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December 24, 1998

U.S. Nuclear Regulatory Commission
ATTN: Joseph J. Holonich, Chief
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Mr. Greg Lyssy
U.S. Environmental Protection Agency
Superfund Coordinator
New Mexico Team (6SF-LT)
1445 Ross Avenue
Dallas, TX 75202-2733

Subject: **License No. SUA-1475, 1998 Ground Water Corrective Action Plan Report**

Dear Messrs. Holonich and Lyssy:

On behalf of United Nuclear Corporation (United Nuclear), Earth Tech Environment and Infrastructure is providing this annual performance review of the ground water corrective action systems installed and operating at United Nuclear's Church Rock Mill and Tailings site near Gallup, New Mexico, pursuant to License Condition 30C. This report is for the 1998 operating year and represents the period from October 1997 through September 1998. Unlike previous years, this report presents only the data collected and a summary of operations, including modifications that were made to the operations through the year. This modification in the report format was discussed with and approved by the U.S. Nuclear Regulatory Commission (NRC) and U.S. Environmental Protection Agency (EPA) in September 1998.

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The 1998 annual review assesses the performance of the corrective action through 1998 and compares the assessment to the EPA's findings in its Five-Year Review Report (EPA, 1998). The EPA report presents a review of the systems' performance through the 1996 operating year. This analysis

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of the 1998 data supports the conclusions reached by United Nuclear in previous annual reviews (Canonie Environmental Services Corp. [Canonie], 1989b, 1990, 1991, 1992b, 1993b and 1995; Smith Technology Corporation [Smith Technology], 1995 and 1996; Rust Environment and Infrastructure [Rust], 1998) and confirms the findings contained in EPA's Five-Year Review Report (1998).

INTRODUCTION

The corrective (or remedial) action systems for tailings seepage remediation were installed and began operating during the summer and fall of 1989. United Nuclear has submitted an annual review report at the end of each subsequent year. This report is the tenth in the series and includes water quality analyses and water level elevations for the fourth quarter of 1997 through the third quarter of 1998 and pumping results from October 1997 through September 1998. Also included are summaries of the operation of the corrective action systems and a description of modifications made to the systems during the operating year.

SITE ORIENTATION

Figure 1 is a site map which shows the location of the extraction wells that operated during 1998, the evaporation ponds, and the reclaimed tailings areas. The figure also shows the remedial action target area for each geologic formation where the impacts of tailings seepage were originally identified and corrective action is being implemented. Additional background information on site facilities and activities is available in the previous annual reviews.

EXTRACTION SYSTEMS

Southwest Alluvium

The corrective action for the Southwest Alluvium in 1998 continued the operation of four extraction wells (801, 802, 803, and 808). The operational data are summarized in Table 1. The four wells pumped at a combined average rate of 19.29 gallons per minute (gpm) during the 1998 reporting period. A total of 9.0 million gallons of water was extracted from the target area during the 1998 reporting period, resulting in a

cumulative total of 114.1 million gallons for the nine-year operating period (October 1989 through September 1998).

Extraction Well 801 continues to pump at very low rates with an average rate of 0.08 gpm in 1998. This well has pumped at a rate of less than 0.5 gpm for the last eight years. The low pumping rate is due to a combination of low formation transmissivity and progressively decreasing saturated thickness in this portion of the alluvium, which is located on the flank of the valley. The Five-Year Review Report (EPA, 1998) recommends that this well be decommissioned and converted into a monitoring well because it meets the decommissioning criteria in the Remedial Design Report (RD Report) (Canonie 1989a), Corrective Action Plan (CAP) (United Nuclear, 1989a), and Remedial Action Plan (RAP) (United Nuclear, 1989b).

Well 808 also continues to have reduced productivity related primarily to plugging of the pump and drop pipe by chemical precipitation. Historically this well has been the highest producer, but since July 1997 it has been operating for only 3 to 4 weeks before the pump is plugged and has to be pulled and cleaned. This well did not operate for nine weeks during the 1998 operating year and pumped an average of less than 5 gpm. Continued cleaning and stimulation of the well may damage the casing and screen and may eventually make the installation of a replacement well desirable. In the meantime, the existing cleaning and stimulation procedures will be followed.

Zone 3

Table 2 presents the pumping rates and field pHs recorded during the 1998 operating year for each set of wells. As shown, the average weekly pumping rates for the Northeast Pump-Back, Stage I, and Stage II systems were 0.05 gpm, 2.69 gpm and 21.58 gpm, respectively, when all the wells were operating. The total weekly pumping rate of 24.32 gpm is relatively high, indicating that the Zone 3 extraction system, particularly the downgradient Stage II wells, is still capable of removing significant volumes of water.

The average pHs at the Northeast Pump-Back, Stage I and Stage II wells were 2.7, 4.3 and 6.2, respectively. The pH of 6.2 at the Stage II wells indicates that this water is of background quality or impacted only to a minor extent by tailings seepage. Extraction of this better quality water is consistent with the approved remedial design and has been necessary to effectively dewater the Zone 3 Target Area. However, the benefit of continuing to dewater the target area is diminishing relative to the negative

impact of expanding the migration of seepage-impacted water further downdip (EPA, 1998).

Table 3 summarizes the volume extracted from Zone 3 since the system was turned on in 1989. As shown, the total volume pumped during 1998 was 10.0 million gallons, which is similar to the volume pumped in 1997. The total volume pumped since 1989 is 146.9 million gallons.

Modifications to extraction well operation were made during the 1998 operating year because of continued declines in saturation and plugging of the wells. A key issue with operating the Zone 3 extraction wells is the loss of saturated thickness caused by dewatering of the formation. The wells that meet the decommissioning criteria are discussed below and their performance data is presented in Table 4 and on Figure 2.

Zone 3 Extraction Well Decommissioning

Nine of the Zone 3 pump-back and extraction wells continued to pump at less than 1.0 gpm during the 1998 operating year. Their low pumping rates were due to a combination of low formation transmissivity at these wells and decreasing saturated thickness. Although cleaned and stimulated in accordance with the procedures in the CAP (United Nuclear, 1989a) and RD Report (Canonie, 1989a), none of the wells produced more than 1.0 gpm. These wells averaged only 0.26 gpm per well and accounted for less than 1 percent of the system production at the end of the operating year.

Table 4 summarizes the results of the well redevelopment procedures implemented for the nine pump-back and extraction wells. When corrective action began, the initial average pumping rate of these wells was approximately 3.49 gpm. By the end of the 1998 operating year, even with annual and semiannual cleaning and stimulation, the average pumping rate has declined to approximately 0.18 gpm.

Figure 2 graphically illustrates the loss in productivity for these wells over time. All nine wells have exhibited a steady decline in pumping rate since they began operating. This long-term decline in pumping rates is due to the reduced saturation in the vicinity of the wells as Zone 3 continues to be dewatered. Table 4 shows that the saturated thickness at all of the wells has declined to 30 feet or less and that the average saturated thickness has been reduced from 48.2 feet to approximately 20 feet. This decline in saturated thickness is a result of pumping and natural dissipation of the

temporary saturation as water levels decline in the alluvium, the source of recharge to Zone 3.

