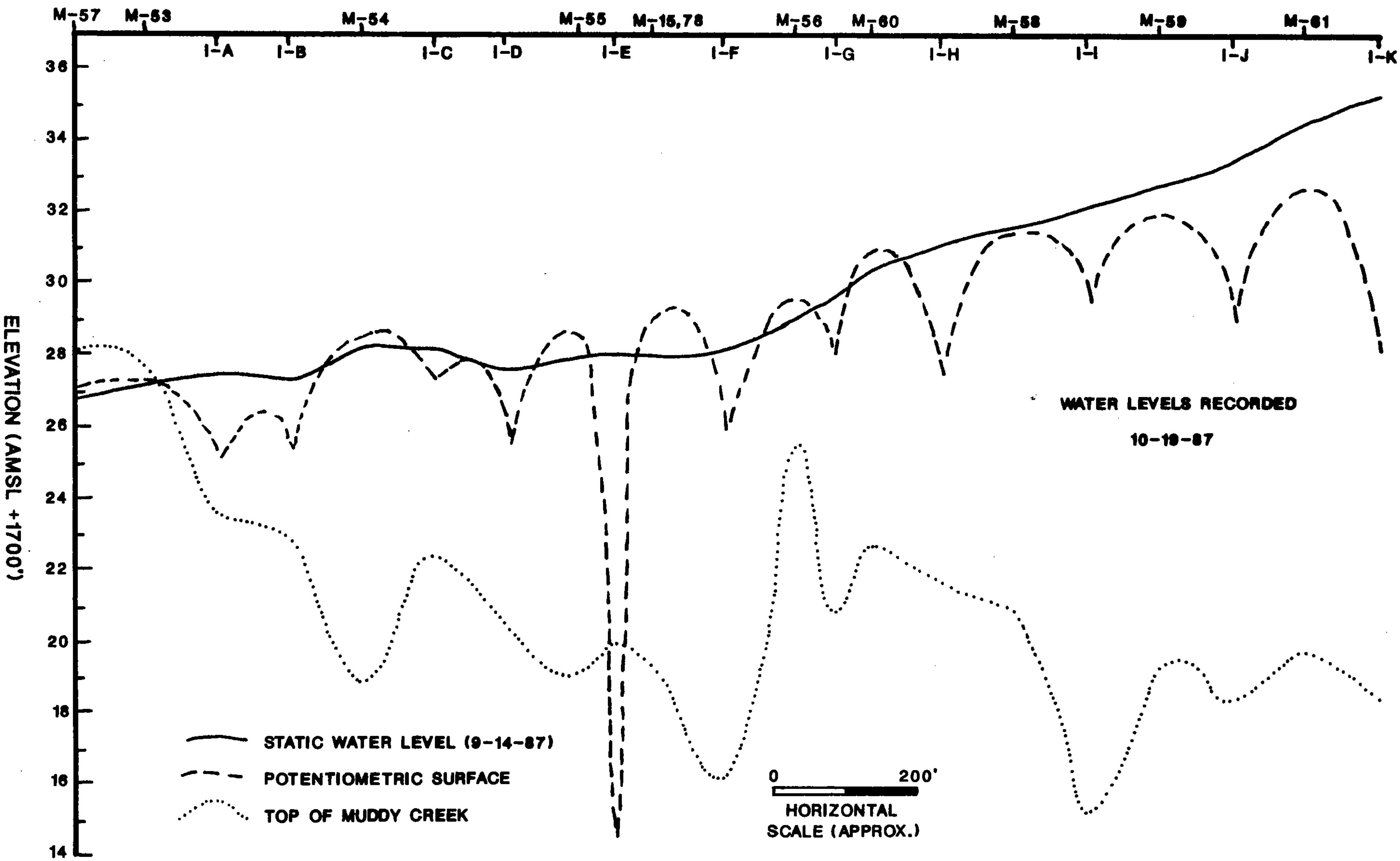
TABLE 2
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
GROUNDWATER ELEVATIONS