The possibility of installing new or replacement wells to increase the system's performance and shorten the remediation time was considered. However, replacement wells located within the areas of low saturation would not extract significant amounts of water. The EPA's Five-Year Review Report (1998) recognizes that these conditions exist in Zone 3 and has recommended that all the wells pumping less than 0.75 gpm be decommissioned and/or converted to monitoring wells. The 1998 data shows that the EPA's conclusions are appropriate in that all nine wells continue to pump at decreasingly low rates and meet the 0.75 gpm criterion for decommissioning.

In addition, EPA recommends that the wells located downgradient from the seepage-impacted area also be decommissioned. These wells (706, 717 and 718) are still pumping at rates greater than one gpm but, because they are located downgradient from the seepage-impacted water, they are extracting background quality water and effectively drawing the seepage-impacted water further downgradient. Review of the 1989 through 1998 data shows that these downgradient wells, although extracting background quality water, have operated as designed to help dewater the target area. However, the benefit of continued dewatering of the target area is diminishing relative to the negative impact of expanding the migration of seepage-impacted water further downdip.

Zone 1

Corrective action for Zone 1 during the 1998 operating year consisted of continued operation of the Revised East Pump-Back wells. Table 5 summarizes the 1991 through 1998 operational data for the pump-back wells. The three Revised East Pump-Back wells continue to pump at the extremely low rates identified in the previous annual reviews. Although Well 616 exhibited an increase in pumping rate after being cleaned and stimulated, the overall rate is still very low. The three wells pumped at an average combined rate of 0.65 gpm and extracted approximately 323,000 gallons of water in 1998.

The recovery wells are all equipped with automatic controllers and typically pump for less than one hour per day because of the low rate of ground water inflow into the wells. These yields are low even with more than 50 percent saturation in the vicinity of the pump-back wells. The low productivity of the Zone 1 formation is recognized

in the EPA's Five-Year Review Report (1998) and EPA recommends that pumping wells be decommissioned and/or converted to monitoring wells.

MASS EXTRACTED

In accordance with the requirements of the NRC and EPA, the mass of chemical constituents extracted is calculated for each of the three formations. The constituents with concentrations that exceeded NRC standards and/or EPA Applicable or Relevant and Appropriate Requirements within the target area were included in the calculation. Total dissolved solids (TDS) concentrations were not included in the mass extraction calculations because TDS are mainly composed of constituents that are included in the calculations (e.g., sulfate).

Appendix A presents the methodology and calculations used to determine the mass extracted. The results of the calculations are presented in the tables in the appendix.

PERFORMANCE MONITORING

The CAP (United Nuclear, 1989a), RD Report (Canonie, 1989a) and RAP (United Nuclear, 1989b) approved by the NRC and EPA describe the performance monitoring program. The program has been modified over time as described in the annual reports (Canonie, 1989b, 1990, 1991, 1992b, 1993b and 1995; Smith Technology, 1995 and 1996; Rust, 1998) to adjust the monitoring requirements as the corrective action has taken effect. All modifications have been approved by the NRC and EPA.

The field and laboratory data collected from the fourth quarter 1989 through the third quarter 1998 are summarized in the tables in Appendices B (Southwest Alluvium), C (Zone 3) and D (Zone 1). The quarterly laboratory data sheets for the 1998 operating year are included at the end of the appendices. The original field and laboratory data for the period from 1989 to 1997 are included in the previous annual reviews.

Modification to Monitoring Wells

Over the past nine years, modifications to the performance monitoring system have occurred as a result of changes in the condition of several of the monitoring wells. These modifications result primarily from formation dewatering that has caused some of the wells to become dry. These dry wells are still checked quarterly to see if their

condition has changed, but they no longer provide water quality or water level information. Table 6 lists the wells that have been eliminated from the monitoring system along with the date and reason for their elimination. During the 1998 operating period, four additional wells were eliminated, Wells EPA-22A and EPA 27 in the Southwest Alluvium and Wells EPA-1 and 411 in Zone 3.

Performance Monitoring Results

The performance monitoring data show that water level and water quality conditions remain the same as those described in previous annual reviews (Canonie, 1989b, 1990, 1991, 1992b, 1993b and 1995; Smith Technology, 1995 and 1996; Rust, 1998) and confirmed in EPA's Five-Year Review Report (1998). Water levels continue to decline in all three formations as the mine discharge water drains out of the system. As discussed above and shown in Table 6, four additional monitoring wells are no longer usable because of the declining water levels.

The water quality data continue to exhibit similar trends and exceedences as those reported in EPA's Five-Year Review Report. Table 7 summarizes the water quality at the point of compliance (POC) wells. These data are similar to those presented in the past two years (Smith Technology, 1996; Rust, 1998), indicating that, as recognized in the EPA's Five-Year Review Report, the corrective action systems have reached the physical limit where they are no longer effectively reducing constituent concentrations. The lack of change in the data also is related to the fact that background levels of constituents, particularly sulfate, nitrate and TDS, are higher than was originally recognized in the Record of Decision (ROD) (EPA, 1988). As a result, many of the exceedences are related in whole or in part to background concentrations rather than tailings seepage.

Table 7 shows that sulfate, nitrate and TDS continue to exceed the site standards in all three formations. The EPA's Five-Year Review Report recognizes that the natural background levels for these three constituents may be higher than the levels stated in the ROD (EPA, 1988) and that these exceedences are in part the result of natural background rather than tailings seepage. Table 7 also shows that exceedences of other constituent site standards are also evident in the areas impacted by seepage. However, as discussed in the EPA Five-Year Review Report, these exceedences are also observed in areas that have not been impacted by tailings seepage and may also be related to higher background levels than were recognized in the ROD.

EVAPORATION DISPOSAL SYSTEM

Table 8 provides the monthly water balance for the system for the 1998 operating year. As shown in the table, the system had inflows of approximately 19.27 million gallons and outflows of approximately 19.54 million gallons. The system contained an estimated 5.5 million gallons at the end of the operating year (September 25, 1998) with 10.5 million gallons of capacity remaining for winter operation. This is similar to the winter capacity remaining at the end of the previous operating year.

The outflow from the system was from the evaporation ponds and spray guns. Passive evaporation from the two ponds and enhanced evaporation from the associated misters removed approximately 11.28 million gallons of water from the system during 1998, representing approximately 59 percent of the total system outflow for the year. Table 8 shows that the spray guns removed a total of 7.99 million gallons of water through enhanced evaporation during 1998 representing the other 41 percent of the total outflow for the 1998 operating year.

Based on the system pumping rates at the end of the third quarter 1998, it does not appear that reductions will be required during the upcoming winter months to maintain adequate storage capacity in the evaporation ponds. However, reductions may be necessary if storage capacity becomes inadequate because of unusually cold temperatures or high precipitation.

SUMMARY AND RECOMMENDATIONS

The results of the 1998 annual review support the conclusions reached by United Nuclear in the previous annual reviews (Canonie, 1989b, 1990, 1991, 1992b, 1993b and 1995; Smith Technology, 1995 and 1996; Rust, 1998) and confirm the findings and recommendations in the EPA's Five-Year Review Report (1998), as summarized below:

Extraction Systems

- Southwest Alluvium - continues to operate as designed. Modifications needed include decommissioning Well 801 because it meets the decommissioning criteria. Consideration will be given to replacing Well 808; however, it is likely that the chemical precipitation problem would recur.

- Zone 3 - continues to dewater the target area. Decommissioning the extraction wells is recommended because nine wells meet the decommissioning criteria and the remaining wells are drawing seepage downgradient. The benefit of dewatering no longer outweighs the negative impact of downgradient migration of seepage-impacted water.

- Zone 1 - continues to produce water at very low rates. Decommissioning the system is recommended because the transmissivity of the formation in this area is so low that extraction is ineffective in reducing constituent concentrations.

Performance Monitoring

The performance monitoring data show that water level and water quality conditions remain the same as those described in previous annual reviews. The data evaluations indicated:

- Water levels continue to decline as the saturation created by the mine discharge water drains out.

- Four additional monitoring wells are no longer usable because of the declining water levels.

- Water quality trends remain the same. Improvement in water quality is limited by the fact that natural background concentrations of several constituents, particularly sulfate, nitrate and TDS, are higher than the standards set for the site. As a result, exceedences of site standards are in part due to natural background rather than tailings seepage.

United Nuclear is now preparing to address the recommendations made by the EPA in its Five-Year Review Report. These include:

- Turning off the Zone 1 and Zone 3 extraction systems;

- Developing a revised performance monitoring program which will designate the wells to be monitored and update the monitoring procedures used;

- Abandoning the more than 100 monitoring wells that are not used for performance monitoring;
- Performing an analysis of background concentrations for the performance monitoring constituents other than sulfate, nitrate and TDS; and
- Developing and applying for Alternate Concentration Limits or Technical Impracticability waivers for all three formations.

Please call Roy Blickwedel (General Electric Corporation) at (610) 992-7935; Larry Bush (United Nuclear) at (505) 722-6651; or me at (303) 804-2367 if you have any questions about the information presented herein.

Very truly yours,
Earth Tech Environment and Infrastructure, Inc.

Suzie du Pont
Project Manager

Enclosures

cc: Larry Bush, United Nuclear
Roy Blickwedel, General Electric Corporation
Juan Velasquez, United Nuclear

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TABLES

TABLE 1

SUMMARY OF OPERATIONAL DATA
SOUTHWEST ALLUVIUM EXTRACTION WELLS

Well No.	Annual Average Pumping Rate (gpm)									
	1990 (a)	1991 (b)	1992 (c)	1993 (d)	1994 (e)	1995 (f)	1996 (g)	1997 (h)	1998 (i)	1990-98
801	1.2	0.5	0.4	0.2	0.2	0.1	0.1	0.1	0.08	0.33
802	11.1	12.5	11.9	9.0	9.8	9.7	9.1	10.1	11.02	10.47
803	2.0	2.6	2.5	3.0	3.2	3.5	3.1	2.9	3.84	2.96
808 (j)		10.0	15.5	19.9	15.6	12.3	12.2	7.2	4.34	12.13
Total Pumping Rate	14.3	25.6	30.3	32.1	28.8	25.6	24.5	20.3	19.29	25.88
Volume Pumped (millions of gallons) (k)	7.4	12.4	17.2	18.1	15.7	12.9	12.2	9.2	9.0	114.1

Notes:

a. Average pumping rate calculated for the period between October 13, 1989 and October 12, 1990.
b. Average pumping rate calculated for the period between October 13, 1990 and October 11, 1991, except Well 808, which calculated for the period between June 26, 1991 (i.e., well startup) and October 11, 1991.
c. Average pumping rate calculated for the period between October 12, 1991 and October 8, 1992.
d. Average pumping rate calculated for the period between October 9, 1992 and October 8, 1993.
e. Average pumping rate calculated for the period between October 9, 1993 and October 14, 1994.
f. Average pumping rate calculated for the period between October 15, 1994 and September 29, 1995.
g. Average pumping rate calculated for the period between September 30, 1995 and September 27, 1996.
h. Average pumping rate calculated for the period between September 28, 1996 and September 26, 1997.
i. Average pumping rate calculated for the period between September 27, 1997 and September 25, 1998.
j. Well 808 began operation on June 26, 1991.
k. Data obtained from system flowmeter.

gpm = gallons per minute

TABLE 2

SUMMARY OF OPERATIONAL DATA
ZONE 3 EXTRACTION WELLS
OCTOBER 1997 - SEPTEMBER 1998

Well No.	Weeks Pumped (b)	Weekly Pumping Rate (c) (gpm)	Annual Pumping Rate (d) (gpm)	Average Field pH (e) (SU)
Northeast Pump-Back Wells				
613	37	0.05	0.04	2.7
Total		0.05	0.04	2.7
Stage I Wells				
701	37	0.61	0.43	3.8
706	50	1.13	1.09	4.2
707	42	0.25	0.20	4.7
708	45	0.10	0.09	4.8
709	50	0.18	0.17	5.2
711	39	0.25	0.19	4.7
713	50	0.17	0.17	5.6
Total		2.69	2.34	4.3
Stage II Wells				
714 (a)	0	--	--	--
715 (a)	0	--	--	--
716	38	12.45	9.10	6.6
717	44	5.13	4.34	6.4
718	41	2.83	2.23	6.3
719	48	0.39	0.36	5.9
720	46	0.78	0.69	5.3
Total		21.58	16.72	6.2
Total - Zone 3 Extraction Wells		24.32	19.10	6.0
Total volume pumped October 1997 - September 1998: 9.9 million gallons (f)				

Notes:

a. Extraction Wells 714 and 715 were shut down on November 1, 1993, in accordance with approved license amendment of October 22, 1993.
b. Number of weeks that each well was pumped for the period between September 27, 1997, and September 25, 1998.
c. Calculated for the weeks when the well was pumped.
d. Calculated for the 52-week operating year.
e. The average field pH for a set of wells is a weighted average:

$$pH = \frac{\Sigma \text{ gpm x pH}}{\Sigma \text{ gpm}}$$

f. Data obtained from the Zone 3 system flowmeter for the period from September 27, 1997 to September 25, 1998.

gpm = gallons per minute
SU = Standard Units

TABLE 3

SUMMARY OF VOLUME EXTRACTED
ZONE 3 EXTRACTION SYSTEM
1989 THROUGH 1998

Operating Year	NE Pump-Back		Stage I		Stage II		Total All Systems	
	Volume Pumped (million gallons)	Average Field pH (f) (SU)	Volume Pumped (million gallons)	Average Field pH (f) (SU)	Volume Pumped (million gallons)	Average Field pH (f) (SU)	Volume Pumped (million gallons)	Average Field pH (f) (SU)
1989 (a)	0.80	3.6	4.5	5.5	---	---	5.3	5.2
1990 (b)	3.30	3.2	17.9	5.3	---	---	21.2	5.0
1991 (b, c)	1.60	3.4	11.2	5.1	2.7	6.3	15.5	5.8
1992 (b)	1.40	3.3	9.1	5.6	12.8	6.5	23.3	5.9
1993 (b)	0.70	3.1	6.9	5.6	11.4	6.4	19.0	6.0
1994 (b)	0.20	3.1	5.0	5.3	9.9	6.4	15.1	6.0
1995 (d)	0.20	2.9	3.4	4.8	9.5	6.4	13.1	5.9
1996 (e)	0.10	2.8	2.5	4.5	11.4	6.4	14.0	6.1
1997 (e)	0.03	2.7	1.7	4.4	8.6	6.3	10.4	6.0
1998 (e)	0.02	2.7	1.2	4.3	8.8	6.2	10.0	6.0
Summary 1989 - 1998	8.35	3.3	63.4	5.3	75.1	6.4	156.9	5.7