WELL #	TOC ELEV	DTW 9/14	WATER ELEV 9/14	DTW 9/15	WATER ELEV 9/15	DTW 10/19	WATER ELEV 10/19	DTW 11/9	WATER ELEV 11/
M-14	1759.43	28.55	30.88	28.46	30.97	28.02	31.41	27.71	31.7
M-15	1750.86	23.23	27.63	24.26	26.60	22.36	28.50	21.84	28.4
M-17	1770.22	27.60	42.62	27.41	42.81			26.47	43.7
M-18	1738.93	10.65	28.28	10.70	28.23	11.00	27.93	10.17	28.7
M-19	1768.55	25.18	43.37					24.41	44.1
M-22	1759.38	20.50	38.88	20.39	38.99	20.37	39.01	20.10	39.2
M-25	1757.36	25.69	31.67	25.69	31.67	24.66	32.70	24.50	32.8
M-27	1741.59	17.89	23.70	17.39	24.21	14.41	27.18	14.00	27.5
M-36	1758.88	23.47	35.41	23.34	35.54	22.73	36.15	22.61	36.2
M-37	1759.58	26.15	33.43	26.14	33.44	25.33	34.25	25.03	34.5
M-38	1759.08	24.04	35.04	24.03	35.05	23.05	36.03	23.07	36.0
M-39	1760.22	19.75	40.47	19.68	40.54	19.92	40.30	19.52	40.7
M-53	1752.34	25.10	27.24	25.19	27.15	25.00	27.34	24.56	27.7
M-54	1749.85	21.57	28.28	21.77	28.08	21.30	28.55	20.80	29.0
M-55	1750.15	22.11	28.04	23.08	27.07	21.66	28.49	21.22	28.9
M-56	1750.14	20.94	29.20	22.09	28.05	20.49	29.65	20.13	30.0
M-57	1753.12	21.30	26.82	26.37	26.75	26.00	27.12	25.67	27.4
M-58	1750.51	18.76	31.75	19.31	31.20	18.81	31.70	18.52	31.9
M-59	1744.16	11.32	32.84	12.03	32.13	12.01	32.15	11.53	32.6
M-60	1750.37	10.78	30.59	20.41	29.96	19.36	31.01	19.08	31.2
M-61	1746.37	11.74	34.63	12.82	33.55	13.55	32.82	12.59	33.7
M-62	1754.05	24.37	29.68	24.37	29.68	24.09	29.96	23.71	30.3
M-63	1751.88	22.52	29.36	22.67	29.21	22.32	29.56	21.85	30.0
M-64	1751.70	22.21	29.49	22.80	28.90	21.84	29.86	21.51	30.1
M-65	1752.93	22.92	30.01	23.88	29.05	22.52	30.41	22.15	30.7
M-66	1753.00	19.83	33.17	20.20	32.80	19.73	33.27	19.50	33.5
M-67	1745.36	10.20	35.16	10.75	34.61	10.92	34.44	10.41	34.9
M-68	1748.15	10.11	38.04	10.78	37.37	11.75	36.40	10.53	37.6
M-69	1749.14	22.93	26.21	22.98	26.16	22.87	26.27	22.33	26.8
M-70	1747.31	20.29	27.02	21.12	26.19	19.85	27.46	19.27	28.0

TABLE 2 (CONT'D)
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
GROUNDWATER ELEVATIONS

WELL #	TOC ELEV	DTW 9/14	WATER ELEV 9/14	DTW 9/15	WATER ELEV 9/15	DTW 10/19	ELEV 10/19	DTW 11/9	WATER ELEV 11/9
M-71	1747.14	19.43	27.71	20.31	26.83	17.51	29.63	17.16	29.9
M-72	1745.84	15.98	29.86	16.13	29.71	14.92	30.92	14.52	31.3
M-73	1740.61	9.64	30.97			9.78	30.83	9.23	31.3
M-74	1743.84	11.33	32.51			12.71	31.13	11.70	32.1
M-78	1750.95	22.83	28.12	23.69	27.26	21.84	29.11		
M-79	1744.27	19.81	24.46			19.01	25.26	18.04	26.2
M-80	1745.57	20.61	24.96			16.78	28.79	16.55	29.0
M-81	1743.42	18.57	24.85			14.51	28.91	13.81	29.6
M-82	1741.84	17.25	24.59			16.37	25.47	25.59	26.2
M-83	1742.01	18.46	23.56			16.07	25.94	15.45	26.5
M-84	1740.51	16.61	23.90			13.22	27.29	12.83	27.6
M-85	1741.95	17.75	24.20			13.94	28.01	13.42	28.5
M-86	1741.98	17.84	24.14			14.80	27.18	14.12	27.8
M-87	1741.89	16.90	24.99			15.84	26.05	14.91	26.9
M-88	1738.73	12.28	26.45			12.10	26.63	11.38	27.3
I-A	1752.59	25.06	27.53	26.69	25.86	27.18	25.41		
I-B	1752.24	24.98	27.26	26.15	26.09	26.73	25.51		
I-C	1752.02	23.86	28.16	25.82	26.20	24.58	27.44		
I-D	1752.05	24.36	27.69	27.94	24.11	26.48	25.57		
I-E	1751.65	23.53	28.12	45.56	6.09	36.80	14.85		
I-F	1749.03	20.73	28.30	25.48	23.55	22.99	26.04		
I-G	1751.86	22.13	29.73	25.39	26.47	23.63	28.23		
I-H	1752.50	21.12	31.38	25.55	26.95	24.90	27.60		
I-J	1749.57	12.67	32.36	15.73	29.30	15.35	29.68		
I-K	1745.49	10.21	35.28	15.78	29.71	17.15	28.34		