Notes:

a. The 1989 operating year is defined as the period from August 7, 1989 (startup of Stage I wells) to mid-October 1989.

b. Operating year is from mid-October of the previous year to mid-October of the indicated year.

c. The 1991 operating year for the Stage II Wells is the period from August 19, 1991 (startup of Stage II Wells) to mid-October 1991.

d. Operating year is from mid-October 1994 to the end of September 1995.

e. Operating year is from October of the previous year through September of the indicated year.

f. Field pH is a weighted value (i.e.,

$$pH = \frac{\Sigma \text{ gpm x pH}}{\Sigma \text{ gpm}}$$

SU = Standard Units

TABLE 4

ZONE 3 EXTRACTION WELLS CLEANED AND STIMULATED 1993 - 1998

Well Number	Period of Stimulation	Pumping Rate (gpm)					Saturated Thickness (ft)		
		Initial (a)	Before Stimulation	After Stimulation	September 1998	Percent Change (b) 1989 - 1998	Initial (c)	3rd Quarter 1998 (d)	Percent Change (e) 1989 - 1998
613	11/3/93 - 11/5/93	3.93	<1.0	0.99					
	10/3/97 - 11/14/97	3.93	0.05	0.07					
	6/11/98 - 8/5/98	3.93	0.01	0.06	0.05	-99%	67.2	21	-69%
701	2/6/96 - 2/15/96	4.53	0.70	1.05					
	10/3/97 -11/14/97	4.53	0.65	0.85					
	1/3/98 - 1/30/98	4.53	0.45	0.89	0.10	-98%	46.1	25	-46%
707	8/22/95 - 8/25/95	3.87	0.38	0.78					
	5/6/97 - 5/22/97	3.87	0.24	0.37					
	6/4/98 - 8/3/98	3.87	0.12	0.12	0.12	-97%	58.8	27	-54%
708	3/8/95 - 3/19/95	4.63	0.14	0.46					
	9/10/97 - 12/13/96	4.63	<1.0	0.08					
	8/18/98 - 11/20/98	4.63	0.1	0.16	0.16	-97%	49.8	21	-58%
709	5/3/95 - 5/10/95	1.68	0.27	0.64					
	12/20/96 - 2/21/97	1.68	0.08	0.26	0.22	-87%	56.1	24	-57%
711	7/24/96 - 7/26/96	4.58	0.07	2.01					
	6/9/97 - 6/26/97	4.58	0.15	0.41					
	5/29/98 - 7/16/98	4.58	0.19	0.23					
	8/14/98 - 11/04/98	4.58	0.23	0.25	0.25	-95%	43.7	16.5	-62%
713	1/9/96 - 1/25/96	3.37	0.28	0.45			34.2		
	5/30/97 - 7/25/97	3.37	0.13	0.20	0.17	-95%	34.2	13	-62%
719	12/27/95 - 1/22/96	2.80	0.48	0.76					
	12/31/96 - 2/4/97	2.80	0.09	0.68					
	7/11/97 - 8/14/97	2.80	0.39	0.53					
	1/23/98 - 2/4/98	2.80	0.44	0.44	0.24	-91%	39.9	19	-52%

TABLE 4

ZONE 3 EXTRACTION WELLS CLEANED AND STIMULATED 1993 - 1998

Well Number	Period of Stimulation	Pumping Rate (gpm)					Saturated Thickness (ft)		
		Initial (a)	Before Stimulation	After Stimulation	September 1998	Percent Change (b) 1989 - 1998	Initial (c)	3rd Quarter 1998 (d)	Percent Change (e) 1989 - 1998
720	11/05/96 - 2/5/97	2.06	<1.0	0.25					
	10/30/97 - 11/25/97	2.06	0.93	1.08	0.30	-85%	33.1	13	-61%
AVERAGE (f)		3.49	0.28	0.38	0.18	-95%	48.2	20	-58%

Notes:

All wells cleaned and stimulated in accordance with the procedures in the CAP (United Nuclear, 1989a) and RD Report (Canonie, 1989a).

a. Initial pumping rate from August 1989 (Wells 701, 707, 708, 709, 711, 713), November 1989 (Well 613), June 1991 (Well 719), and August 1991 (Wells 716, 717, 718, 719, 720).
b. Percent change from initial rate to September 1998 rate.
c. Initial saturated thickness from 1983 (Well 613), 1989 (Wells 701, 707, 708, 709, 711, 713), 1991 (Wells 719 and 720).
d. Estimated saturated thickness based on water level data included in Appendix C.
e. Percent change in saturated thickness from initial measurement to September 1998 measurement.
f. Average pumping rates before and after well stimulation were calculated from the most recent data for each well.

TABLE 5

SUMMARY OF OPERATIONAL DATA
ZONE 1 REVISED EAST SYSTEM

Pumping Rates

Well No.	Average Pumping Rate (gpm)								Percent Change
	1991 (a)	1992 (b)	1993 (c)	1994 (d)	1995 (e)	1996 (f)	1997(g)	1998(h)	1991-98
615	0.30	0.21	0.19	0.20	0.21	0.19	0.16	0.15	-50%
616	0.26	0.24	0.18	0.18	0.15	0.19	0.12	0.58	123%
617	0 12	0 10	0.09	0.10	0.13	0.11	0.10	0.09	-25%
EPA 7	0.28	0.22	0.21	0.21	0.00	0.00	0.00	0.00	-100%
Combined Pumping Rate	0.95	0.75	0.67	0.69	0.49	0.49	0.39	0.65	-32%
Volume Pumped (gallons)	480,000	390,000	350,000	370,000	246,000	252,000	202,000	323,000	-58%

pH of Extracted Water (in SU)

Well No.	October 1990	October 1991	October 1992	October 1993	October 1994	July 1995	July 1996	July 1997	July 1998	Change 1990-98
615	4.3	4.3	4.6	4.0	4.0	4.3	4.2	4.6	4.3	0.0
616	5.4	5.2	5.7	5.7	5.3	5.9	4.8	5.2	5.3	-0.1
617	6.3	6.2	6.1	6.1	6.2	6.2	6.3	6.8	6.6	0.3
EPA 7	4.6	5.1	5.6	5.7	5.7	--	--	--	--	--
Average	5.2	5.2	5.5	5.4	5.3	5.5	5.1	5.5	5.4	0.2

Notes:

a. Calculated for the period between October 13, 1990 and October 11, 1991.
b. Calculated for the period between October 12, 1991 and October 9, 1992.
c. Calculated for the period between October 10, 1992 and October 8, 1993.
d. Calculated for the period between October 9, 1993 and October 14, 1994.
e. Calculated for the period between October 15, 1994 and September 29, 1995.
f. Calculated for the period between September 30, 1995 and September 27, 1996.
g. Calculated for the period between September 28, 1996 and September 26, 1997.
h. Calculated for the period between September 27, 1997 and September 25, 1998.

gpm = gallons per minute
SU = Standard Units

TABLE 6

SUMMARY OF WELLS ELIMINATED FROM MONITORING NETWORK

Well	Date of Modification	Type of Modification	Reason For Modification
SOUTHWEST ALLUVIUM			
645	Jan-91	No Monitoring	Lack of recharge - area dewatered
644	Jan-93	No Monitoring	Lack of recharge - area dewatered
639	Jan-95	No Monitoring	Lack of recharge - area dewatered
29 A	Jan-95	No Monitoring	Lack of recharge - area dewatered
642	Oct-95	Water Level Only	Lack of recharge - area dewatered
642	Jan-96	No Monitoring	Lack of recharge - area dewatered
EPA 22A	Oct-97	No Monitoring	Lack of recharge - area dewatered
EPA 27	Apr-98	No Monitoring	Lack of recharge - area dewatered
Number of Wells Eliminated = 8 Total Number of Monitoring Wells = 22			
ZONE 3			
EPA 11	Apr-90	No Monitoring	Water level decline below pump, pump cemented in well - cannot be moved
EPA 3	Jan-91	No Monitoring	Lack of recharge - area dewatered
106 D	Oct-91	No Monitoring	Lack of recharge - area dewatered, well completed above base of Zone 3
EPA 17	Jul-92	No Monitoring	Lack of recharge - area dewatered, only had a maximum of 2 feet of saturation
9 D	Jul-92	No Monitoring	Lack of recharge - area dewatered, well completed above base of Zone 3
126		No Monitoring	Lack of recharge - area dewatered, well completed above base of Zone 3
EPA 12	Oct-92	Water Level Only	Lack of recharge - area dewatered
EPA 12		No Monitoring	Lack of recharge - area dewatered
501 B	Oct-93	Water Level Only	Lack of recharge - area dewatered
501 B		No Monitoring	Lack of recharge - area dewatered
EPA 18	Jan-95	No Monitoring	Water level in sump below base of Zone 3 - not representative
EPA 18	Jan-95	No Monitoring	Lack of recharge - area dewatered, only had a maximum of 5 feet of saturation
EPA 15	Jan-96	Water Level Only	Lack of recharge - area dewatered
EPA 15	Apr-96	No Monitoring	Lack of recharge - area dewatered
EPA 1	Jan-98	No Monitoring	Lack of recharge - area dewatered
411	Apr-98	No Monitoring	Filled with oil - cannot get water sample
Number of Wells Eliminated = 12 Total Number of Monitoring Wells = 20			

Note:
Shading indicates wells eliminated from monitoring during 1998 operational year.

TABLE 7
WATER QUALITY AT POC WELLS
THIRD QUARTER 1998

Location	POC Well No.	Lab TDS (mg/l)	SO_4 (mg/l)	NO_3 as N (mg/l)	Cl (mg/l)	Chloro-form (mg/l)	Al (mg/l)	As (mg/l)	Be (mg/l)	Cd (mg/l)	Co (mg/l)	Pb (mg/l)	Mn (mg/l)	Mo (mg/l)	Ni (mg/l)	Se (mg/l)	V (mg/l)	U (mg/l)	Ra-226+ Ra-228 (pCi/l)	Th-230 (pCi/l)	Pb-210 (pCi/l)	Gross Alpha (pCi/l)
	NRC Std	NA	NA	NA	NA	0.001	NA	0.05	0.050	0.01	NA	0.05	NA	NA	0.05	0.01	0.10	0.3	5.0	5.0	1.0	15.0
	EPA Std	3170	2160	30.0	250	NA	5.0	0.05	0.017	0.01	0.05	0.05	2.60	1.0	0.2	0.01	0.70	5.0	5.0	NA	NA	15.0
SW Alluvium	0509 D	6,320	2500	42.30	322.0	<0.00100	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	0.98	<0.10	<0.05	<0.001	<0.10	0.1150	<1.6	<0.2	<1.0	<1.0
	0632	6,250	2600	5.00	264.0	0.00230	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	0.72	<0.10	<0.05	<0.001	<0.10	0.0859	5.1	<0.2	<1.0	<1.0
	EPA 22A	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
	EPA 23	5,060	2,200	46.00	98.9	<0.00100	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	3.69	<0.10	<0.05	<0.001	<0.10	0.0448	<1.2	<0.2	<1.0	<1.0
	EPA 28	5,630	2,900	41.70	101.0	<0.00100	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	0.31	<0.10	<0.05	<0.001	<0.10	0.0431	<1.7	<0.2	<1.0	<1.0
	GW 1	4,350	1,800	122.00	132.0	<0.00100	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	0.03	<0.10	<0.05	<0.001	<0.10	0.0464	<1.2	<0.2	<1.0	<1.0
	GW 2	5,880	2,700	8.96	174.0	<0.00100	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	0.3	<0.10	<0.05	<0.001	<0.10	0.0656	<1.7	<0.2	<1.0	<1.0
Zone 3	0501 B	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
	0517	5,170	3,500	4.83	61.80	0.00590	13.50	<0.001	<0.01	0.008	0.55	<0.05	8.64	<0.10	0.5	<0.001	<0.10	0.0885	26.4	<0.2	<1.0	23.4
	0518	7,020	4,600	1.44	33.70	0.00980	75.80	<0.001	0.05	0.009	1.05	<0.05	16.20	<0.10	1.0	<0.001	<0.10	0.3470	<6.6	9.2	7.0	17.0
	EPA 03	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
	EPA 18	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
Zone 1	0516 A	11,800	6,500	117	257	0.00300	<0.10	<0.001	<0.01	<0.005	0.02	<0.05	1.59	<0.10	<0.05	<0.001	<0.10	0.0181	<2.1	<0.2	<1.0	2.2
	0604	7,600	4,600	80.7	61.5	<0.00100	20.80	<0.001	0.01	0.006	0.36	<0.05	12.50	<0.10	0.41	<0.001	<0.10	0.0031	5.9	<0.2	<1.0	3.7
	0614	7,990	3,800	202	261	0.39200	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	0.34	<0.10	<0.05	<0.001	<0.10	0.0631	<3.3	<0.2	<1.0	2.3
	EPA 04	4,620	3,000	<0.10	36.7	<0.00100	<0.10	<0.001	<0.01	<0.005	<0.01	<0.05	2.98	<0.10	<0.05	<0.001	<0.10	0.0009	4.3	<0.2	<1.0	<1.0
	EPA 07	8,460	4,300	133	186	0.00120	0.18	<0.001	<0.01	<0.005	0.10	<0.05	15.10	<0.10	0.12	<0.001	<0.10	0.0023	3.2	<0.2	<1.0	<1.0

Notes:

Shading indicates an exceedance of the site cleanup standard.

"<" indicates constituent not detected above level shown.

mg/l = milligrams per liter. pCi/l = picoCuries per liter.