KERR-McGEE CHEMICAL CORPORATION - HENDERSON, NEVADA
GROUNDWATER INTERCEPTOR CROSS-SECTION
FIGURE 5



on this data is presented as Figure 6. Analysis of the water level elevations along the upgradient line of monitor wells shows a regional increase in elevation of the water table throughout all but the eastern extremity of the Consent Order area. Non-contact cooling water is periodically discharged into the beta ditch, located in the southern portion of the Consent Order area. The amount of water being discharged into this ditch increased between the time the treatment plant was started, and the October 19 water level measurements. Infiltration from this ditch can exceed 500 gallons per minute, and affects groundwater levels in the interceptor trench area. KMCC believes this groundwater recharge source is responsible for the rise in water levels between September 14 and October 19.

The full effect of groundwater infiltration from the beta ditch on the groundwater intercept system has not yet been fully analyzed. The fact that this discharge of non-contact cooling water was not continuous made analysis difficult. The decision was made by KMCC personnel to run the cooling water continuously in an attempt to define its potential effects on the interceptor system.

Water levels were again recorded November 9, 1987. Due to infiltration from the beta ditch, continuous since October 20, water levels had risen throughout most of the Consent Degree area. Calculation of entry and exit flowrates in the beta ditch showed a net loss of over 550 gallons per minute of water to the subsurface. Because the beta ditch is located hydrologically upgradient from the interceptor trench, this amount of infiltration puts an excessive demand on the interceptor system. As a result, the decision was made to discontinue discharge of the cooling water into the beta ditch.