TABLE 8

MONTHLY WATER BALANCE
EVAPORATION DISPOSAL SYSTEM
OCTOBER 1997 - SEPTEMBER 1998

Date	Total Inflow (a)	Outflows					Net Change	System Volume (b)
		Passive Evaporation	Mist System	Spray Gun System	Dust Suppression	Total		
								5.50
Oct 97	1.52	-0.76	-0.025	-1.24	0.00	-2.02	-0.50	5.00
Nov 97	1.68	0.35	-0.037	0.00	0.00	0.32	2.00	7.00
Dec 97	1.62	1.48	0.000	0.00	0.00	1.48	3.10	10.10
Jan 98	1.46	-1.06	0.000	0.00	0.00	-1.06	0.40	10.50
Feb 98	1.64	0.36	0.000	0.00	0.00	0.36	2.00	12.50
Mar 98	1.70	0.30	0.003	0.00	0.00	0.30	2.00	14.50
Apr 98	1.03	-2.49	-0.057	-0.78	0.00	-3.33	-2.30	12.20
May 98	1.59	-0.23	-0.094	-3.47	0.00	-3.79	-2.20	10.00
Jun 98	1.75	-4.99	-0.063	-2.50	0.00	-7.55	-5.80	4.20
Jul 98	2.04	-1.67	-0.069	-0.01	0.00	-1.74	0.30	4.50
Aug 98	1.80	-0.80	0.000	0.00	0.00	-0.80	1.00	5.50
Sep 98	1.44	-1.40	-0.037	0.00	0.00	-1.44	0.00	5.50
Total	19.27	-10.90	-0.38	-7.99	0.00	-19.27	0.00	

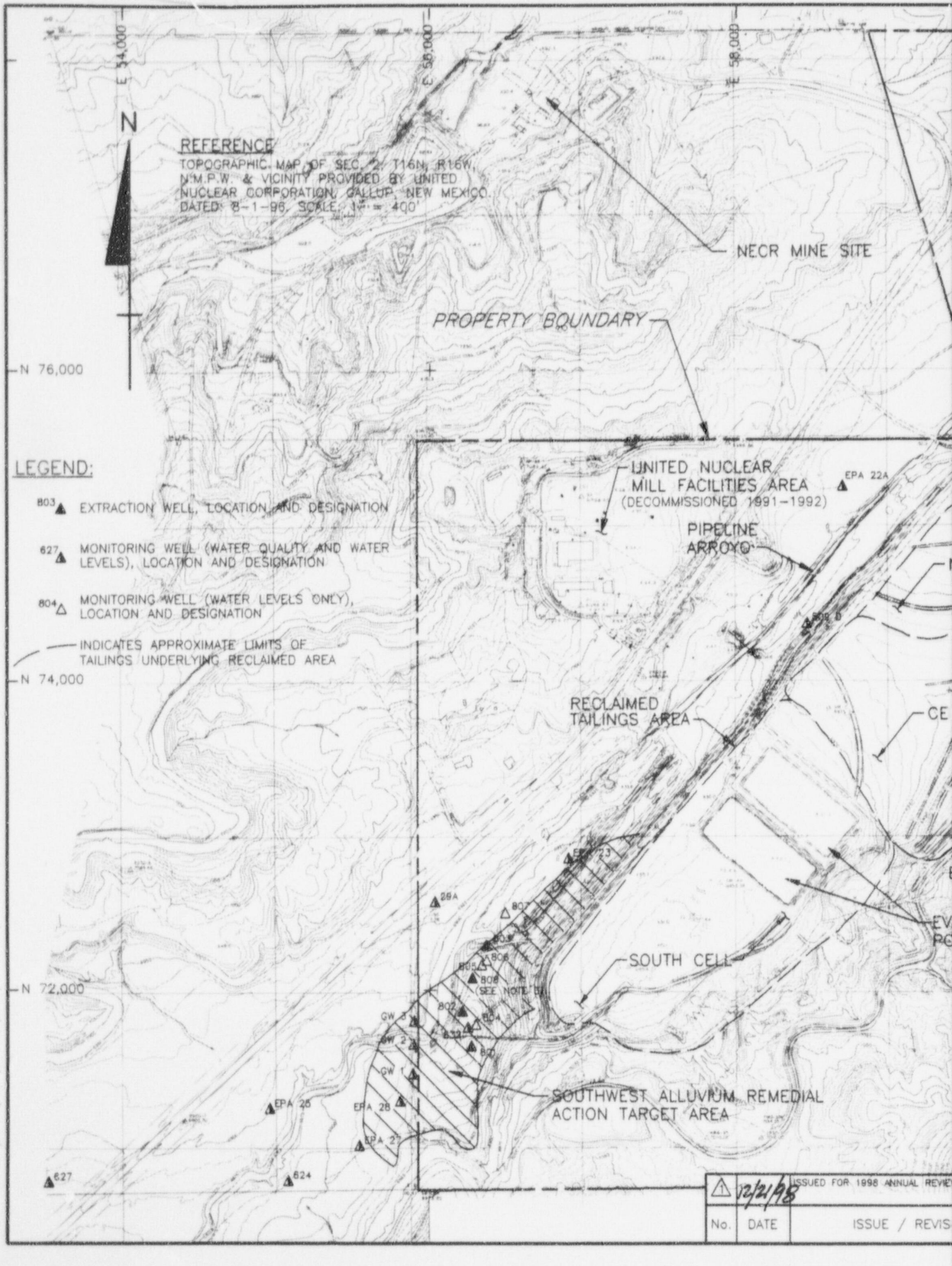
Notes:

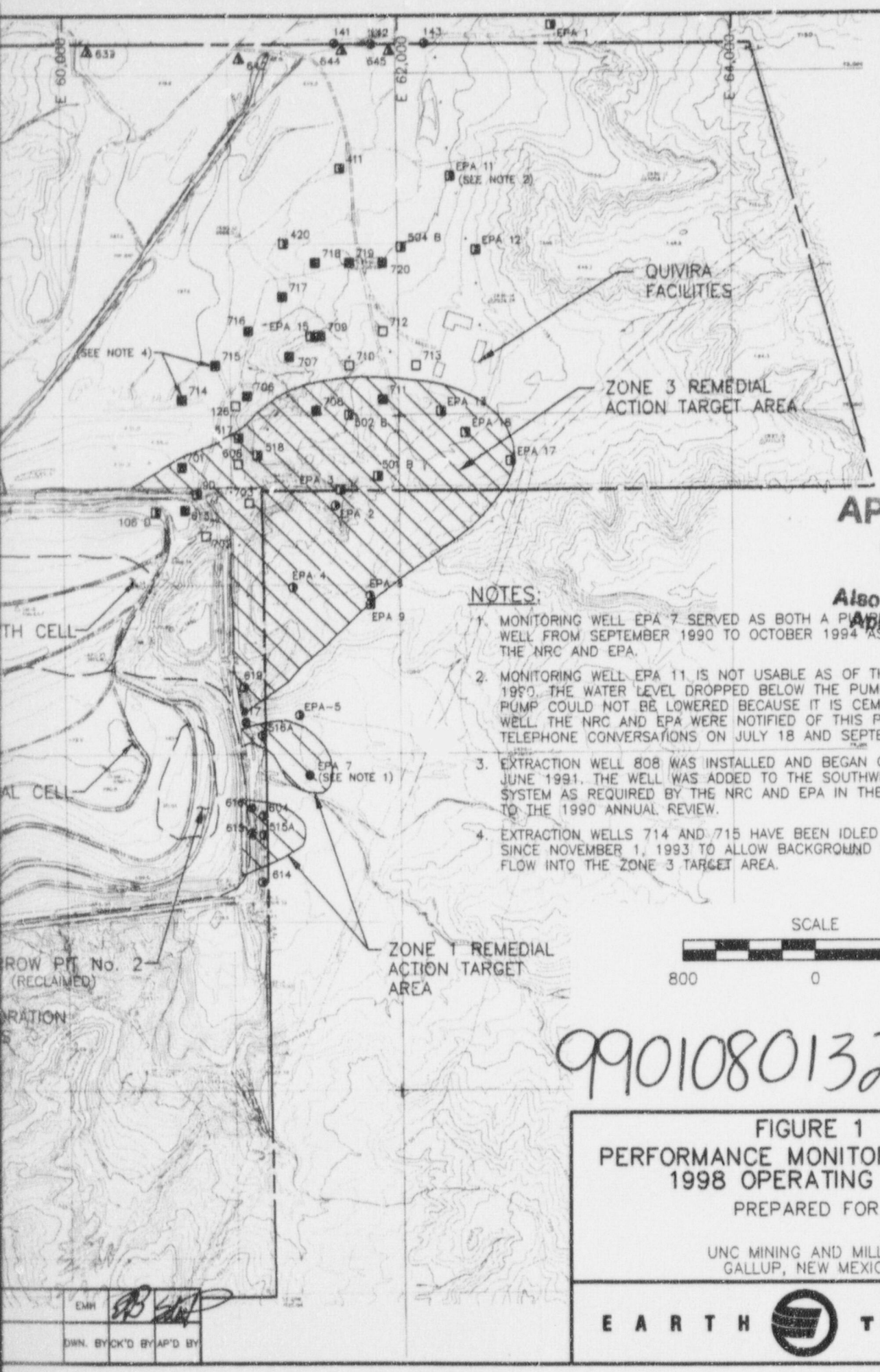
a. Includes water extracted from Zone 3, Zone 1 and the Southwest Alluvium.

b. Maximum system capacity is 16 million gallons.

All volumes shown are in millions of gallons.

FIGURES


86-060-B1057
E 54,000
E 56,000
E 58,000
N
REFERENCE
TOPOGRAPHIC MAP OF SEC. 2, T16N, R16W, N.M.P.M. & VICINITY PROVIDED BY UNITED NUCLEAR CORPORATION, GALLUP, NEW MEXICO. DATED: 8-1-96, SCALE: 1" = 400'
NECR MINE SITE
PROPERTY BOUNDARY
N 76,000
LEGEND:
803 EXTRACTION WELL, LOCATION AND DESIGNATION
627 MONITORING WELL (WATER QUALITY AND WATER LEVELS), LOCATION AND DESIGNATION
804 MONITORING WELL (WATER LEVELS ONLY), LOCATION AND DESIGNATION
INDICATES APPROXIMATE LIMITS OF TAILINGS UNDERLYING RECLAIMED AREA
N 74,000
UNITED NUCLEAR MILL FACILITIES AREA (DECOMMISSIONED 1991-1992)
EPA 22A
PIPELINE ARROYO
RECLAIMED TAILINGS AREA
SOUTH CELL
SOUTHWEST ALLUVIUM REMEDIAL ACTION TARGET AREA
N 72,000
EPA 23
EPA 29A
EPA 26
EPA 28
EPA 27
GW 3
GW 2
GW 1
627
624
FILE NAME: L:\WORK\UNC\201760\CAD\AUTOCAD\B1110.DWG EMH 12/21/98 REF BASE B1057
12/21/98
ISSUED FOR 1998 ANNUAL REVIEW
No.
DATE
ISSUE / REVIS



NOTES:

1. MONITORING WELL EPA 7 SERVED AS BOTH A PUMPING AND MONITORING WELL FROM SEPTEMBER 1990 TO OCTOBER 1994 AS REQUIRED BY THE NRC AND EPA.
2. MONITORING WELL EPA 11 IS NOT USABLE AS OF THE THIRD QUARTER, 1990. THE WATER LEVEL DROPPED BELOW THE PUMP INTAKE. THE PUMP COULD NOT BE LOWERED BECAUSE IT IS CEMENTED IN THE WELL. THE NRC AND EPA WERE NOTIFIED OF THIS PROBLEM IN TELEPHONE CONVERSATIONS ON JULY 18 AND SEPTEMBER 5, 1990.
3. EXTRACTION WELL 808 WAS INSTALLED AND BEGAN OPERATING IN JUNE 1991. THE WELL WAS ADDED TO THE SOUTHWEST ALLUVIUM SYSTEM AS REQUIRED BY THE NRC AND EPA IN THEIR COMMENTS TO THE 1990 ANNUAL REVIEW.
4. EXTRACTION WELLS 714 AND 715 HAVE BEEN IDLED SINCE NOVEMBER 1, 1993 TO ALLOW BACKGROUND WATER TO FLOW INTO THE ZONE 3 TARGET AREA.

9901080132-01

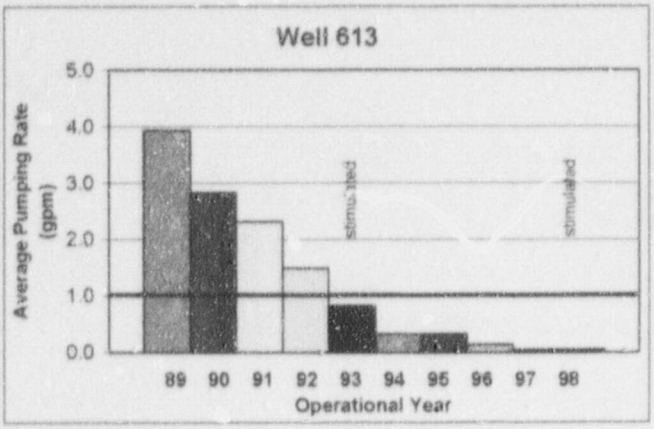
FIGURE 1
PERFORMANCE MONITORING WELLS
1998 OPERATING YEAR

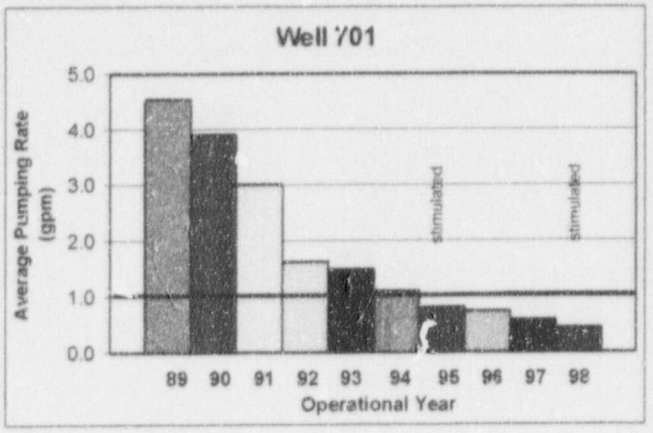
PREPARED FOR:

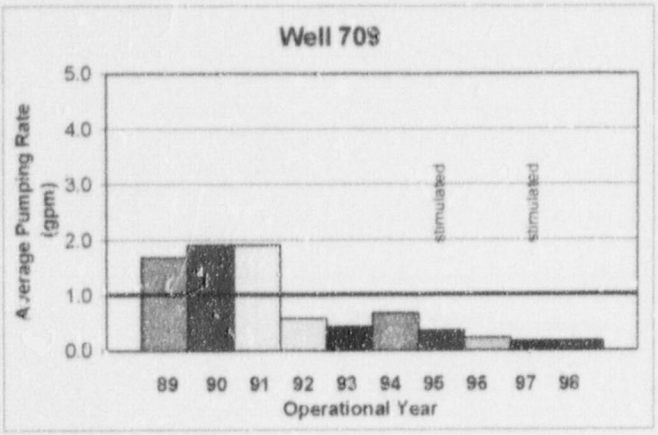
UNC MINING AND MILLING
GALLUP, NEW MEXICO