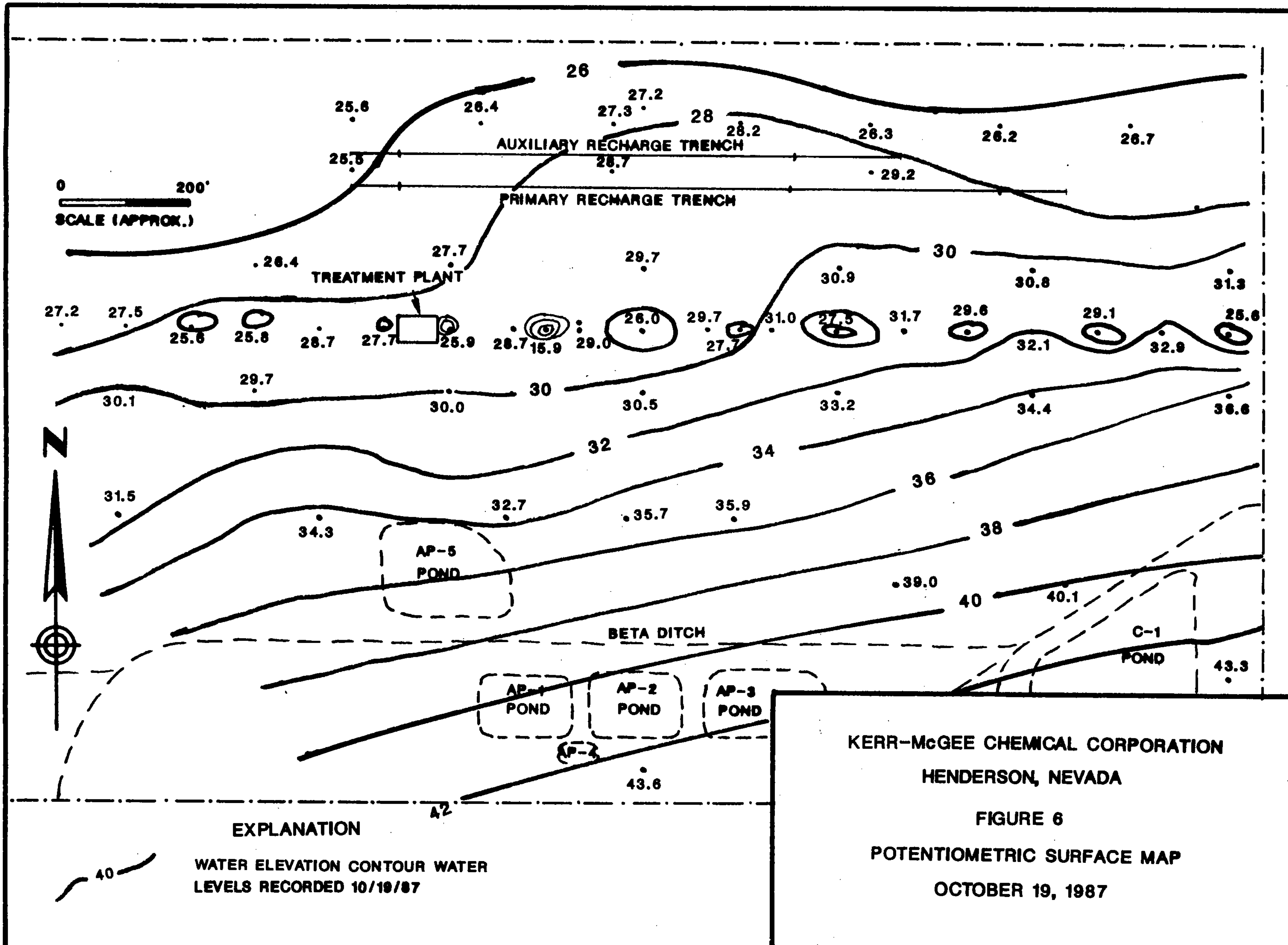


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FIGURE 6

POTENTIOMETRIC SURFACE MAP

OCTOBER 19, 1987

Interceptor well I-E shows significant drawdown, with very little drawdown from the monitor wells on either side (see Figure 5). It is believed this is due to excessive well losses, and that redevelopment of this well is required. Analysis of data to date indicates that the following steps must be implemented in order for the intercept system to effectively control groundwater flow:

- discontinue discharge of water to the beta ditch. At some point in the future, discharge can be resumed after steps are taken to prevent infiltration into the groundwater.

- redevelop well I-E.

- continue to monitor well levels on a regular basis to verify decline in water levels in the interceptor area.

KMCC maintains that, on the basis of extensive pumping test analysis, as well as consideration of the drawdown observed after one day of pumping, that the interceptor system, as designed, will effectively restrict the flow of contaminated groundwater past the interceptor line. Time is needed to allow water levels to decline as a result of discontinued discharge of cooling water to the beta ditch. Water level data recorded in 1984 showed that, after temporarily discontinuing use of the beta ditch, water levels in M-15 (in the middle of the interceptor trench) continued to decline for over a year. KMCC believes groundwater control will be effectively demonstrated long before this amount of time passes.

Recharge System Effectiveness

Treated groundwater is currently flowing, under gravity feed, into the middle header of the primary recharge trench. Based on recorded water levels in the area of the recharge trench (see Table 2 and Figure 6), it is apparent that the recharge trenches are operating at only a fraction of their capacity. Groundwater elevation changes nearly four feet between the point where water enters the trench and the western end of the trench. When the regional increase in groundwater elevation is taken into consideration, the groundwater elevation at the west end of the trench may not have risen at all.

KMCC believes the recharge system, as installed, is fully effective, and that no further modifications are necessary to insure continued successful performance of this portion of the groundwater intercept, treatmnt, and recovery program.

CONCLUSIONS

Kerr-McGee Chemical Corporation concludes that the design, installation, and operation of the groundwater recovery, treatment, and recharge systems are satisfactory. Difficulties encountered in demonstrating groundwater control are due to the unforeseen addition of water to the groundwater system directly upgradient of the interceptor trench via the beta ditch. This problem should be eliminated when the use of the beta ditch for discharge of cooling water is discontinued. It is estimated that it will be at least a month before the beneficial effect of this process change can be documented, and significantly longer than that before the full effect can be observed. At this time, over 10 million gallons of contaminated groundwater have been successfully treated and returned to the groundwater downgradient from the treatment plant since the system has been started. Effective groundwater control will be demonstrated in the near future, utilizing the existing intercept system and design discharge rates from the interceptor wells.

The groundwater recharge system is functioning as designed, and no further modifications to this system are anticipated. Data gathered to date shows the recharge system is capable of handling a far greater volume of treated water than it is currently receiving.

APPENDIX A

KERR-MCGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
WELL INVENTORY

APPENDIX A
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
WELL INVENTORY

WELL NO.	PURPOSE	DATE INSTALLED	WELL DEPTH FT. FROM TOC	CASING TYPE	SCREEN SIZE/TYPE	SCREENED INTERVAL (TOC)	GRAVEL PACK INTERVAL (TOC)	ELEVATION TOC (AMSL)	ELEVATION TOP OF MUDDY CREEK	REMARKS
HR-1	RECOVERY WELL	9-30-86	47.0	6 IN. PVC	.020/SLOT	13.6-43.6	11.6-47.0	1752.02	1721.89	RENAMED I-H
HR-2	RECOVERY WELL	10-1-86	47.0	6 IN. PVC	.020/SLOT	17.8-44.8	14.3-47.0	1752.15	1723.05	RENAMED I-B
HR-3	RECOVERY WELL	10-1-86	47.0	6 IN. PVC	.020/SLOT	15.8-44.8	10.7-47.0	1751.67	1720.56	RENAMED I-D
HR-4	RECOVERY WELL	9-30-86	50.0	6 IN. PVC	.020/SLOT	11.7-43.7	11.0-50.0	1748.56	1716.28	RENAMED I-F
HR-5	RECOVERY WELL	12-11-86	42.5	6 IN. PVC	.020/SLOT	21.2-40.8	6.0-42.5	1751.38	1723.56	RENAMED I-A
HR-6	RECOVERY WELL	12-11-86	44.5	6 IN. PVC	.020/SLOT	13.1-42.5	10.4-44.5	1752.14	1722.43	RENAMED I-C
HR-7	RECOVERY WELL	12-11-86	49.0	6 IN. PVC	.020/SLOT	14.2-43.5	10.2-49.0	1752.67	1720.09	RENAMED I-E
HR-8	RECOVERY WELL	12-12-86	43.5	6 IN. PVC	.020/SLOT	9.5-39.1	7.0-43.5	1751.06	1720.82	RENAMED I-G
HR-9	RECOVERY WELL	12-10-86	45.0	6 IN. PVC	.020/SLOT	11.3-40.6	8.4-45.0	1744.50	1715.33	RENAMED I-I
HR-10	RECOVERY WELL	12-9-86	45.0	6 IN. PVC	.020/SLOT	11.2-40.6	8.7-45.0	1748.58	1718.54	RENAMED I-J
HR-11	RECOVERY WELL	12-12-86	43.0	6 IN. PVC	.020/SLOT	6.7-35.6	6.0-43.0	1744.41	1718.65	RENAMED I-K
I-A	RECOVERY WELL	9-30-86	42.7	6 IN. PVC	.020/SLOT	21.4-41.0	6.2-42.7	1752.59	1721.89	WAS HR-5
I-B	RECOVERY WELL	10-1-86	47.1	6 IN. PVC	.020/SLOT	17.9-44.9	14.4-47.1	1752.24	1723.05	WAS HR-2
I-C	RECOVERY WELL	10-1-86	44.4	6 IN. PVC	.020/SLOT			1752.02	1720.56	WAS HR-6
I-D	RECOVERY WELL	9-30-86	47.5	6 IN. PVC	.020/SLOT	16.3-45.3	11.2-47.5	1752.05	1716.28	WAS HR-3
I-E	RECOVERY WELL	12-11-86	49.0	6 IN. PVC	.020/SLOT	14.2-43.5	10.2-49.0	1751.65	1723.56	WAS HR-7