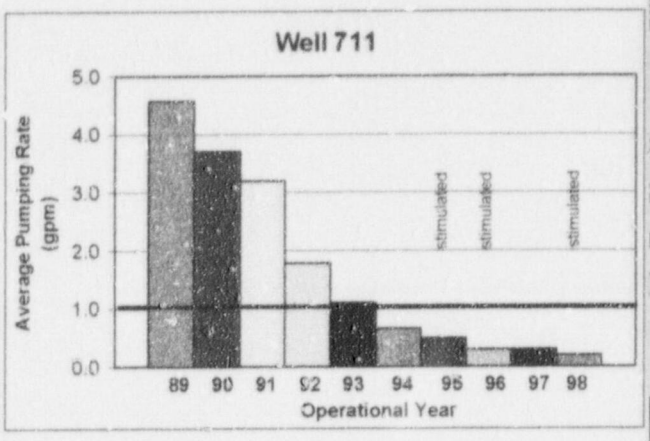
DWN. BY	CK'D BY	AP'D BY
EMH		

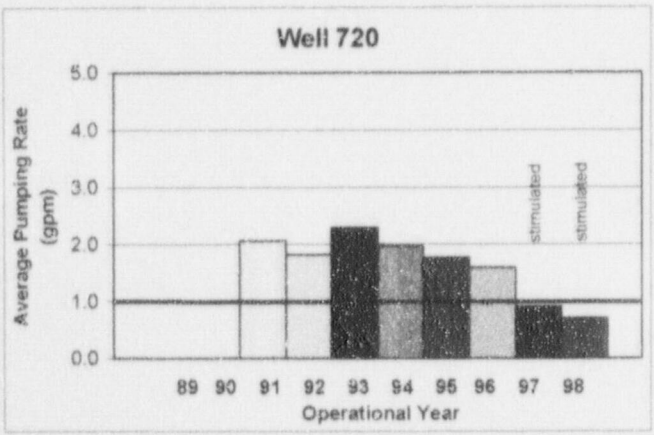
EARTH TECH



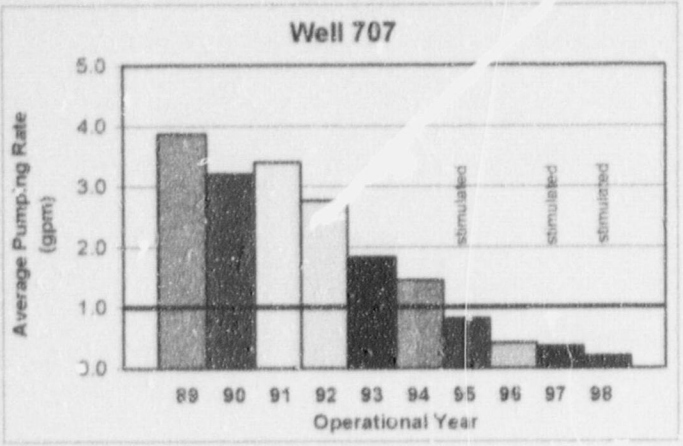


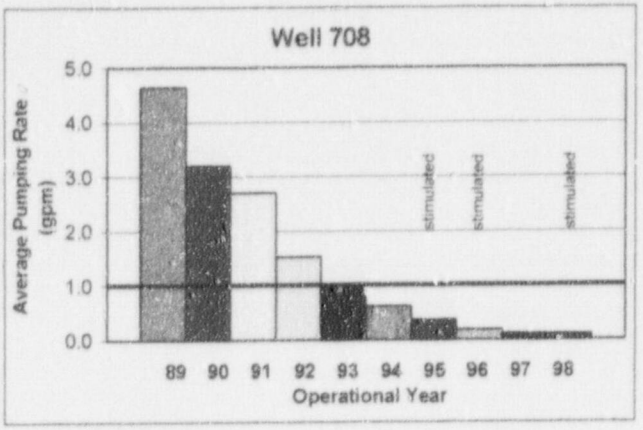


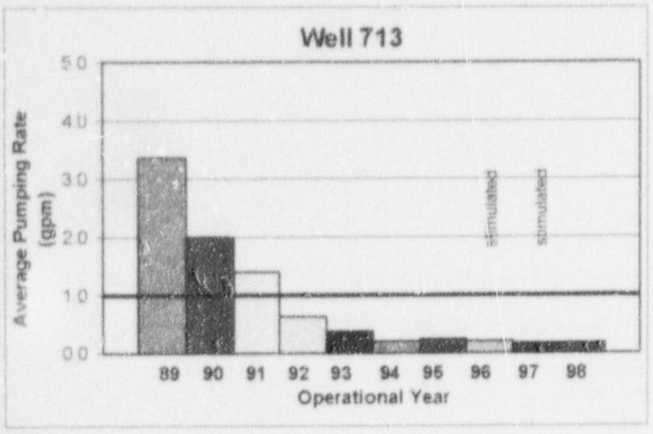


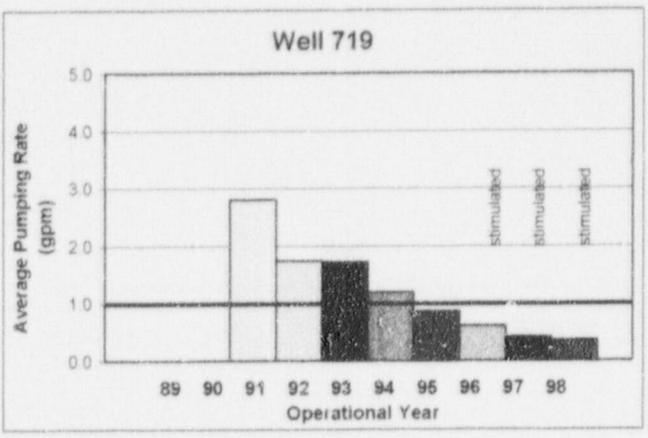


No.	DATE	ISSUE / REVISION	DRWN BY	CK'D BY	AP'D BY
1	12/2/98	ISSUED FOR 1998 ANNUAL REVIEW	EMH		









9901080132-02

EARTH TECH

FIGURE 2
SUMMARY OF ZONE 3 EXTRACTION WELL PRODUCTIVITY OVER TIME
UNC MINING AND MILLING
GALLUP, NEW MEXICO

12/16/98 201760.30200

OATH & AFFIRMATION

I, Juan R. Velasquez, do solemnly swear and affirm that to the best of my knowledge, the information enclosed herewith is true and correct, under the pain of penalties and perjury.

By: _____

President & Manager of Environmental Affairs
United Nuclear Corporation

This 21 day of December, 1998 appeared before me, the undersigned, a notary public of the county of Bernalillo, and state of New Mexico, Juan R. Velasquez, and did solemnly swear and affirm that the enclosed information is true and correct to the best of his knowledge.

Witness my hand and official seal.

_____

Notary Public

OFFICIAL SEAL
RENEE CISNEROS
NOTARY PUBLIC-STATE OF NEW MEXICO
My commission expires: 6-10-2001

My Commission Expires:

6-10-2001