I-F	RECOVERY WELL	12-11-86	50.5	6 IN. PVC	.020/SLOT	12.2-44.2	11.5-50.5	1749.03	1722.43	WAS HR-4
I-G	RECOVERY WELL	12-11-86	44.3	6 IN. PVC	.020/SLOT	10.3-39.9	7.8-44.3	1751.86	1720.09	WAS HR-8
I-H	RECOVERY WELL	12-12-86	47.5	6 IN. PVC	.020/SLOT	14.1-44.1	12.1-47.5	1752.50	1720.82	WAS HR-1
I-I	RECOVERY WELL	12-10-86	45.5	6 IN. PVC	.020/SLOT	11.8-41.1	8.9-45.5	1745.03	1715.33	WAS HR-9
I-J	RECOVERY WELL	12-9-86	46.0	6 IN. PVC	.020/SLOT	12.2-41.6	9.7-46.0	1749.57	1718.54	WAS HR-10
I-K	RECOVERY WELL	12-12-86	44.1	6 IN. PVC	.020/SLOT	7.8-36.7	7.1-44.1	1745.49	1718.65	WAS HR-11
M-1	UPGDNT TO P&S PONDS	11-81	45 G.E.	5 IN. STEEL	.040/SLOT	35- 45 G.E.	33-50 G.E.	1798.68	1751	YIELD 1/2 GPM
M-2	DWNGDNT TO P&S PONDS	11-81	40 G.E.	5 IN. STEEL	.040/SLOT	30- 40 G.E.	28- 44 G.E.	1781.20	1739	YIELD 15 GPM
M-3	DWNGDNT TO P&S PONDS	11-81	40 G.E.	5 IN. STEEL	.040/SLOT	30- 40 G.E.	28- 45 G.E.	1780.46	1739	YIELD 15 GPM
M-4	DWNGDNT TO P&S PONDS	11-81	40 G.E.	5 IN. STEEL	.040/SLOT	30- 40 G.E.	28- 46 G.E.	1780.41	1744	YIELD 3 GPM
M-5	UPGDNT HAZ WST FILL	6-1-82	39 G.E.	5 IN. STEEL	.040/SLOT	29- 39 G.E.	28- 43 G.E.	1747.86	1721	
M-6	DWNGDNT HAZ WST FILL	6-2-82	35 G.E.	5 IN. STEEL	.040/SLOT	25- 35 G.E.	25- 43 G.E.	1729.15	1696	
M-7	DWNGDNT HAZ WST FILL	6-3-82	34 G.E.	5 IN. STEEL	.040/SLOT	25- 35 G.E.	23- 37 G.E.	1729.81	1699	
M-8	DWNGDNT TO P&S PONDS	6-14-82	40 G.E.	5 IN. STEEL	.040/SLOT	30- 40 G.E.	28- 45 G.E.	1782.06	1735	
M-9	DWNGDNT TO P&S PONDS	6-15-82	40 G.E.	5 IN. STEEL	.040/SLOT	30- 40 G.E.	28- 45 G.E.	1780.30	1744	
M-10	UPGDNT FROM PLANT	5-83	68 G.E.	5 IN. STEEL	.090/SLOT	43- 63 G.E.	36- 75 G.E.	1834.76	1795	
M-11	DWNGDNT FROM UNIT 5	5-83	58 G.E.	5 IN. STEEL	.090/SLOT	33- 53 G.E.	25- 60 G.E.	1814.45	1776	
M-12	DWNGDNT FROM UNIT 4	5-83	52 G.E.	5 IN. STEEL	.090/SLOT	37- 47 G.E.	32- 65 G.E.	1816.18	1778	
M-13	DWNGDNT FROM UNIT 3	5-83	53 G.E.	5 IN. STEEL	.090/SLOT	28- 48 G.E.	25- 55 G.E.	1815.21	1775	
M-14	DWNGDNT FROM AP POND	5-83	37 G.E.	2 IN. PVC	.020/SLOT	22- 37 G.E.	18- 37 G.E.	1759.43	1729	

APPENDIX A
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
WELL INVENTORY

WELL NO.	PURPOSE	DATE INSTALLED	WELL DEPTH FT. FROM TOC	CASING TYPE	SCREEN SIZE/TYPE	SCREENED INTERVAL (TOC)	GRAVEL PACK INTERVAL (TOC)	ELEVATION TOC (AMSL)	ELEVATION TOP OF MUDDY CREEK	REMARKS
M-15	DWNGDNT FROM AP POND	5-83	41 G.E.	2 IN. PVC	.020/SLOT	26- 41 G.E.	20- 41 G.E.	1751.07	1714	
M-16	DWNGDNT FROM AP POND	5-83	37 G.E.	2 IN. PVC	.020/SLOT	22- 37 G.E.	16- 37 G.E.		1729	
M-17	UPGDNT FROM AP PONDS	5-83	42 G.E.	2 IN. PVC	.020/SLOT	27- 42 G.E.	18- 42 G.E.	1772.18	1714	
M-18		8-10-83	28 G.E.	2 IN. PVC	.020/SLOT	15.0-25.0	9.0- 29.0	1738.93	1713	
M-19		8-10-83	40 G.E.	2 IN. PVC	.020/SLOT	16.7-36.5	13.0-42.0	1768.52	1731	
M-20		8-11-83	47.6 G.E.	2 IN. PVC	.020/SLOT	23.0-43.0	17.6-47.6	1798.21	1756	
M-21		8-11-83	45.1 G.E.	2 IN. PVC	.020/SLOT	20.1-40.1	18.1-45.1	1790.50	1751	
M-22		8-11-83	37.1 G.E.	2 IN. PVC	.020/SLOT	13.1-33.1	11.1-37.1	1758.91	1727	
M-23		8-11-83	42.4 G.E.	2 IN. PVC	.020/SLOT	9.4-37.4	6-43 G.E.	1718.09	1677	
M-24		5-14-84	40 G.E.	2 IN. PVC	.020/SLOT			1788.54	1750	
M-25	AP-5 MONITOR WELL	5-14-84	40 G.E.	2 IN. PVC	.020/SLOT			1757.25	1726	
M-26		5-14-84	37 G.E.	2 IN. PVC	.020/SLOT				1729	
M-27		5-14-84	35 G.E.	2 IN. PVC	.020/SLOT			1741.28	<1699	
M-28	UNIT 6 MONITOR WELL	7-23-84	50.5 G.E.	2 IN. PVC	.010/SLOT	39- 49 G.E.	31- 49 G.E.	1810.68	1780	
M-29	UNIT 6 MONITOR WELL	7-13-84	50 G.E.	2 IN. PVC	.010/SLOT	30- 50 G.E.	22- 50 G.E.	1806.60	1785	
M-30	UNIT 6 MONITOR WELL	7-17-84	45 G.E.	2 IN. PVC	.010/SLOT	35- 45 G.E.	32- 45 G.E.	1811.27	1786	
M-31	CR PLUME MONITOR	6-85	47.60	2 IN. PVC	.010/SLOT	30-45		1789.92	1750	
M-32	CR PLUME MONITOR	6-85	46.76	2 IN. PVC	.010/SLOT	30-45		1787.48	1752	
M-33	CR PLUME MONITOR	6-85	46.78	2 IN. PVC	.010/SLOT	30-45		1786.98	1750	
M-34	CR PLUME MONITOR	6-85	41.83	2 IN. PVC	.010/SLOT	25-40		1776.10	1739	
M-35	CR PLUME MONITOR	6-85	42.33	2 IN. PVC	.010/SLOT	25-40		1775.01	1740	
M-36	CR PLUME MONITOR	6-85	37.85	2 IN. PVC	.010/SLOT	20-35		1758.88	1729	
M-37	CR PLUME MONITOR	6-85	37.18	2 IN. PVC	.010/SLOT	20-35		1759.58	1730	
M-38	CR PLUME MONITOR	6-85	37.44	2 IN. PVC	.010/SLOT	20-35		1759.08	1729	
M-39	CR PLUME MONITOR	6-85	42.60	2 IN. PVC	.010/SLOT	20-35		1760.22	1724	
M-40	CR PLUME MONITOR	6-85	47.40	2 IN. PVC	.010/SLOT	30-45		1797.89	1764	
M-41	CR PLUME MONITOR	7-85	37.52	2 IN. PVC	.010/SLOT	5-35		1695.60	1669	
M-42	CR PLUME MONITOR	7-85	37.02	2 IN. PVC	.010/SLOT	4.4-34.4		1696.24	1668	
M-43	CR PLUME MONITOR	7-85	37.56	2 IN. PVC	.010/SLOT	4.9-34.9		1696.16	1669	
M-44	CR PLUME MONITOR	7-85	37.65	2 IN. PVC	.010/SLOT	5.1-35.1		1696.74	1674	
M-45	CR PLUME MONITOR	7-85	36.59	2 IN. PVC	.010/SLOT	4.2-34.2		1697.13	1668	
M-46	CR PLUME MONITOR	7-85	46.89	2 IN. PVC	.010/SLOT	4.2-44.2		1716.08	1672	
M-47	CR PLUME MONITOR	7-85	42.59	2 IN. PVC	.010/SLOT	0.1-40.0		1715.04	1671	
M-48	CR PLUME MONITOR	7-85	38.59	2 IN. PVC	.010/SLOT	6.1-36.1		1719.05	1685	
M-49	CR PLUME MONITOR	7-85	46.50	2 IN. PVC	.010/SLOT	4.0-44.0		1718.89	1680	
M-50	CR PLUME MONITOR	7-85	62.15	2 IN. PVC	.010/SLOT	39.6-59.6		1793.87	1751	
M-51	CR PLUME MONITOR	7-85	36.62	2 IN. PVC	.010/SLOT	3.9-33.9		1695.34	1667	
M-52	CR PLUME MONITOR	7-85	47.38	2 IN. PVC	.010/SLOT	34.5-44.5		1798.70	1764	
M-53	INT'CPT MONITOR	9-27-86	41.0	2" PVC	.010/SLOT	20.8-40.7	19.0-41.0	1752.34	1728.34	

APPENDIX A
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
WELL INVENTORY

WELL NO.	PURPOSE	DATE INSTALLED	WELL DEPTH FT. FROM TOC	CASING TYPE	SCREEN SIZE/TYPE	SCREENED INTERVAL (TOC)	GRAVEL PACK INTERVAL (TOC)	ELEVATION TOC (AMSL)	ELEVATION TOP OF MUDDY CREEK	REMARKS
M-54	INT'CPT MONITOR	9-29-86	46.0	2" PVC	.010/SLOT	14.8-44.7	13.0-46.0	1749.85	1719.85	
M-55	INT'CPT MONITOR	9-29-86	45.0	2" PVC	.010/SLOT	14.6-44.4	13.0-45.0	1750.15	1719.15	
M-56	INT'CPT MONITOR	9-28-86	40.0	2" PVC	.010/SLOT	15.1-40.0	13.0-40.0	1750.14	1725.64	
M-57	INT'CPT MONITOR	9-30-86	41.0	2" PVC	.010/SLOT	20.8-40.1	18.0-41.0	1753.12	1728.12	
M-58	INT'CPT MONITOR	9-30-86	45.0	2" PVC	.010/SLOT	15.0-44.8	13.0-45.0	1750.51	1721.01	
M-59	INT'CPT MONITOR	9-28-86	40.0	2" PVC	.010/SLOT	5.0-39.8	4.0-40.0	1744.16	1719.66	
M-60	INT'CPT MONITOR	12-10-86	43.0	2" PVC	.010/SLOT	17.8-42.8	16.0-43.0	1750.37	1722.87	
M-61	INT'CPT MONITOR	12-9-86	41.0	2" PVC	.010/SLOT	9.3-39.0	7.5-41.0	1746.37	1719.87	
M-62	INT'CPT MONITOR	12-17-86	33.0	2" PVC	.010/SLOT	18.1-33.0	16.0-33.0	1754.05		
M-63	INT'CPT MONITOR	12-18-86	40.0	2" PVC	.010/SLOT	19.6-39.6	18.0-40.0	1751.88		
M-64	INT'CPT MONITOR	12-19-86	38.0	2" PVC	.010/SLOT	12.7-37.5	11.0-38.0	1751.70		
M-65	INT'CPT MONITOR	12-16-86	40.0	2" PVC	.010/SLOT	14.4-39.2	13.0-40.0	1752.93		
M-66	INT'CPT MONITOR	12-15-86	43.0	2" PVC	.010/SLOT	17.5-42.5	16.0-43.0	1753.00		
M-67	INT'CPT MONITOR	12-12-86	38.0	2" PVC	.010/SLOT	7.8-37.6	6.0-38.0	1745.36		
M-68	INT'CPT MONITOR	12-11-86	41.0	2" PVC	.010/SLOT	11.2-41.0	10.2-41.0	1748.15		
M-69	INT'CPT MONITOR	12-17-86	40.0	2" PVC	.010/SLOT	19.9-39.5	18.0-40.0	1749.14		
M-70	INT'CPT MONITOR	12-16-86	41.0	2" PVC	.010/SLOT	15.3-40.2	14.0-41.0	1747.31		
M-71	INT'CPT MONITOR	12-16-86	43.0	2" PVC	.010/SLOT	17.5-42.2	16.0-43.0	1747.14		
M-72	INT'CPT MONITOR	12-16-86	36.0	2" PVC	.010/SLOT	10.1-35.0	9.0-36.0	1745.84		
M-73	INT'CPT MONITOR	12-15-86	36.0	2" PVC	.010/SLOT	11.0-36.0	9.0-36.0	1740.61		
M-74	INT'CPT MONITOR	12-11-86	39.0	2" PVC	.010/SLOT	9.2-39.0	8.0-39.0	1743.84		
M-75	DWNGDNT TO P&S PONDS	8-20-87	53.9	2" PVC	.010/SLOT	37.0-51.7	33.4-53.9			M-3 REPLACEMENT
M-76	DWNGDNT TO P&S PONDS	8-20-87	54.6	2" PVC	.010/SLOT	37.8-52.5	37.0-54.6			M-4 REPLACEMENT
M-77		8-20-87	47.8	2" PVC	.010/SLOT	30.9-45.6	29.6-47.8			M-20 REPLACEMENT
M-78	WTR LVL RECORDER	8-26-87	43.6	4" PVC	.010/SLOT	21.5-41.5	14.0-43.6	1750.95		PLATE ELEV=1752.59
M-79	RECHARGE MONITOR	8-21-87	37.6	2" PVC	.010/SLOT	10.8-35.4	9.0-37.6	1744.27		
M-80	WTR LVL RECORDER	8-26-87	43.7	4" PVC	.010/SLOT	11.5-41.5	9.2-43.7	1745.57		PLATE ELEV=1747.23
M-81	RECHARGE MONITOR	8-21-87	42.9	2" PVC	.010/SLOT	11.2-40.7	8.6-42.9	1743.42		
M-82	RECHARGE MONITOR	8-24-87	33.3	2" PVC	.010/SLOT	11.1-31.1	10.0-33.3	1741.84		
M-83	RECHARGE MONITOR	8-24-87	42.5	2" PVC	.010/SLOT	10.8-40.3	10.0-42.5	1742.01		
M-84	RECHARGE MONITOR	8-24-87	36.6	2" PVC	.010/SLOT	11.8-34.1	8.5-36.6	1740.51		
M-85	RECHARGE MONITOR	8-25-87	37.1	2" PVC	.010/SLOT	10.4-34.9	9.2-37.1	1741.95		
M-86	RECHARGE MONITOR	8-25-87	43.0	2" PVC	.010/SLOT	11.3-40.8	9.9-43.0	1741.98		
M-87	RECHARGE MONITOR	8-25-87	41.0	2" PVC	.010/SLOT	9.3-38.3	8.6-41.0	1741.89		
M-88	RECHARGE MONITOR	8-26-87	39.0	2" PVC	.010/SLOT	7.3-36.8	6.6-39.0	1738.73		
M-6A	DWNGDNT LANDFILL	12-18-86	46.0	2" PVC	.010/SLOT	26.8-41.5	24.0-46.0			
M-7A	DWNGDNT LANDFILL	12-18-86	39.0	2" PVC	.010/SLOT	20.1-35.1	18.0-39.0			